

The figure 74 describes that 4% of total households are owning single room in the rural area while 40% and 17% households live in two and three-room dwelling units, respectively. Out of 14446 two room units 86.79% are owned, whereas only 10.07% are on rent status. It is also observed that 22% of the Households are living in four dwelling rooms where only 0.74% are rented and major units are under ownership. In overall the 7% of the households are living without any exclusive room in rural area on the total rural households.

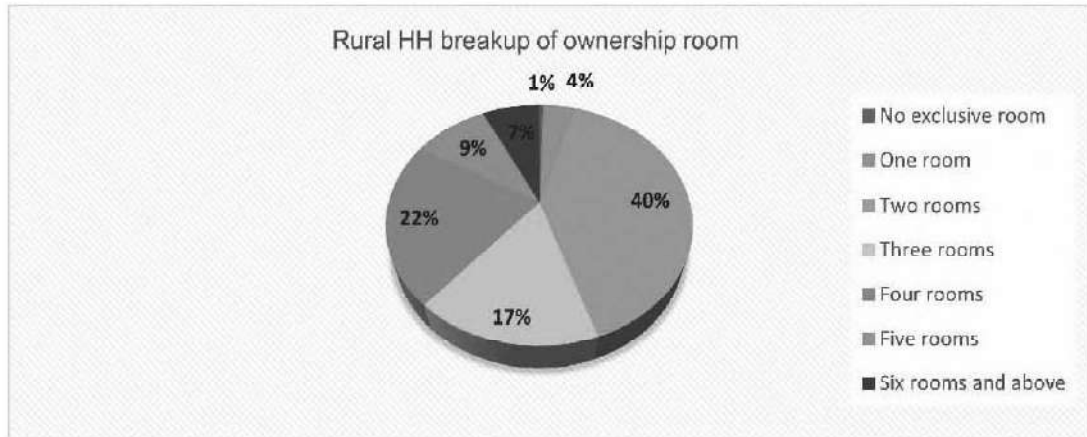


Figure 74. Rural Housing ownership of dwelling in NMPA

Source: Census of India 2011

Table 67 NMPA Housing Ownership by Dwelling Rooms

Area Name	Total number of households (Excluding Vacant Houses)	Households having number of dwelling rooms				
		No exclusive room	One room	Two and Three rooms	Four and Five rooms	Six rooms and above
NMPA	64331	470 (1%)	8378 (13%)	33052 (51%)	17413 (27%)	5018 (9%)

(Source: Census of India, 2011)

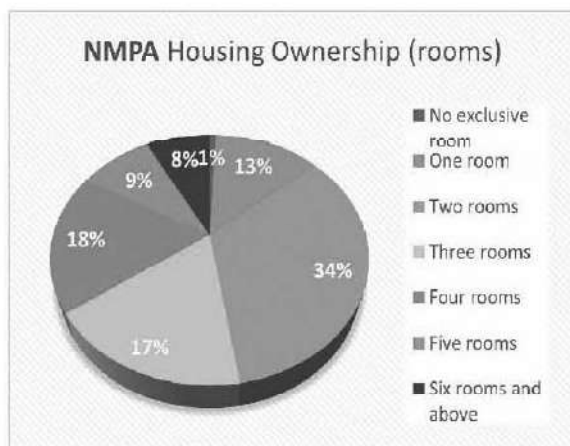


Figure 75: NPA ownership dwelling unit

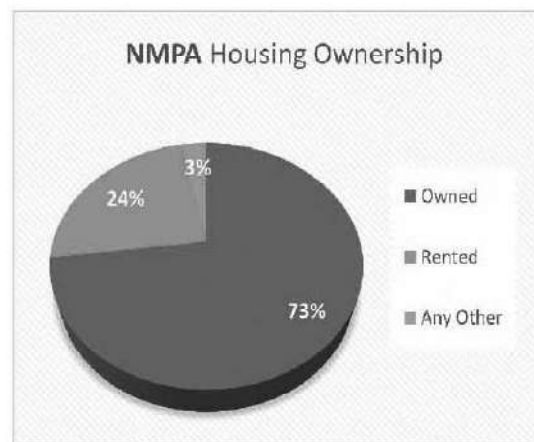


Figure 76: NMPA Housing ownership

In NMPA, 34% are two -room dwelling units as majority followed by three and four room categories, while 1% not having any exclusive rooms. Overall, NMPA observes 73% housing under ownership status and 24% under rent category status. Very few households fall under other category.

5.1.7 SERVICES

5.1.7.1 Source of Drinking Water:

On an average, more than half of the household in the region have source of drinking water within their premises. Water taps, wells, hand pumps, tube wells or boreholes are the primary sources of drinking water for households within-premises water facilities, while river, pond, lake, spring, and tank are the main drinking water source of water for them who do not have sources within their premises or nearby their premises and must go little far.

Table 68 Source of Drinking Water

Total/ Rural/ Urban	Location	No. of Hhs	Main Source of Drinking Water							
			Tap	well	Hand Pump	Tube well/ Bore hole	Spring	River/ Canal	Tank/ Pond/ Lake	Others
State	Within the premises	55%	10%	17%	62%	11%	0%	0%	0%	0%
	Near the premises	27%	12%	19%	40%	8%	1%	5%	14%	2%
	Away	18%	9%	24%	31%	6%	5%	12%	5%	7%
District	Within the premises	65%	6%	9%	78%	7%	0%	0%	0%	0%
	Near the premises	20%	6%	14%	65%	6%	0%	1%	1%	3%
	Away	15%	6%	16%	51%	6%	2%	6%	2%	10%
NMB+OG+CT	Within the premises	93%	20%	0%	70%	9%	0%	0%	0%	0%
	Near the premises	6%	7%	1%	82%	6%	0%	1%	0%	3%
	Away	1%	36%	1%	56%	1%	0%	0%	0%	6%

(Source: Census of India 2011)

As compared to the state, both districts and NMB have higher number of houses with the drinking facilities within in the premises. Majority houses in NMB have drinking water facilities within their premises. Unlike NMB where taps and tube wells are the primary source of water for the in-premises water facilities, hand pumps and tube well are the preliminary source of drinking water for the district.

5.1.7.2 Source of Lighting:

Around 85% of households in NMB, CTs and OGs have electricity connection. Similarly, majority of households in other urban centres of the project area have electricity connection. However, at the state level, less than 50% household have electricity connection, which means electricity has not yet reached to the all-rural areas in the state, and kerosene is still being used as a main lightening source widely in Assam. In NMB, the main source of lightning is electricity, which mainly provided by Assam State Electricity Board.

Table 69 Source of Lighting

Area Name	No. of households	Main Source of Lighting					
		Electricity	Kerosene	Solar Energy	Other Oil	Any Other	No Lighting
State	6,367,295	37.0%	61.8%	0.8%	0.1%	0.1%	0.2%
District	5,60,857	34.88%	64%	0.43%	0.09%	0.07%	0.15%
NMB+OG+CT	34377	85.13%	14.4%6	0.06%	0.0%5	0.12%	0.15%

(Source: Census of India, 2011)

5.1.7.3 Type of Latrine Facility:

Around 98% of households in NMB, CTs and OGs have latrine facility within the premises. Similarly, majority of households in other urban centres of the project area also have latrine facility within the premises. However, around 65% to 75% households in the state and districts do have latrine facilities within their premises. Septic tank is the most common type of treatment for in-premises latrine facility found in the project area.

Table 70 Latrine facility

Area Name	Number of Hhs Having Latrine Facility Within	Type of Latrine Facility Within the Premises								Number of Hhs Not Having Latrine Facility	No Latrine Within Premises	
		Flush/Pour Flush Latrine Connected			Pit Latrine		Night Soil Disposed Into	Service Latrine			Public Latrine	Open
		Piped Sewer	Septic Tank	Others	Ventilated	Open Pit		Night Soil Remo	Night Soil			
State	65%	5%	15%	8%	10%	24%	1%	0%	1%	35%	2%	33%
District	75%	6%	17%	12%	13%	50%	1%	1%	1%	25%	5%	95%
NMB+OG+CT	98%	17%	48%	6%	12%	15%	0%	0%	1%	2%	51%	49%

(Source: Census of India, 2011)

5.1.7.4 Type of Bathroom and Drainage Connectivity:

Over half of the households in the urban centres of the project area have bathing facilities within their premises. In fact, 69% households in NMB, CTs and OGs have in-premises bathroom facility. On the other hand, 58% households in the state and the district do not have in-premises bathroom facility.

Except NMB, the rest of the region is facing issues due to the lack of properly planned drainage system (suffering from lack of planned drainage system) for wastewater discharge. However, the 50% of NMB, CT and OG area has wastewater outlet connected to the drainage system, only 19% of the area has planned underground drainage system, and the rest of 31% area has open drainage system connected to the wastewater outlets from houses.

Table 71 type of Drainage & Bathroom

Area Name	Number of Hhs having Bathing Facility within the Premises			Waste Water Outlet Connected to		
	Yes		No	Closed Drainage	Open Drainage	No Drainage
	Bathroom	Enclosure without roof				
Assam	24%	17%	58%	4%	17%	80%
District	22%	23%	55%	3%	12%	86%
NMB+OG+CT	69%	20%	11%	19%	31%	50%

(Source: Census of India 2011)

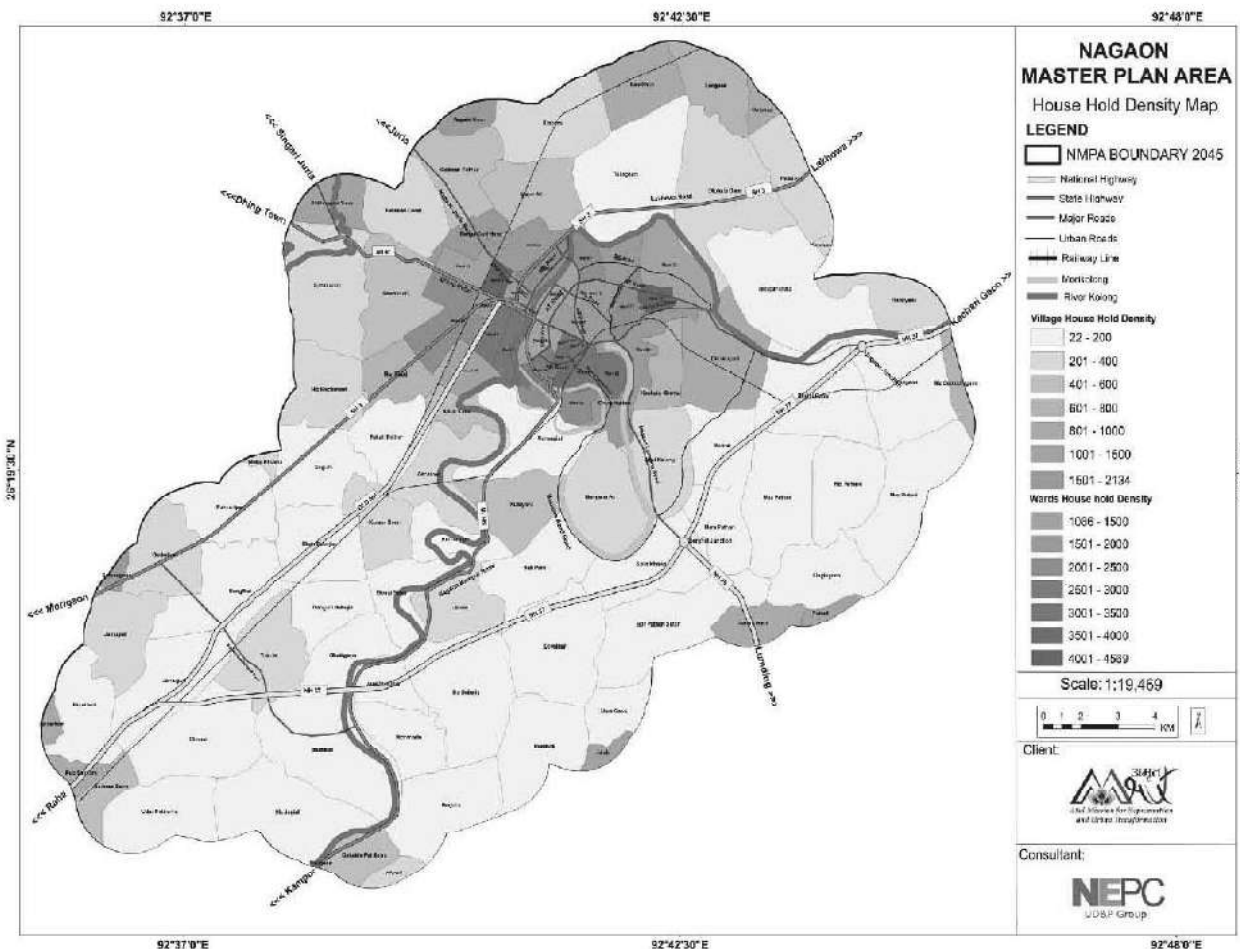
5.2 GROSS HOUSING DENSITY

Table 72 Gross Housing Density

Sr. No.	Name of Area	No. Of Household	Area (sq. km.)	Housing Density
1	NMB (28 Wards)	26483	12.33	2148
2	OGs	837	1.83	457
3	3 CTs	5703	6.61	862
4	76 Villages	31308	129.1	242

(Source: Compiled by Consultant)

Cities in India tend to have highest housing density in the central area. The density often progressively falls towards outskirts of the city this phenomenon is produced by intermixing of land uses in the central area particularly commercial activities, with residences. Housing density is defined as the average number of houses in one square kilometre of land or total number of households per total area. The housing density is important to be studied in urban study because it describes the level of openness or congestion in an area in terms of built-up area and open areas with respect to total area. Analysis of housing density in Nagaon MPA has revealed the overall gross housing density as 2148. The high housing density in Nagaon MB area is not a reflection of high-rise building but it is essentially due to the high occupancy rate and land coverage.



5.3 GROWTH OF REAL ESTATE

The real estate sector is one of the most globally recognized sectors. In India, real estate is the second largest employer after agriculture and is slated to grow at 30 per cent over the next decade. The real estate sector comprises of further sub sectors like township, housing, retail, hospitality, infrastructure and commercial. The growth of this sector is well complemented by the growth of the corporate environment and the demand for office space as well as urban and semi-urban accommodations. The construction industry ranks third among the 14 major sectors in terms of direct, indirect and induced effects in all sectors of the economy. (Source: Department of Industrial policy and promotion 2016).

Nagaon region experienced almost 20% population growth between the census year 1991 and 2011. This increasing trend has resulted in promotion of huge amount of all kind infrastructure development in Nagaon Planning Area. The real estate sector is one of the most globally recognized sectors. In India, real estate is the second largest employer after agriculture and is slated to grow at 30 per cent over the next decade. The real estate sector comprises of further sub sectors – township, housing, retail, hospitality, infrastructure and commercial. The growth of this sector is well complemented by the growth of the corporate environment and the demand for office space as well as urban and semi-urban accommodations. The construction industry ranks third among the 14 major sectors in terms of direct, indirect and induced effects in all sectors of the economy.

The real estate growth witnessed in the region is a result of the aforementioned reasons and it is poised to grow at a good pace with development initiatives taken by the Government of Nagaon and measures adopted as part of Master Plan 2045 which will open more residential properties for development along with industrial properties and Industrial corridors. With these proposals being adopted and implemented by the government, it will create an exponential growth in the real estate market of the Nagaon region. Hence based on the study of above facts, it indicates that there are 5 growth driven factors of Indian state's real estate. They are:

- Rapid Urbanisation
- Significant rise in consumerism
- Policy and regulatory reforms
- Surge in industrial and business activities
- Increasing demand for newer avenues for entertainment, leisure, and shopping

Considering the above factors, the Real estate developers aim to utilise opportunities in line of market demand. Hence, these phenomena of possible development act as catalyst in the development process by creating more demand for residential and commercial area in the Planning Area. On the other hand, it gives boost to the property values and paves the way to keep the real estate sector vibrant in Planning Area. However, while this development is progressive for human beings, sociologist and ecologists are concerned about the fate of the agriculture land. More and more farmers of Nagaon region will be forced to sell their lands to builders as they pay lucrative amounts for the plots. Areas which were barren or even wetlands at one point are now seeing construction of residential or commercial buildings. Therefore, to bring the orderly development and to protect the fertile agricultural land, the Government of India has come up with "The Real Estate (Regulation and Development) Act, 2016".

5.3.1 THE REAL ESTATE (REGULATION AND DEVELOPMENT) ACT, 2016

The Real Estate (Regulation and Development) Act, 2016 is an Act which protects the interest of purchasers of plots and dwelling units / flats. It further helps to boost investments in the real estate industry. The Act mandates establishment of Real Estate Regulatory Authority (RERA) in each state for regulation of the real estate sector and acts as an adjudicating body for speedy dispute redressal. The Real Estate Regulatory Authority regulates the real estate sector and ensures sale of plot, apartment, or building or sale of real

estate project, in an efficient and transparent manner and also protects the interest of consumers in the real estate sector. The act has got provision for an adjudicating mechanism for speedy dispute redressal and for establishment of Appellate Tribunal to hear appeals filed under the Act.

it is now a mandate for the city's real estate developers to register their projects under the Real Estate (Regulation and Development) (RERA) Act 2016, after the Assam Government notified the Act as Assam Real Estate (Regulation and Development) Rules 2017 in May,2017.

5.3.2 SALIENT FEATURES OF THE REAL ESTATE REGULATION ACT (RERA), 2016

- The act establishes the state - level Real Estate Regulatory Authority for the regulation and promotion of the real estate sector, under section 20;
- The Act mandates prior registration of a project with the Real Estate Regulatory Authority under section 3(1). It also states that prior to registration no promoter shall advertise, market, book, sell or offer for sale, or invite persons to purchase in any manner any plot, apartment to building in any real estate project registering the real estate project with the Authority;
- The Act additionally provides for the registration of real estate agents by the real Estate Regulatory Authority under Section 34(a).
- The Act lays down the functions and duties of promoters under section 4, and under section
- it provides that once registration is applied for, RERA is given a time period of 30 days to either approve upon registration, the promoter shall be provided with a log-in and password to access the website of the authority and shall create his web page on the website and enter the details of proposed projects.
- Under Section 4(2) (l) (d), it makes mandatory upon the promoters to deposit fund amounting to 70 per cent to over the construction cost of the project in a separate bank account to be maintained at a scheduled bank, to prohibit unaccounted money from being pumped in and out of the sector to the detriment of the consumer.
- The Act states, under section 4(2) (d), the project shall be developed by the promoter in accordance with the sanctioned plans, layout plans and specifications as approved by the competent authorities.
- Under Section 15(1), promoter shall not transfer or assign his majority rights and liabilities in respect of a real estate project to a third party without obtaining prior written consent from two-third allottees.
- Under Section 19, the Act provides for the rights and duties of allottees, like allottee shall be entitled to know stage-wise time schedule of completion of the project, right to claim the refund of amount paid along with interest and compensation in the manner as provided under the Act.
- Under Section 38(1), the Act provides for penalties and offences in case of violations of law by the promoters, allottees and the real estate agents.

WHAT IS RERA?


The Real Estate Regulation & Development Act (RERA) which came into effect on May 1, 2017, provides India's real estate sector its very first regulator. It will bring clarity & establish fair practices that would protect the interests of home buyers. Here are the top features of RERA that you should know about:

SECURITY

- A minimum of 70% of investors' and buyers' money would be kept in a separate escrow account. This money can only be spent on construction of the project and the cost borne towards the land.
- Developers can't ask more than 10% of the property's cost as an advanced payment booking amount before the registered sale agreement is signed.

RERA

FOR HOME BUYERS



FAIRNESS

- Under RERA, properties will be sold based on carpet area, and not on super built-up area.
- In the event of project delay, buyers are entitled to receive the entire money invested or they can stay invested and receive monthly interest.

TRANSPARENCY

- Under RERA, builders are required to submit the original approved plans for their ongoing projects and the alterations that they made later to the regulator.
- Developers can't make any changes to the plan without the written consent of the buyer.

QUALITY

- If any issue is highlighted by the buyer to the regulator within 5 years from the date of possession, then it has to be fixed within 30 days by the builder.

AUTHORISATION

- Without registration with the regulator, a developer would not be able to invite, advertise, sell, offer or book any plot, apartment, house, building or any other investment in the project.
- Post registration, all the advertisement soliciting investment will have to bear the unique project-wise RERA registration number.

5.3.3 NEED FOR HOUSING POLICY

Housing is an important economic activity besides being a necessity. As part of the construction industry, which accounts for more than 50 per cent of the development outlays, housing has emerged as a major sector of economy having backward and forward linkages with almost all other sectors. With the increasing urbanization and rural to urban migration for employment, it becomes inevitable to provide basic infrastructure to people. Thus, to meet this demand, Government of India is introducing various policies like Pradhan Mantri Aavas Yojana (Housing for all), affordable housing policies etc. For the vulnerable and weaker sections of the society, the Government is playing the role of direct provider. A Centrally sponsored scheme called Valmiki Ambedkar Awas Yojana (VAMBAY) was launched with a view to ameliorating the conditions of the urban slum dwellers living below poverty line who have inadequate shelter. The scheme has the primary objective of facilitating the construction and upgradation of the dwelling units in the slum areas and to provide health and enabling urban environment through community toilets under Nirman Bharat Abhiyan, a component of the scheme. The scheme is being implemented through HUDCO.

The Pradhan Mantri Aavas Yojana is being implemented during 2015-2022 and provides central assistance to Urban Local Bodies (ULBs) and other implementing agencies through States/UTs for:

- In-situ Rehabilitation of existing slum dwellers using land as a resource through private participation
- Credit Linked Subsidy
- Affordable Housing in Partnership
- Subsidy for beneficiary-led individual house construction/enhancement

Credit Linked subsidy component is being implemented as a Central Sector Scheme while other three components as Centrally Sponsored Scheme (CSS). All statutory towns as per Census 2011 and towns notified subsequently would be eligible for coverage under the Mission.

In the spirit of cooperative federalism, mission provides flexibility to the States for choosing the best options amongst four verticals of mission to meet the demand of housing in their states. Process of project formulation and approval in accordance with the mission Guidelines has been left to the States so that projects can be formulated, approved, and implemented faster.

Other than these interventions, various other interventions were done by the government of India. A historical context of policy interventions towards Housing in India is described below:

- The policies of urban development and housing in India have had a long journey since independence. In early 1950s, the pressure of urban population and lack of housing along with basic services was an issue of great concern to the Government as well as to the civil society. It has generally been the responsibility of States to intervene towards meeting the housing requirements of the vulnerable sections of society and to create an enabling environment for provision of shelter to all on a sustainable basis.
- As part of the First Five Year Plan (1951-56), concrete governmental initiatives began with a focus on institution-building and housing for weaker sections of society. Government undertook construction of houses for Government employees and industrial workers (through Industrial Housing Scheme). The urban land was getting scarce for provision of housing especially for the middle and low-income groups, resulting in the government enacting the Urban Land (Ceiling & Regulation) Act, 1976. Housing and Urban Development Corporation (HUDCO) was set up in 1970 to provide affordable housing and provide specialized attention to critical segments of infrastructure development in cities and towns.
- In the late 80's and early 90's, Government envisaged a larger role for the private sector in the construction of housing, whereas government focused on mobilization of resources, provision for subsidized housing for the poor and acquisition of land. The National Housing Bank (NHB) was set up as a wholly owned subsidiary of Reserve Bank of India (RBI), in 1988 under the National Housing Bank Act, 1987 to expand the base of housing finance. These were coupled with schemes aimed at provision of housing and basic services for the urban poor.
- The first National Housing Policy was announced in 1988 to eradicate houselessness and improve the housing conditions. Thereafter a revised National Housing Policy was announced in 1994 as a by-product

of economic reforms process initiated in 1991. The goal of this policy was to increase the supply of land and basic minimum services with a view to promote a healthy environment. Subsequently, a Housing and Habitat Policy was unveiled in 1998 with the vision of "shelter for all" and better quality of life to all citizens by using the potential of public, private and household sectors. The key objective of the policy was on creating strong Public-Private Partnership (PPP) for tackling the housing problem.

- The National Urban Housing and Habitat Policy (NUHHP) 2007 was formulated with the goal of 'Affordable Housing for All' with special emphasis on vulnerable sections of society such as Scheduled Castes/Scheduled Tribes, Backward Classes, Minorities and the Urban Poor. The spotlight was on 'habitat development' with a 'Regional Planning Approach' with the role of Government as a 'facilitator' and 'regulator.' The NUHHP-2007 lays emphasis on earmarking of land for EWS/LIG groups in new housing projects while retaining Governments role in social housing so that affordable housing is made available for EWS and LIG categories either on ownership or on rental basis.

Recently, the government of India has also come up with the Draft Model State Affordable Housing Policy for Urban Areas in 2014. The aim of this policy is to "create an enabling environment for providing "affordable housing for all" with special emphasis on EWS and LIG and other vulnerable sections of society such as Scheduled castes/Scheduled Tribes, Backward Classes, Minorities and senior citizens, physically challenged persons in the State and to ensure that no individual is left shelter less. The Policy further aims to promote Public Private People Participation (PPPP) for addressing the shortage of adequate and affordable housing." To supplement the efforts of the State Government, it is anticipated that the Government of India support will be forthcoming in the following aspects:

Through National Policies, Programmes and Schemes and act as a facilitator in the creation of affordable housing stock.

- The Central Government will also on one hand provide for capital grants support to Affordable Housing projects under various schemes to act as a lever to boost the supply of affordable housing and also provide for greater channelization of credit to the urban poor to enhance their purchasing power on the other.
- Ministry of Housing and Urban Poverty Alleviation from time to time will provide inputs to the Ministry of Finance for providing fiscal and financial incentives to this segment.
- The Government of India shall also strive to accord industry status to the real estate segment.
- The Government of India shall also consider making Viability Gap Funding available for Affordable Housing projects.
- Facilitate greater flow of capital through external sources like the External Commercial Borrowings and Foreign Direct Investment.
- The Central Government will encourage development of new avenues for project financing for Affordable Housing including that from the insurance and pension funds.
- The recent initiatives of Government of India like the Credit Risk Guarantee Fund Trust and Urban Housing Fund needs to be further promoted.

Apart from the interventions to be done by central government, state government also has to intervene in order to achieve the central governments' goal of providing affordable housing for all under the Model State Affordable Housing Policy for Urban Areas.

State interventions and specific actions points under W Model State Affordable Housing Policy for Urban Areas:

Since the Constitution of India envisages provision of Housing as the primary responsibility of the State Government, major initiatives are proposed to be taken by the State as part of the vision of the Government to provide affordable housing for all residents. Few interventions are listed below:

- At least 15% of the total project Floor Area Ratio (FAR)/Floor Space Index (FSI) or 35% of the total number of dwelling units, whichever is higher, will be reserved for EWS category.
- The State Government including that of its agencies such as the Urban Development Authorities, Housing

Boards, other parastatal agencies and Urban Local Bodies (ULBs) will, as far as possible, provide land for affordable housing projects.

- Subject to any Central Law, a people friendly land acquisition policy for the State will be created for undertaking affordable housing projects.
- Various models for assembling land will be encouraged in both Government and Private sectors by offering trunk infrastructure facilities and transportation linkages to such site.
- The policy aims to create an inventory of land holdings in cities to constitute a land bank and prepare an asset management plan for better management of the available land and targeting its supply to create affordable housing dwelling units. The State shall compile and maintain the inventory.
- The State will also develop innovative ways for capturing the value of land by way of developing infrastructure and regional connectivity.
- The State shall notify a policy on property rights to slum dwellers to provide title to the land and a non-eviction policy for residents of slums with over 5 years of documented stay in a particular location.
- Mortgageable leasehold property rights and land titles for the EWS and LIG categories shall be facilitated by the Revenue Department and the ULBs.
- Infrastructure services including water supply, sanitation, health, education facilities to existing housing colonies where there is absence of such facilities will be ensured.
- Special dispensation to the socially vulnerable sections like senior citizens, women, students, physically challenged, SC/ST/OBC and Minorities, etc. of the State shall be made.
- In situ Slum upgradation of slums and allied infrastructure will be taken up by tying up various schemes of Central and State Government.

The agencies responsible for various works to be implemented in Assam under majority of the central government's initiative are Town and Country Planning Department, Housing Board or Slum Board etc..

In Nagaon region, due to pressure in the urban areas, rampant development has taken place. Therefore, in order to have a streamlined growth in the coming future, Nagaon will require a Housing policy for the NMPA. Various Indian states like Madhya Pradesh, Chhattisgarh, Maharashtra, Karnataka etc. have introduced housing policy in order to have ordered development in the state. Thus, Assam Government shall also come up with a detailed Housing Policy. This policy should focus on various issues being faced by regions in terms of Housing.

It is noticed that a large number of unapproved layouts and sub-divisions have been developed in the Nagaon regions without adequate infrastructure and public civic amenities and most of the plots in such layouts and sub-divisions have been purchased by ignorant people and there is no way to convert these layouts and sub-divisions or plots back to their original land use;

It is expedient to regularise the plots in such unapproved layouts or sub-divisions, so as to protect the interests of ignorant purchasers and to mobilise financial resources in order to provide basic infrastructure facilities in areas where such unapproved layouts have come up.

Regularization of unapproved layouts will enable the purchasers to avail institutional finances to build houses at affordable interest rates and to improve their security of tenure and thereby their quality of life. It is also observed that regularisation of sold out plots alone without considering the layout or subdivision as a whole will result in discontinuous pockets of development, causing enormous difficulties to the Local Bodies to provide services to the regularised plots in isolation and therefore, it is considered necessary to regularise these unapproved layouts and sub-divisions in their entirety by insisting to widen the roads, improve circulation, reserve areas for open space and public purpose to the extent feasible in each layout.

Effect of regularization – Plots regularised under this scheme shall be deemed to be regularised for residential use.

Some imperative objectives of the Housing Policy to be formulated is described as under:

- To facilitate affordable housing in urban and rural areas, create adequate housing stock for Lower Income Group (LIG), Economically Weaker Section (EWS) and shelters for the poorest of the poor on ownership

or rental basis.

- To pursue the target of cities without slums through equitable slum redevelopment and rehabilitation strategy and shelters for the poor.
- To deregulate housing sector and encourage competition and public private partnerships in financing, construction and maintenance of houses for Lower Income Groups (LIG) and Weaker Sections of the society.
- To rationalize development control regulations and streamline approval procedures.
- To promote rental housing and incentives to different options of rental housing for weaker sections.
- To facilitate the redevelopment and renewal of inner-city areas and dilapidated buildings through options of land assembly, conserving heritage structures and places of archeological importance.
- Encourage technology innovation, training and capacity building of the construction workers to enhance their productivity and improve quality of housing stock.
- To promote larger flow of funds for investment in housing and infrastructure using innovative products and appropriate institutional mechanism.
- To encourage progressive shift from target orientation to a demand driven approach as also from a subsidy-based housing scheme to cost sharing or cost recovery-cum-subsidy schemes.
- To provide for mandatory construction of EWS/LIG housing by the private sector in the government-provided land, government facilitated site or their own projects.
- The policy will orient towards setting up of a land bank to ensure smooth supply of land for projects specifically meant for construction of houses to low-income segment households
- To create skilled manpower for building construction industry and create employment opportunity for low-income group.
- To conserve ecologically sensitive areas and promote environmentally sustainable cities and townships.
- To establish Management Information System to strengthen monitoring of building activity in the Union Territory.

5.3.4 AFFORDABLE HOUSING POLICY

A policy document is a set of guidelines to direct the actions of all persons/ institutions involved or connected regarding any area of activity. Preparation of a housing policy is the need of the hour with respect to growing requirement of shelter and related infrastructure. As discussed in the previous section requirement for shelter is growing in context of rapid urbanization, migration to cities, mismatch between demand and supply of housing (especially affordable housing for EWS/ LIG), and inability of the urban poor to access the formal housing market to fulfil its housing need. An Affordable housing policy within the framework of State Affordable Housing policy to cater to the local need of the district may be formulated.



5.4 HOUSING STOCK AND SHORTAGE

Housing shortage is defined as the set of populations who does not hold any house. There may be a growing concern for homeless across big cities during winters, but progress in construction of night shelters has been very slow across most of the states despite the centre providing 75% of funds required for building and refurbishing shelters for the urban homeless. In absence of city level data on the houseless population and pavement dwellers, the houseless population is derived from the data published as part of Census of India, 2011. Details of housing stock, Municipal Board, and urban centre wise, in NMPA were computed based on the Census of India, 2011 and are presented in the table 73.

Table 73 Housing Stock in NMPA 2011

Sr. No.	Nagaon Planning Area	No. Of Household 2011	Total no. of Housing Stock 2011	Housing Shortage
1	NMB + OG	27320	26,822	498
2	CT	5703	5,576	127
3	Rural	31,308	29,314	1994
Total for NMPA		64,331	61,712	2619

(Source: Census of India, 2011)

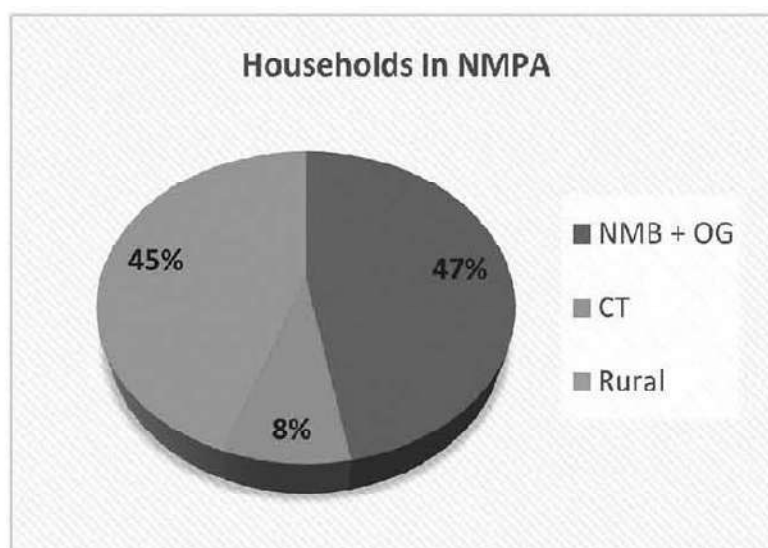


Figure 77: Households in NMPA

(Source: Census of India, 2011)

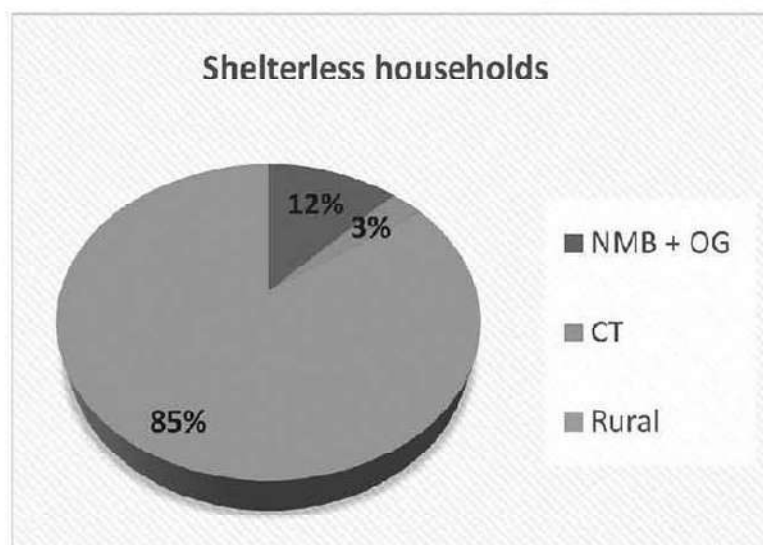


Figure 78: Shelter less households

(Source: Census of India, 2011)

5.5 SLUMS

A Slum, for the purpose of Census, has been defined as residential areas where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the safety and health.

According to Census, slums are categorized into notified and identified slums. The high rate of growth of urban population and its accumulative nature with a population has led to increasing problem of housing, reducing privacy, and overcrowding in small house, steady growth of slums and unplanned settlements and severe effect on civic services in urban areas in the system.

Slums can be commonly seen in urban areas which are occupied by urban poor or economically weaker sections of the society or the migrants from nearby villages or other states that come to the urban areas in search of employment to earn their livelihood. Slums are an indispensable part of our cities because as the cities grow, due to economic and physical growth of the urban area, people migrate from different areas in search of employment. So, to provide basic amenities to the urban poor and slum dwelling people this aspect needs to be incorporated while doing urban study to have an overall development of the city. Planning is for the people and in a way, slums are an indispensable part of the society. To make the city livable for all and to improve the condition of slums, this comprehensive study regarding slums plays a vital role in planning.

5.5.1 REASON FOR SLUM

The Nagaon region presents a wide range of activities in various institutional, Commercial and tourism sectors. Growth in such activities, possibilities of absorption in various service sectors, scope of employment in trade and business activities, hawking, retailing, carting etc., could have attracted more rural poor to the urban. Due to their economic status, these urban poor are unable to get a house within their limited income and hence occupy vacant spaces wherever available and lead a marginal level of living. These habitations in due course develop into slums proliferate exponentially further due to rapid urbanization and natural growth of population. In this scenario, the role of Government in tackling the slum becomes more pertinent.

5.5.2 IMPACT OF SLUM

The development of slums leads to Poor environmental conditions in such areas which lead to poor health, which aggravates poverty and often results in lower educational levels, as well as loss of income owing to sickness, disease, and increased spending on health care, which may deplete household savings. On the other hand, environmental problems exacerbate urban poverty and poor neighbourhoods suffer disproportionately from inadequate water and sanitation facilities and indoor air pollution. Poor people living in slum are often forced to live in environmental unsafe areas, steep hillsides and flood plains or polluted sites near solid waste dumps, open drains and sewers, and polluting industries. Conflicts like quarrel, clash and fight in the squatters of this area is a regular phenomenon. This creates noise and violence which leads to lack of security in the area and disturbs the city dwellers, particularly the nearby residents, office workers, and school children. Besides, many of the residents are involved in prostitution, drug trafficking, hijacking, smuggling etc. These activities threaten the social and cultural environment of the city.

5.5.3 SLUMS IN NMPA

As per Census 2011, there are 18110 people living in slums within Nagaon MB and OG area which is approximately 6%.

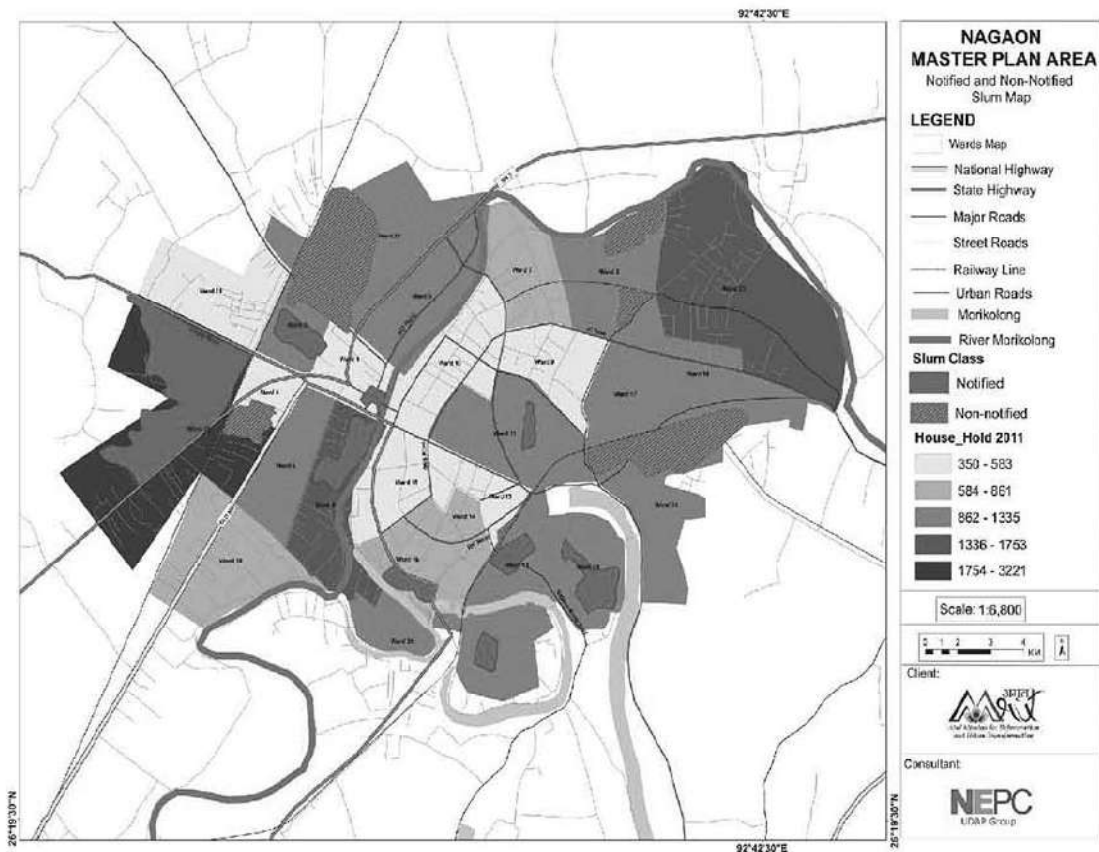
Table 74 Percentage of slum population from total population

Town Name	Total Population of Town	Slum Population	Percentage share from total population (%)
Nagaon (MB + OG)	298680	18110	6.06

(Source: Census of India, 2011)

5.5.4 NOTIFIED AND NON-NOTIFIED SLUM

Areas notified as slums by the respective municipalities, corporations, local bodies or development authorities are treated as “notified slums”. In any city, it is generally observed that the slum is developed mostly near their working places. Slum dwellers first prefer the location of land which is nearer to the workplace and then they prefer the location where basic amenities such as water, proximity to public transport etc. is available. That is why slums generally develop near the industries, wholesale-markets, godowns, railway stations and even in residential areas. They generally use public-transport or slow-moving vehicles such as cycle, rickshaws etc. as it is economical.



Few notified slums are already situated within city area which are marked here in light blue color polygon. The hygiene condition within slum area is degraded and major area is found with litters and thrown garbage. Open channel sewerage is a part of slum which also spills over with garbage at some places. Some patch of slum area along riverbank is non notified as they are accompanied by legal properties. Owing to slum area the premises is lacking in fundamental amenities of sanitation and hygiene. The area is on the rudimentary level of development. Slum area develops unhygienic conditions for the local areas as well. Slum locations include,

The table 75 shows the details of slums which includes the name of slums, the land ownership status, total area, population, and number of households. According to the data, there are 15 notified slums in the town and 8 un-notified slums. The total area constituted by slums is 0.62 sq.km. with total population of 10646.

Table 75 Slum population and housing details

Sr. No.	Name of the Slum (notified) Notified	Ownership of land where slum is located	Area (sq. mt.)	Slum Population	No. of Slum Household
Notified					
1	Haiborgaon	1	0.026365	126	29
2	Harizon	2	0.004649	267	37
3	Rabi udayanchal	2	0.020328	880	189
4	Aminpatty	1	0.019658	440	83
5	Fauzdaripatty	1	0.009884	335	83
6	Hotel bari	1	0.018481	615	122
7	Islampatty	1	0.198345	1953	39
8	Mulapatty north	1	0.122139	1161	234
9	Mulapatty south	1	0.065767	619	126
10	Chandmari west	1	0.025663	343	76
11	Charikhuti	1	0.006011	433	79
12	Azadnagar	1	0.017025	546	110
13	Geetanagr	1	0.014439	189	39
14	Chokitop west	1	0.010723	287	58
15	Kalongpar	2	0.003398	378	78
Total			0.562875	8572	1382
Sr. No.	Name of the Slum (Non-Notified)	Ownership of land where slum is located	Area (sq.mt.)	Slum Population	No. of Slum Household
Non-Notified Slum					
16	Santipur	1	0.010334	279	66
17	Amulapatty east	1	0.0184	221	58
18	Itachali	1	0.002866	308	69
19	Morikallong	4	0.012034	514	98
20	Hedayatngar	3	0.00996	31	59
21	Panigaon	1	0.002551	348	61
22	Lachinagar	1	0.003473	277	50
23	Chandmari north	1	0.003742	96	22
Total			0.0633	2074	483
TOTAL Slums			0.626234	10646	1865

(Local body - 01, State Government - 02, Central Government - 03, Private - 04, others - 05)

(Source: Census of India, 2011)

Table 76 Slum Census Houses

Sr. No.	Area Name	Nagaon (MB + OG)
1	Total number of Slum census houses	6983
2	Total number of occupied Slum census houses	5920
3	Total number of vacant Slum census houses	1063
4	Total number of occupied locked Slum census houses	66

(Source: Census of India, 2011)

5.6 HOUSING DEMAND GAP ANALYSIS

5.6.1 FACTORS CAUSING HOUSING SHORTAGE

There are several factors which would affect the housing shortage. The recent technique in finding the housing shortage is published by Ministry of urban poverty and alleviation. There are 5 major factors which decides the housing shortage in the system. They are -

1. WCongestion factors
2. Obsolescence factors
3. Non-Durability
4. Present housing shortage
5. Calculation of housing shortage for 2045 for the projected population

5.6.1.1 Congestion Factor

Congestion factor is the ratio of households that are residing in unacceptable congested conditions, from physical and socio-cultural viewpoints (i.e. married couples sharing the room with other adults etc.,) or the percentage of households in which each married couple does not have separate room to live. The table 77 indicates that the congestion factor for each Municipalities/Commune Panchayats according to the census 2011. It is observed that the planning area shows a uniform congestion factor for all the Municipalities/communes in Nagaon region for the year 2011.

Table 77 Household without exclusive room

Sr. No.	Nagaon Planning Area	HH 2011	No exclusive room for marriage couples 2011	Congestion Factor
1	NMB+OG	27320	296	0.01
2	CT	5703	58	0.01
3	Rural	31308	174	0.005
Total for NMPA		64331	528	0.008

(Source: Compiled by Consultant)

5.6.1.2 Obsolescence Factor

Obsolescence factors is all the bad houses, excluding those that are less than 40 years old and all houses' ages 80 years or more. Obsolescence are the households living in obsolete buildings (40 to 80 years old in a bad structural condition, and 80 or more years) and excluding temporary houses (to avoid double counting). The table 78 illustrates the Obsolescence Factor for Nagaon Planning Area according to Census 2011.

Table 78 Housing shortage due to obsolescence

Sr. No.	Nagaon Planning Area	HH 2011	HH above 50+ yrs in NMPA	Obsolescence Factor
1	NMB+OG	27320	1093	0.04
2	CT	5703	171	0.03
3	Rural	31308	1565	0.05
Total for NMPA		64331	2829	0.04

The table reveals that the highest obsolescence factor is observed in rural area which indicates that the status of housing condition is poor with respect to the overall housing condition of the Nagaon Planning Area. It is also observed that the Obsolescence factor in NMB area is 0.04, which also witnesses the good quality of socio-economic status in the region mainly due to the urban nature of the area and developments which are in tune with the overall development of the Nagaon region.

5.6.1.3 Non-Durability

Non-durability is the no. of temporary houses which are not suitable for living or Non-serviceable units are taken out. Temporary/ kutchra houses are those in which both the walls and roof are made of materials that need to be replaced frequently. As per the census definition, temporary houses are made with walls and roofs made of temporary material. Walls can be made of grass, thatch, bamboo, plastic, polythene, mud, unburnt bricks or wood. Roofs can be made of grass, thatch, bamboo, wood, mud, plastic or polythene. Hence the non-durability of housing is the difference between the number of housing stock to the number of permanent houses. The table 79 represents the details of permanent, semi-permanent house and temporary house within the NMPA.

Table 79 Housing shortage due to non-durability

Particular		Permanent	Semi-permanent	Temporary	Number of Housing Stock
Urban	Nagaon MB+OG	25299	14073	498	39372
	Census Towns (CT)	2694	3845	127	6539
Rural	Rural areas	5285	10516	1994	15801
Total		33278	28434	2619	61712

(Source: Compiled by Consultant)

5.6.2 ESTIMATION OF HOUSING SHORTAGE

Acute housing shortage in country specially in urban centres has become a burning problem of the day since house construction activities do not keep pace with the growth of population of urban centres. The number of houses has, therefore, been successively falling short of actual requirement of the urban population.

Based on the Ministry of Housing and Urban Poverty Alleviation, National housing shortage, the final estimation of housing shortage is calculated based on the corresponding factors such as homeless population, Non-durability factor, Congestion factor, Obsolescence. It has been calculated based on the census 2011. For this exercise, the following assumptions were adopted with the reference to the Assam state, District and NMB Housing Profile based on Census 2011 housing data:

- Dilapidated houses accounts for 11% of total housing stock for the project area and 4% for the urban areas.
- Vacant houses accounts for 4% of total housing stock for the project area and 10% for the urban areas.

The details of housing shortage based on census 2011 data are presented in the table 80.

Table 80 Total Housing Shortage in Nagaon

Sr. No.	Housing Shortage	No. of Shortage household
1	Shortage due to Homeless Population	2619
2	Shortage due to Dilapidated Houses	6788
3	Shortage due to Vacant houses	2468
4	Shortage for Slum households	6983
5	Shortage due to congestion in 2011	528
6	Shortage due to obsolescence in 2011	2829
Total Housing Shortage (2011)		22215

(Source: Compiled by Consultant)

5.7 HOUSING DEMAND GAP ANALYSIS

The future housing requirement for NMPA has been assessed considering both, the quantitative housing shortage, and the qualitative housing shortage. Below mentioned is the quantitative calculation of future housing requirement for year 2045.

Table 81 Decadal additional housing requirement

Year	Additional Population	HH size	Additional HHs
2021	47460	4.5	10547
2031	46556	4	11639
2041	48537	4	12134
2045	22988	4	5747
Total Additional Housing Requirement till 2045			40067

(Source: Compiled by Consultant)

For the 2021 housing projection considered average household size is 4.5; while for 2031,2041 and 2045 projection 4 household size is considered, based on the assumptions of having more numbers of nuclear families in the future than today and constant household formation rate for the entire Planning Area. The projected additional housing requirement considering increase in population by 2045 is 40067.

Table 82 Total Housing Demand by 2045

Sr. No.	Particulars	Numbers
1	Region	NMPA
2	Total Population 2011	2,98,680
3	Total Household	64,331
4	No. of Housing Stock 2011	61,712
5	Housing Gap (Factor 1)	2,619
6	No. of Good and Livable Houses	57543
7	No. of Dilapidated houses (Factor 2)	6788
8	Congestion Factor 2011	0.008
9	Shortage Due to Congestion Factor (Factor 3)	528
10	Obsolescence Factor 2011	0.04
11	Shortage due to Obsolescence Factor (Factor 4)	2829
12	No. of Locked and Vacant houses (Factor 5)	2468
13	No. of Slum houses (Factor 6)	6983
14	Projected Population 2045	464221
15	Projected Increase in Population from 2011 to 2045	165541
16	Housing requirement for increase in Population (Factor 7)	40067
Total Housing Demand – 2045 (Factor 1+2+3+4+5+6+7)		62282

(Source: Compiled by Consultant)

5.8 HOUSING PROVISION

The housing provision is met can be accommodate in the proposed Residential, Mixed Use and Conservation zones. Further, the residential and mixed uses zones are divided into different categories; with each has various FSI to offer so the development intensity can be managed. It is proposed to facilitate the provision of a fully serviced dwelling unit for each family and reduce the gap between housing shortage and supply through suitable measures. The planned catering for the additional housing is as mentioned in table 83.

Table 83 Decadal housing provision in NMPA

Year	Additional Population	HH size	Additional HH	Catering for the Shortage	Total Housing Need (decade wise)
2021	47480	4.5	10547	7775 (35%)	18322
2031	46556	4	11639	6664 (30%)	18303
2041	48537	4	12134	4443(20%)	16577
2045	22988	4	5748	3332 (15%)	9080
Total			40067	22215	62282

(Source: Compiled by Consultant)

For the decade 2021, 35% catering for housing shortage has been considered by taking benefit of the different housing schemes and state-central government fund utilization. Similarly, 30%,20% and 15% catering for year 2031,2041 and 2045, respectively.

5.8.1 HOUSING PROVISION BASED ON INCOME GROUP

Table 84 Housing provision considering Income Group

Year	Total Housing Need (decade wise)	EWS 20%	LIG 30%	MIG 40%	HIG 10%
2021	18322	3664	5497	7328	1832
2031	18303	3660	5490	7321	1830
2041	16577	3315	4973	6631	1657
2045	9080	1816	2724	3632	908
Total	62282	12456	18684	24913	6228

(Source: Compiled by Consultant)

As per the Ministry of Urban Poverty and Alleviation the population is categorised based on the income level such as Economically Weaker Section (EWS), Low Income Group (LIG), Medium Income Group (MIG) and High-Income Group (HIG). The table 84 indicates that the housing shortage for 2045 is calculated for each classification based on income level. This table helps to earmark the affordable housing in the Nagaon Planning Area and would also help to formulate the housing policy.

5.9 HOUSING POLICY

The main objective of the housing policy for Nagaon Planning Area is not only to meet the housing demand by horizon 2045 but also to improve the residential conditions at large. In view of this, Master Plan proposes development of residential neighborhoods having adequate facilities within walkable

distance. Design considerations require better planning.

Private sector Participation

Privatization must be encouraged by participation of individuals and developers in the house building activities. The local administration could provide land with offsite

and on-site physical and social infrastructure and the private entrepreneurs could invest in house building. In principles, housing has four distinct components for its development i.e., Land Assembly, infrastructure provision, building construction and post occupancy management. The above diagram

gives an idea how these activities should be distributed amongst the Government, private and cooperatives making the Government a facilitator for housing development.

Role of Government

Government has to play proactive role of promoting the housing industry by regulatory measures and acting as a watch-dog rather than fully involving its organs in the provision of shelter to the town inhabitants. The magnitude of housing shortage is enormous and the State on its own cannot provide the housing stock. Government will limit its role to development of serviced land and subsequently its release to private developers and Cooperative Societies on premium equivalent to the cost of land plus marginal profit with only advisory and regulatory role in the development of housing industry.

Housing of Different Income Categories

The Master Plan recommends identification of priorities in dealing with different segments of the population. Out of the total demand, income category wise demand has been given in fixing the priority in dealing with different segments of the population: H.I.G. and M.I.G. dwelling units shall be provided with only developed land at market price to cross subsidize the housing for E.W.S./L.I.G.

Group Housing Schemes

To meet the housing demand by 2045, based on the need housing colonies or townships can be developed. Economies of scale are favorable to large colonies because of reduced per capita on investment on infrastructure and services development in large colonies. The Master Plan also envisages smart growth of the

city to overcome the scarcity of land and regulate sprawl of urban development in rich agricultural hinterland.

Urban Village

The peripheral village settlements, which have been incorporated in the Planning Area of Nagaon, are going to be part of its proposed Urban Area Limits during the process of its expansion. The settlements having a completely different life-style for centuries are now getting merged into urban environment and need a sensitive approach in the planning and development process. At present these settlements do not conform to any urban character and need an 'Action Plan' for extension of water supply, sewerage and drainage facilities and other basic urban amenities and efficient linkages with the main city. The settlements should get the modern services and amenities and should also be catered for their traditional cultural styles.



5.10 SLUM UPGRADATION PROGRAM

The scheme aims at acquiring sites in various parts of urban areas and to construct tenements and provide developed plots under "Sites and Services" concept to the slum dwellers. Improvement works to the existing Slums are being implemented through the Assam State Housing Board. The tenements in storeyed blocks are made available to the slum dwellers on rental basis. Apart from that, upgradation of slum areas by extending basic amenities viz., roads, water supply, sewerage, education, health, electricity, social infrastructure are also undertaken.

5.10.1 RAJIV AWAS YOJNA (RAY)

Rajiv Awas Yojna a path breaking centrally sponsored scheme for the slum dwellers and urban poor envisages a "Slum Free India" through encouraging states to tackle the problem of slums in holistic manner. The main objectives of RAY are -

1. Bringing existing slums within the formal system and enabling them to avail the same level of basic amenities as the rest of the town.
2. Redressing of failures of the formal system that lie behind the creation of slums.
3. Tackling the shortage of urban land and housing that keep shelter out of reach of the urban poor and force them to resort to extra-legal solutions in a bid to retain their sources of livelihood and employment.

5.10.2 PRADHAN MANTRI AWAS YOJANA (PMAY)

The "Pradhan Mantri Awas Yojana (Urban) - Housing for All" was launched by Government of India with an objective of providing houses to every family by the year 2022. The Mission is being implemented during 2015-2022 and provides central assistance to Urban Local Bodies (ULBs) and other implementing agencies through States/UTs. The "Pradhan Mantri Awas Yojana (Urban) - Housing for All" has following four Sub-schemes giving options for beneficiaries, ULBs / Implementing Agencies and the State Governments:

1. In-situ Slum rehabilitation of Slum Dwellers
2. Credit Linked Subsidy Scheme.
3. Affordable housing in partnership with Public & Private sectors.
4. Beneficiary Led Individual House Construction or enhancement.

5.10.2.1 In-situ Slum Rehabilitation of Slum Dwellers (ISSR)

"In-situ" slum rehabilitation using land as a resource with private participation for providing houses to eligible slum dwellers is an important component of the "Pradhan Mantri Awas Yojana (Urban) - Housing for All" mission. This approach aims to leverage the locked potential of land under slums to provide houses to the eligible slum dwellers bringing them into the formal urban settlement. Slums so redeveloped should compulsorily be denotified.

Eligibility

- Slums, whether on Central Government land/State Government land/ULB land, Private Land, should be taken up for "in-situ" redevelopment for providing houses to all eligible slum dwellers.
- Eligibility of the slum dwellers like cut-off date etc. will be decided by States/UTs preferably through legislation.

Highlights

- Additional Floor Area Ratio (FAR)/Floor Space Index (FSI)/Transferable Development Rights (TDR) for making slum redevelopment projects financially viable.
- Slum rehabilitation grant of Rs. 1 lakh per house, on an average, would be admissible for all houses built for eligible slum dwellers in all such projects.
- Beneficiary contribution in slum redevelopment project, if any, shall be decided and fixed by the States/UTs Government.
- State/UT Governments and cities would, if required, provide additional Floor Area Ratio (FAR)/Floor Space

Index (FSI)/Transferable Development Rights (TDR) for making slum redevelopment projects financially viable.

- States/UTs will have the flexibility to deploy this central grant for other slums being redeveloped for providing houses to eligible slum dwellers with private participation, except slums on private land. It means that States/UTs can utilise more than Rs. 1 lakh per house in some projects and less in other projects but within overall average of Rs. 1 lakh per house calculated across the States/UTs.
- The per house upper ceiling of central assistance, if any, for such slum redevelopment projects would be decided by the Ministry.
- States/UTs may decide whether the houses constructed will be allotted on ownership rights or on renewable, mortgageable and inheritable leasehold rights.
- States/UTs may impose suitable restrictions on transfer of houses constructed under this component.
- "In-situ" redevelopment of slums on private owned lands for providing houses to eligible slum dwellers can be incentivised by State Governments/UTs or ULBs by giving additional FSI/FAR or TDR to land owner as per its policy. Central assistance cannot be used in such cases.
- A viable project would have two components i.e. "slum rehabilitation component" which provides housing along with basic civic infrastructure to eligible slum dwellers and a "free sale component" which will be available to developers for selling in the market so as to cross subsidize the project.

• **Implementation/Approach for Slum Rehabilitation with Private Partnership is outlined as below:**

- All tenable slums as identified in Housing for All Plan of Action (HFAPoA) of the city should be analysed with respect to their location, number of eligible slum dwellers in that slum, area of the slum land, market potential of the land (land value as per ready reckoner can be used), FAR/FSI available and density norms applicable to that piece of land etc..
- On the basis of analysis of slums, the implementing authorities should decide whether a particular slum can be redeveloped with private participation or not using land as a resource and to provide houses to eligible slums dwellers.
- For making projects financially viable, in some cases, States/UTs and cities might have to provide additional FAR/FSI or TDR and relax density and other planning norms. States/UTs may also allow commercial usage for part of the land/FAR as mixed usage of the land.
- States/UTs can also consider clubbing of nearby slums in clusters for in-situ redevelopment to make them financially and technically viable. Such cluster of slums can be considered as a single project.
- While formulating the project, the project planning and implementing authorities should also decide the area of slum land which should be given to the private developers. In some cases, the area of slum may be more than what is required for rehabilitating all eligible slum dwellers plus free sale component for cross subsidizing the project. In such cases, project planning authorities should give only the required slum land to private developers and remaining slum land should be utilised for rehabilitating slums dwellers living in other slums or for housing for other urban poor.
- Slum dwellers through their association or other suitable means should be consulted while formulating redevelopment projects especially for the purpose of designing of slum rehabilitation component.
- The private developers who will execute the slum redevelopment project should be selected through an open transparent bidding process. The eligibility criteria for prospective developers can be decided by States/UTs and ULBs. The scope of work of the prospective developers should be to conceive and to execute the project as mandated by the implementing agency using its financial and technical resources. The project developers would also be responsible for providing transit accommodation to the eligible slum dwellers during the construction period.
- All financial and non financial incentives and concessions, if any, should be integrated in the project and declared 'a priori' in the bid document. These incentives and concessions should also include contribution from beneficiaries/slum dwellers, if any.
- Sale of "free sale component" of project should be linked to the completion and transfer of slum

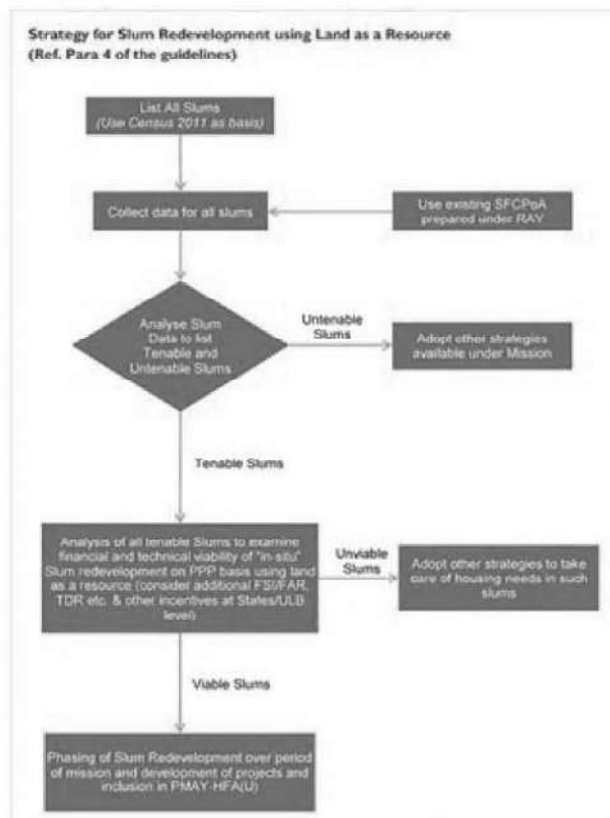
rehabilitation component to the implementing agency/state. Such stipulation should be clearly provided in the bid document to avoid any complication.

- Slum rehabilitation component should be handed over to implementing agency to make allotments to eligible slum dwellers through a transparent process. While making the allotment, families with physically handicapped persons and senior citizens should be given priority for allotment on ground floor or lower floors.
- Open bidding for the slum redevelopment project may result either into a positive premium or negative premium. In case of positive premium, the developer who offers the highest positive premium while satisfying all other conditions should be selected. In case of negative premium, the implementing authority may select the bidder proposing lowest negative premium. Funds required to make the project viable can be made available either from slum rehabilitation grant of Central Government or own fund of States and ULBs as well as positive premium received from other projects.
- Any private participation, that demands substantial grants from Government, may not be encouraged. Slums can either be taken up later for development or Kutcha/ unserviceable houses in such slums can be taken up under other components of the mission.
- States/UTs project planning and implementing authorities, ULBs should have a single project account for slum redevelopment project where positive premium, slum rehabilitation grant from Central Government, funds from State/UT Government or any other source is to be credited and used for financing all slum redevelopment projects with negative premium. Such accounts can be opened city-wise.
- Slum rehabilitation projects would require various approvals from different agencies as per prevailing rules and procedures in the States/UTs. Project development may also require changes in various development control rules. To facilitate such changes and for faster formulation and approval of projects, it is suggested that a single authority should be constituted with the responsibility to change planning and other norms and also for according approval to projects.

5.10.2.2 Credit Linked Subsidy Scheme for EWS/LIG (CLSS)

Pradhan Mantri Awas Yojana (Urban) - Housing For All Mission, in order to expand institutional credit flow to the housing needs of urban poor is implementing credit linked subsidy component as a demand side intervention.

- Beneficiaries of Economically Weaker Section (EWS) and Low Income Group (LIG) seeking housing loans from Banks, Housing Finance Companies and other such institutions would be eligible for an interest subsidy at the rate of 6.5 % for a tenure of 20* years or during tenure of loan whichever is lower.
- The credit linked subsidy will be available only for loan amounts upto Rs 6 lakhs and additional loans beyond Rs. 6 lakhs, if any, will be at nonsubsidized rate.
- Interest subsidy will be credited upfront to the loan account of beneficiaries through Primary Lending Institutions (PLI), resulting in reduced effective housing loan and Equated Monthly Installment (EMI).
- The Net Present Value (NPV) of the interest subsidy will be calculated at a discount rate of 9 %.



Home Ownership

The houses constructed/acquired with central assistance under the Mission should be in the name of the female head of the household or in the joint name of the male head of the household and his wife, and only in case when there is no adult female member in the family, the house can be in the name of male member of the household.

Coverage

All Statutory Towns as per Census 2011 and towns notified subsequently, including planning area as notified with respect to Statutory Town.

Purpose

New construction, acquisition and addition of rooms, kitchen, toilet etc. to existing dwelling houses as incremental housing.

Beneficiaries

- Beneficiary family will comprise husband, wife and unmarried children.
- The beneficiary family should not own a pucca house either in his/her name or in the name of any member of his/her family in any part of India.
- EWS Households having annual income up to Rs. 3,00,000/-
- LIG Households having annual income between Rs. 3,00,001/- and upto Rs. 6,00,000/-
- Preference under the scheme, subject to beneficiaries being from EWS/LIG segments, should be given to Manual Scavengers, Women (with overriding preference to widows), persons belonging to Scheduled Castes/ Scheduled Tribes/ Other Backward Classes, Minorities, Persons with disabilities and Transgender.

Area which can be constructed

- Carpet area of house being constructed or enhanced under this component of the Mission should be upto 30 square meters for EWS category and upto 60 square meters for LIG category.
- Beneficiary, at his/her discretion, can build a house of larger area but interest subsidy would be limited to first Rs.6 lakh only.
- For incremental housing/extension, the area limit will be 30 sq.mt. and 60 sq.mt. of carpet area for EWS and LIG category respectively.

Subsidy and Loan details

- Maximum loan amount: as per eligibility of customer decided by bank / Financial Institution based on due diligence.
- Maximum loan tenure : based on the guidelines of the PLI.
- Maximum tenure for subsidy computation: 20* years or the tenure of the loan, whichever is lower.
- Maximum loan amount for subsidy calculation: Rs. 6 lakh.
- Interest rate for subsidy : 6.5%

Housing and Urban Development Corporation (HUDCO) and National Housing Bank (NHB) have been identified as Central Nodal Agencies (CNAs) to channelize this subsidy to the Primary Lending Institutions and for monitoring the progress of this component. This scheme will be implemented through Banks/Financial Institutions.

5.10.2.3 Affordable Housing in Partnership (AHP)

The third component of the Mission is Affordable Housing in Partnership which is a supply side intervention. The Mission will provide financial assistance to EWS houses being built with different partnerships by States/UTs/Cities.

Affordable housing projects are the projects where atleast 35% of houses are constructed for EWS category.

- To increase availability of houses for EWS category at an affordable rate, States/UTs, either through its agencies or in partnership with private sector including industries, can plan affordable housing projects.
- Central Assistance at the rate of Rs.1.5 Lakh per EWS house would be available for all EWS houses in such projects.
- The States/UTs would decide on an upper ceiling on the sale price of EWS houses in rupees per square

meter of carpet area in such projects with an objective to make them affordable and accessible to the intended beneficiaries. For that purpose, States/UTs and cities may extend other concessions such as their State subsidy, land at affordable cost, stamp duty exemption etc.

- The sale prices may be fixed either on the project basis or city basis using following principles:
- An Affordable Housing Project (AHP) can be a mix of houses for different categories but it will be eligible for central assistance, only if at least 35% of the houses in the project are for EWS category and a single project has at least 250 EWS houses. CSMC at GOI level, however, can reduce the requirement of minimum number of houses in one project on the request of State Government.
- Allotment of houses to identified eligible beneficiaries in AHP projects should be made following a transparent procedure as approved by SLSMC and the beneficiaries selected should be part of HFAPoA.
- Preference in allotment may be given to Physically Handicapped Persons, Senior Citizens, Scheduled Castes, Scheduled Tribes, Other Backward Classes, Minority, Single Women, Transgender and Other Weaker and Vulnerable Sections of the Society.
- While making the allotment, the families with person with disability and senior citizens may be allotted house preferably on the ground floor or lower floors.
- Detailed Project Report (DPR) of such projects prepared by concerned implementing agencies should be approved by SLSMC.

Coverage

- All statutory towns as per Census 2011 and towns notified subsequently would be eligible for coverage under the Mission.
- The Mission will support construction of houses upto 30 square meter carpet area with basic civic infrastructure.
- States/UTs will have flexibility in terms of determining the size of house and other facilities at the State/UT level in consultation with the Ministry but without any enhanced financial assistance from Centre.
- Affordable Housing Projects in partnership should have basic civic infrastructure like water, sanitation, sewerage, road, electricity etc.
- The minimum size of houses constructed under the Mission under each component must conform to the standards provided in National Building Code (NBC).
- The houses under the Mission should be designed and constructed to meet the requirements of structural safety against earthquake, flood, cyclone, landslides etc. conforming to the National Building Code (NBC) and other relevant Bureau of Indian Standards (BIS) codes.
- All houses built or expanded under the Mission should essentially have toilet facility.
- The houses constructed/acquired with central assistance under the Mission should preferably be in the name of the female head of the household or in the joint name of the male head of the household and his wife.
- Only in cases when there is no adult female member in the family, the house can be in the name of male member of the household.

Implementation

A beneficiary will be eligible for availing only a single benefit under any of the existing options i.e. Slum Redevelopment with Private Partner, Credit Linked Subsidy, Direct Subsidy to Individual Beneficiary and Affordable Housing in Partnership. It will be the responsibility of States/UTs Government to ensure that the beneficiary is not given benefit under more than one component of the Mission.

5.10.2.4 Beneficiary Led Construction (BLC)

Beneficiaries could avail the benefits of scheme component for New construction and Enhancement of existing house. Highlights of 'Beneficiary Led (Individual House) Construction' or Enhancement (BLC) Progress to be tracked through geo tagged photographs of the house.

Eligibility for New Construction

- Urban residents of EWS : Economically Weaker Section (annual income upto Rs 3 lakhs) & LIG: Low Income Group (annual income Rs 3 to 6 lakhs).
- Beneficiary families should not own a pucca house anywhere in India.

For BLC Enhancement

- Beneficiaries may be residing either in slums or outside the slums.
- Beneficiaries in slums which are not being redeveloped can be covered under this component if beneficiaries have a Kutcha or Semi-Pucca house

Benefit

- To individual eligible families belonging to EWS categories, to either construct a new house or enhance existing house on their own to cover the beneficiaries, who are not able to take advantage of other components of the mission.
- Such families may avail of central assistance of Rs. 1.50 lakhs for construction of new house or for enhancement of existing house under the mission.

Why Enhancement

- As per the Technical Group on Urban Housing Shortage (2012-17), 80% of households are living in congested houses.
- Congestion factor is defined as the percentage of households in which each married couple does not have a separate room to live.

Provisions related to enhancement in PMAY(U) Guidelines

As per clause 7.2 (b) of PMAY(U) guidelines:

"If the beneficiary has a pucca house with carpet area of up to 21 sq. mt. or a semi-pucca house, lacking in one of the facilities (i.e. room, kitchen, toilet, bathroom or a combination of any of these), it may be taken up for enhancement subject to ULB/State ensuring structural safety of the house and adherence to following conditions:

- The total carpet area after enhancement must not be less than 21 sq mt and must not be more than 30 sq mt.
- Enhancement shall mean addition of minimum carpet area of 9.0 Sq Mt into the existing house with pucca construction of at least one habitable room or room with kitchen and/or bathroom and/or toilet conforming to NBC norms.

5.11 STRATEGIES FOR HOUSING & INCLUSIVE DEVELOPMENT

The housing strategies adopted for the Master Plan – 2045 is based on the principles of densifying areas where there is ample infrastructure available and land is available for residential development. Through the development control regulations, the authority intends to promote mid rise development to optimize the utilization of land and infrastructure and increase the housing stock in the planning area at minimum infrastructure cost to the government. The authority has adopted the mixed use land use to promote residential use adjacent to the employment centers and in areas where the employment centers are absent or in areas far from the residential areas, the authority has tried to bring in employment generating landuses in an attempt to strengthen these areas and promote better housing options nearby for the local population.

Providing residence adjacent to the employment center safeguards the interest of Economically weaker sections who prefers to stay closer to work and avoid transportation cost. It is also advised through the Master Plan-2045 to promote affordable housing by earmarking land for residential projects for economically weaker sections of the planning area. Through Master Plan - 2045 the authority has identified the new conurbation for 2045 which forms a continuous development with residential as a major land use to address the major housing requirements of the planning area. This also enables the merger of unplanned development taken place during the last few decades into main urban development of the planning area with proper circulation network and basic infrastructure.

6. TRANSPORTATION

Transportation plays a vital role towards the mobility of people as well as goods & services of a particular system. People are always mobile, and mobility is most important dynamic functions of a city which is having more bearing towards the economic development. In the absence of mobility due to improper transportation system the city functions would be paralyzed which may affect the dynamism of the system.

For the healthy growth, economic prosperity and improved living standards of any area, a high-quality transportation network is essential. In addition, transportation and landuse are to be integrated to achieve reduction in trip length, increase in public transport usage etc.

6.1 TRANSPORTATION NETWORK

6.1.1 REGIONAL CONNECTIVITY OF NAGAON

Nagaon is well connected to North Eastern major cities like Guwahati, Jorhat, Tezpur through National Highways - NH 36, NH 37 and State Highways. Nagaon bypass highway is the part of Asian Highway AH-1, which further connects it to countries in Asia like Cambodia, Thailand on east.

6.1.1.1 Interstate Connectivity (From Nagaon)

Nagaon is connected to major cities of Assam and other states of India by road and rail. Table 85 manifest the time taken (in hrs.) and distance (in km) from Nagaon to important cities of Assam and other states by different modes of transportation.

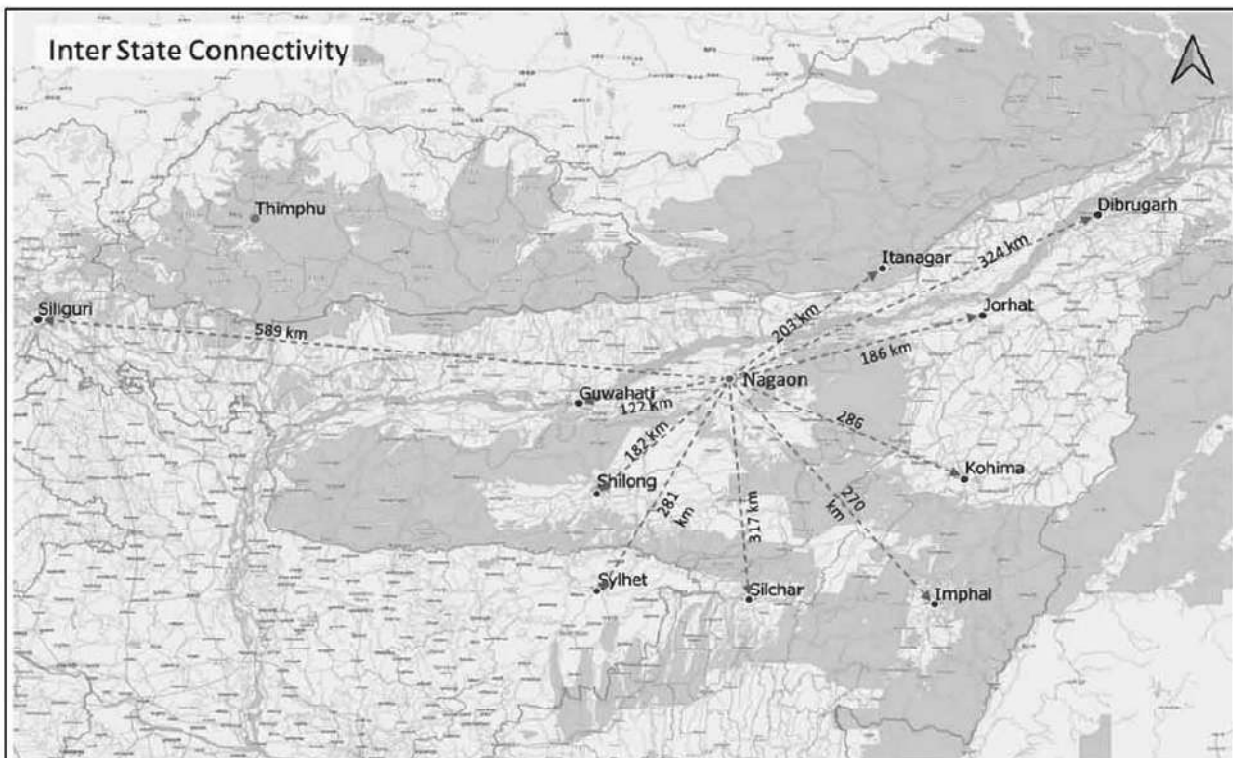


Figure 80: Interstate Connectivity from Nagaon district

Table 85 Interstate modes of transportation from Nagaon

Connectivity from Nagaon	Distance (km)	Time (hrs.)	
		By Road	By Rail
Shilong	182	4 hr	-
Silchar	317	9 hr	9 hrs
Imphal	270	10 hr	-
Kohima	286	6 hr	-
Jorhat	186	4 hr	-
Dibrugrah	324	8 hr	17 hrs
Itanagar	203	5 hr	-
Siliguri	589	11 hr	-
Guwahati	122	2 hr	3 hrs

(Source: Compiled by Consultants)

6.1.1.2 Intercity Connectivity (From Nagaon)

Nagaon has the intercity connectivity by road as well as by rail. The table no. 86 below shows the various modes of transportation and its connectivity with the nearest cities like Samaguri, Roha, Kampur and Dhing. The minimum connecting distance is 12 kilometers from Rupahi to Nagaon and maximum is 30 kilometers from Charaibahi.

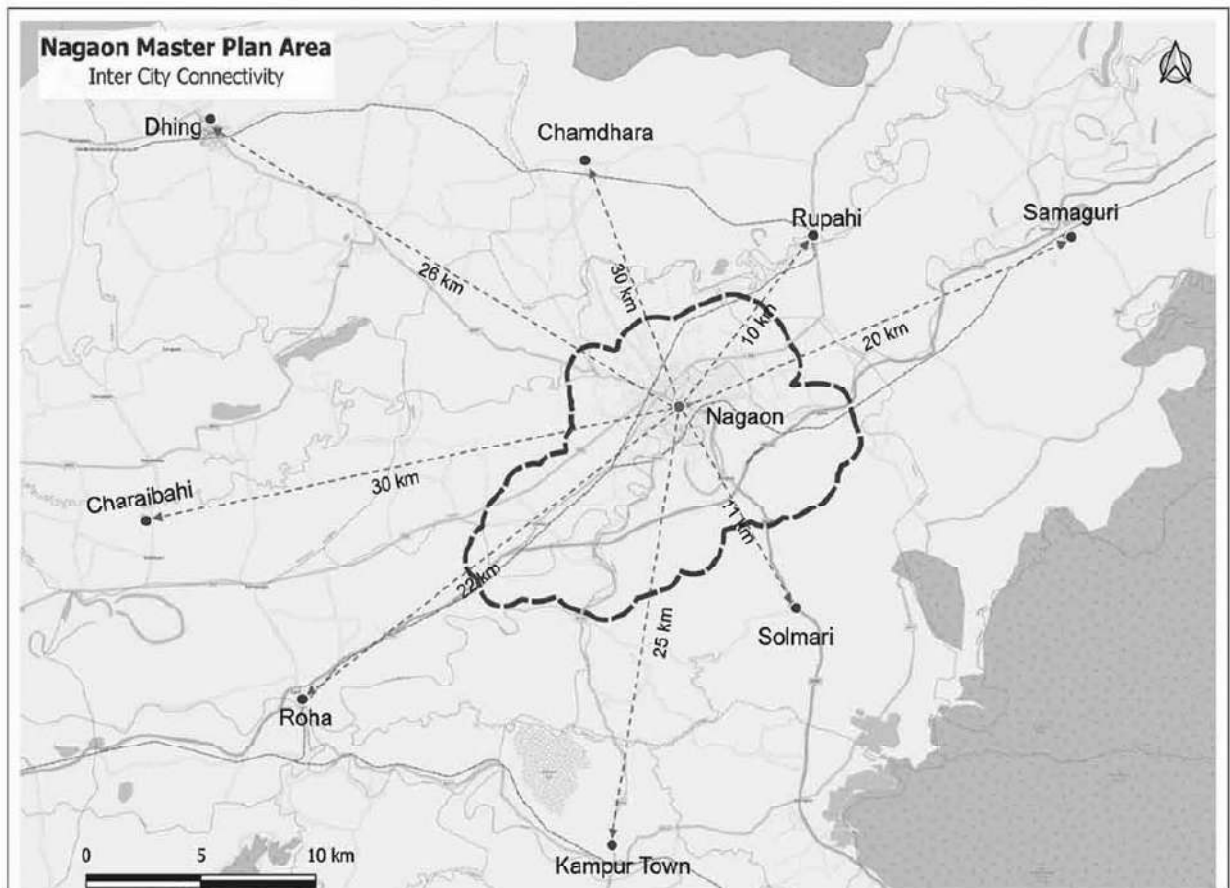


Figure 81: Intercity connectivity

Table 86 Intercity modes of transportation from Nagaon

Urban centres from Nagaon	Distance (km)	Duration (in hrs)	
		By Road	By Rail
Chamdihara	15	50 min	-
Rupahi	12	21 min	-
Samaguri	21	33 min	30 min
Solmari	13	21 min	-
Kampur town	29	41 min	45 min
Roha	23	31 min	-
Charaibahi	30	42 min	-
Dhing	28	55 min	-

(Source: Compiled by Consultants)

6.1.2 RAILWAYS

Nagaon is connected by Indian Railways network. There are several trains plying between Guwahati and Nagaon. Important stations of the town are Nagaon and Haibargaon.

The North- Frontier Railway branch line connects Nagaon town with the rest of the country via Chaparmukh. Nagaon town has got 2 railway stations namely Haibargaon Railway station and Nagaon Railway station. One line from Guwahati via Chaparmukh to Haibargaon which line is extended up to Dhing-Mairabari and another line from Guwahati via Chaparmukh-Nagaon to Silghat. Presently 4 nos. of passenger trains and 2 nos. of goods trains has been running daily to and from Nagaon station and 4 passenger trains runs daily to and from Silghat. The following table shows the movement by railways and income generated at Haibargaon station. Haibargaon Railway station has the computerized reservation facility.

6.1.3 AIRWAYS

The nearest airport is Salonibari Airport, Tezpur located at a distance of 80 Km. Lokapriya Gopinath Bordoloi International Airport, Guwahati (130 Km) has a good flight connectivity with all major destinations throughout the country. Helipad facility has been there in the city. The roads of the town are in a very critical stage. It lacks in infrastructure; one cannot differentiate between main road and secondary roads; wide carriage way but did not have footpaths, and most of them are encroached and taken over by shopkeepers, also did not have drainage facility along the road length and majority have no system of street lighting.

6.1.4 EXISTING ROAD NETWORK

To understand the demand-supply gap and accordingly to assess the improvement requirements of the study area a detail analysis of existing transport facility characteristics is necessary. As existing traffic and travel characteristics introduces the transport system demand, existing transport facility characteristics summarize the system supply. Appreciation of road network characteristics is important to assess existing capacity of the roads, identify the constraints, if any, and assess the potential for improvement/up gradation of the road network to cater the existing and projected traffic demand. For the present study, a detailed inventory of major road network has been carried out. The road network inventory data was analysed in terms of parameters like length of road, carriageway, width of footpath / shoulder, no. of lanes .

6.1.4.1 Primary Road Network

Nagaon is mainly connected to other important destinations by NH-37, NH-36, SH-3, SH-18, and SH-47. National Highway-37, in broad context, is a primary NH which connects States Assam and Arunachal Pradesh and contributes majorly in Nagaon economic development by its connectivity to important trading nodes. In Assam, NH-37 starts from Goalpara and ends at Roing (Arunachal Pradesh) covering total distance of 170 km. NH-37, within NMPA traditionally famous as Nagaon Morigaon road, enters from Garmur Satra gaon from West and bypasses Nagaon urban agglomeration through Nam-pathari and Maz-pathari villages finally merges with Old AT road and heads towards Kachari gaon in East. Old NH splitting from NH-37 enters Nagaon Municipal Board area from Bebejia in west by connecting Kumargaon, Sensuwa and Khutikatia finally ends at SH-3 near Haibar bazar junction. Another important highway is NH 36, which links Nagaon to southern urban centres and towns like Lumbding and Doboka by splitting from NH-37 at Borghat round about point. Other than NH, SH-3, SH-18 and SH 47 connects Nagaon to nearby important towns and urban nodes.

6.1.4.2 Secondary Road Network

Nagaon Urban Area is connected to its adjoining regions mainly via three **Major District Roads** and seven **Major City road**. They are:

1. Bebejia Dakshinpat Road (**MDR**) (SH-3 to SH-18 link road)
2. Singari Juria Road (**MDR**) (SH-47 to Singari-Juria road)
3. Nagaon – Juria Road (**MDR**) (Nagaon to Juria road)
4. Nagaon – Lumbding Road (Civil Hospital Gate - Borghat Point road)
5. ADP Road (Civil Hospital Gate to SH-3 Laokhowa road)
6. MD Road (Haibargaon Bazar road to SH-3 Laokhowa road)
7. MG Road (DC Office to ADP Road)
8. AT Road (Haibarbazar road to NH-37 (Uriagaon Chowk))
9. RK Road (Civil Hospital gate to Police Reserve Ground)
10. GNB Road (AT Road to Police Reserve Ground)

6.1.4.3 Tertiary Road Network

The tertiary road network consists of all the city roads and village roads and link roads which connect the rest of the settlements in the Planning Area. These roads connect the settlements along various contours and hilly undulating terrain

Nagaon district is relatively well placed is road infrastructure as compared to another district of Assam. As the Nagaon district is situated in the middle part of Assam the town is also well connected by roads linking with all the major tower of Assam. The

National Highway 36 and 37 passes through the heart of the town. The radial roads are primarily the major roads which connect the regions and the other important town with Nagaon.

As per record of Nagaon Municipal Board total road length is 82.5 km. out of which 50.3 km bituminous, 26.4 km. graveled and 5.8 km. earthen road. The NH-36 passes through the heart of the town and it is calculated about 8% of the total length. The river Kalong and its off streets have created the problem of linking between the two parts of the town. Moreover, in many cases the roads are not uniform with throughout the length which obstructs traffic from free flow.



6.1.5 ROAD INVENTORY

Road network of a city gives idea of the hierarchy of roads present in the city. The hierarchy of city is based on different widths of the roads. It also tells that which road perform which type of function like arterial road, sub-arterial road, collector streets or access roads. It is important to identify higher hierarchy roads as they are major transit corridors of any city. Road inventory is depicted in the figure 86 which includes all the highways, major roads, minor roads, private/public roads, village roads etc. The whole network shows the road connectivity in the city.

6.1.3.1 Road Hierarchy

The highways which pass through the Planning Area connects Nagaon to nearby cities. Except Highways and few other roads, majority of the roads in the Planning area are having a right of way less than 12m. For example, the roads running across key commercial areas such as Bara Bazar are too congested, and this leads to increased travel time within the city and deterioration in quality of life in these important nodes of the planning area.

The roads in the Planning area are

shown in the fig 65 in different categories with respect to their RoW. The RoW in the planning area varies from 6 m to 33 m. It can be observed from the fig. 83 that some of the important roads such as SH-3 do not have a uniform right of way. In Assam, SH-3 has a right of way of 20 m but reduces to 18 m as it enters in Nagaon MB area near Haibar Bazar Road to MD Road. It further reduces the width from 18 mt to 15 mt from MD Road to Uriagaon Junction. This patch of SH-3 is generally

observed with encroachment by unauthorized parking of HMPVs on both sides of road resulting in reduced accessible width of carriageway only by 8 m. The NH-37 and NH-36 have right of way of 25 mt. through NMPA. SH-18, runs through Nagaon city central area in parallel to Kolong river is having only 7.7 mt of RoW. However, Old NH in NMPA has RoW of 20 mt which increases to 33 mt as it enters Nagaon MB area near Sandapur Gaon but consist carriageway up to 12 m only.

6.1.3.2 Major Regional Roads National Highway (NH)

National Highways passing through the Nagaon Planning Area along with its length, width and number of lanes are presented in table 87. NH-37 enters from West at Garmur Satra gaon in NMPA further meets NH-36 at Borghat junction and heads towards

Kachari Gaon in East through Uriagaon junction. Another is the old NH, formerly known as Nagaon Morigaon road starts from junction near Dimow by splitting from NH-37 it ends to SH-3 at Haibar bazar road junction. Additionally, NH-36 links Nagaon to southern urban

centres and towns like Lumbding and Doboka by splitting from NH-37 at Borghat round about point.

Table 87 List of National Highways passing through Nagaon planning area

Sl. no.	Name of the road (NH)	Type of road	Length of the Road (km)	R.O.W (m)	Shoulder+ footpath width for one side (m)	No. of lanes
1.	Nagaon Morigaon road	NH 37	11	25	2.5	4
2.	Nagaon Lumbding road	NH 36	6.5	25	2.5	4
3.	Garmur Satra to Sandanpur road	Old NH	16	20	4	2
4.	Sandanpur to Haibar Bazar road	Old NH	1	33	21	2

Source: Compiled by Consultants

State Highway (SH)

The table 88 describes the State Highway passing through Nagaon Planning area with parameters like width of carriage way, its length and number of lanes. The SH-3 is one of the prime roads which enters NMPA city centre from west and by criss-crossing Nagaon from Upper north portion it finally heads towards Laokhowa in east. The total length falls under NMPA of SH-3 is 16 km where certain width variation observed throughout the length. SH-47 is another important state highway which connects Nagaon from its city centre to nearby Northern towns like Dhing and the total length of falls within NMPA is 5 km. SH-18, runs through Nagaon city central area in parallel to Kolong river is having only 8 mt.of RoW.

Table 88 List of State Highway passing through Nagaon planning area

Sl.no.	Name of the road (SH)	Type of road	Length of the Road (km)	R.O.W (m)	Shoulder+ footpath width for one side (m)	No. of lanes
1.	Lathabori to Haibar Bazar	SH 3	9	20	4	2
2	Haibar Bazar. To MD road	SH 3	2	18	2.5	2
3	MD to Uriagaon Junction	SH 3	5	15	1.5	2
4	Nagaon Kampur	SH 18	8	8	1	2
5	Dhing road	SH 47	5	12	2.5	2

(Source: Compiled by Consultants)

6.1.3.3 Major Roads

The major roads are the means to serve and connect all the areas in the city and to villages. As per IRC, the roads which are having road width greater than 10 m are counted as Major roads. Following are the roads which fall under this category as per IRC guideline.

Table 89 List of Primary roads of Nagaon MP area

Sl. no.	Name of the Roads (Major Roads)	Junction	Length of the Road (km)	R.O.W (m)	Width of the C.W. (mt)
1.	Bebejia Dakshinpat	Dimow Charall	1.7	10	7
2.	Singuri Juria	Dhing – Singuri juria	3.6	10	7
3.	Nagaon Juria road	SH-47-Juria road	3	10	7
4.	Haiborgaon Bazar road	Haiborgaon junction	1	15	12
5.	Medical road	Decappty junction	1	10	8
6.	GNB road	GNB - AT road	1	10	8
7	ADP Road	ADP – old AT road	1.2	10	6
8	MD road	MD road- Nagaon Morigaon road	1.5	10	5.1
9	AT Road	MG road – BM road	1.5	15	8
10	Nagaon Lumbding	Nagaon-Lumbding Chairali	5	15	7
11	MG road	Ramkrishna road- MG road	1.5	10	6.5
12	RK road	RK road- Nagaon Lumbding road	1	10	6.5
14	Tarun Phukan	MD road -Tarun phukan road	5	10	7

6.1.3.4 Urban Roads

All rest road network including street road, village road and other roads and counted as tertiary roads. Below in table 90 mentioned are the roads fall under this category.

Table 90 List of tertiary roads within NMPA

Sl.no.	Name of the Roads	Junction	Length of the Road (Km)	R.O.W (mt)
1.	Dr. Huze road	ADP road –DR. Huze road	0.68	9.8
2.	Jail Road	Jail road – Police Reserve road	0.59	4
3.	SM Road	SM road – Old AT road	0.61	5.6
4.	Kecha Ali Road	Nagaon Lumbding – Kecha ali road	1.2	4.7
5.	Nagaon Nonoï Road	Nonoi road – Maulana Azad road	5	5.7
6.	Maulana Azad Road	SK Bhuyan road – Maulana Azad road	0.7	9.3
7.	BB Road	Nagaon Lumbding road –BB road	0.17	6.1
8.	Bishnu Rabha Path	Polytechnic – Bishnu Rabha path	1.3	4



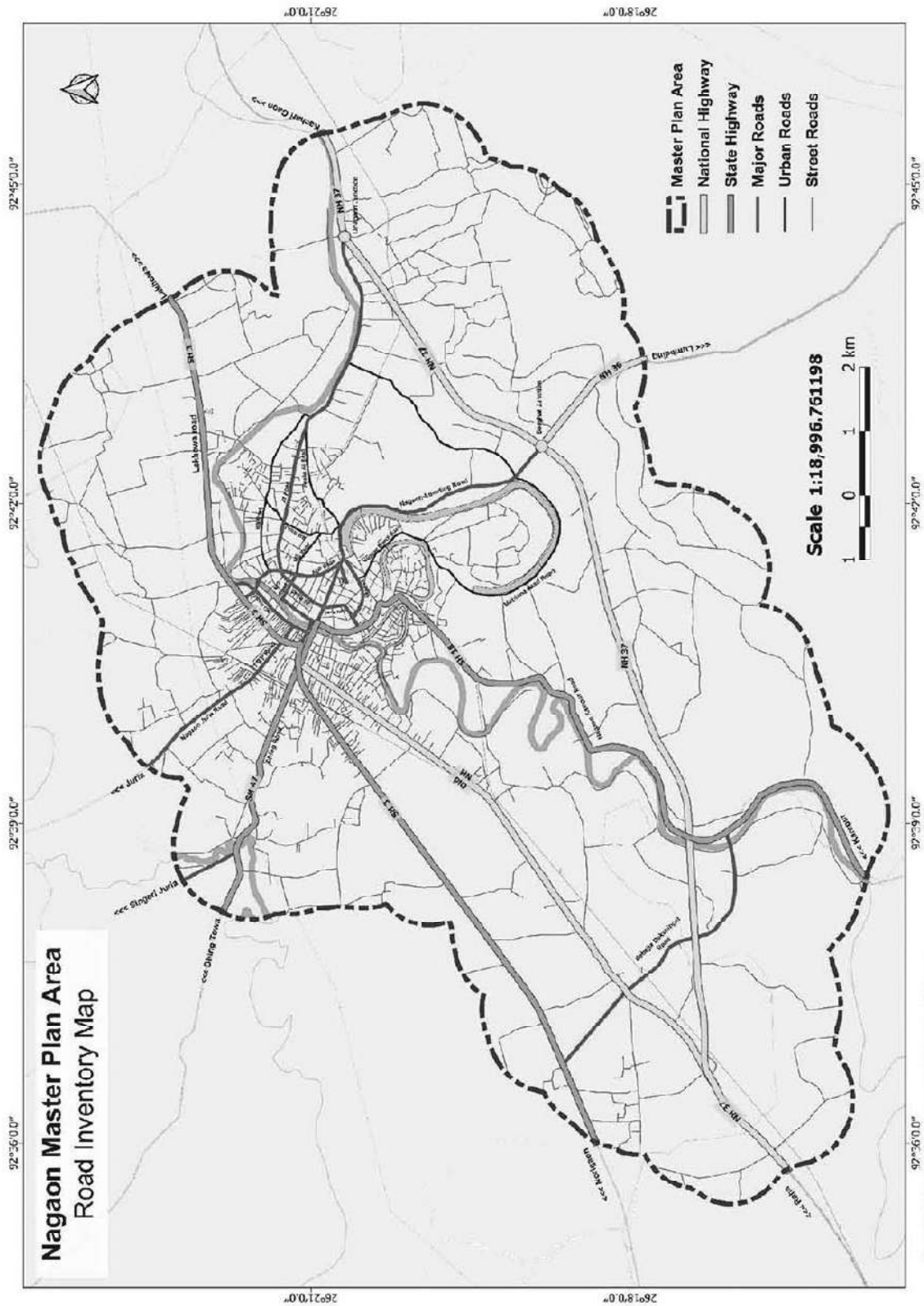


Figure 63: Road inventory map of Nagaon MP area

6.2 VEHICLE REGISTRATION

Vehicle registration is essential to establish link between a vehicle and an owner or user of the vehicle. In the table 91 given below, categories of public and private vehicles along with their number is mentioned. The information has been provided by the District Transport Office, Nagaon. The categorization has been done based on transport and non-transport use. Further in table 91, the number of vehicles is depicted in LMV (light motor vehicles) and HMV (heavy motor vehicles).

Table 91 Growth of first moving vehicle

Year	Truck	Light Vehicle			Bus	Taxi			Non-transport vehicles		
		3 wheeler	4 wheeler	Total		Four wheeler	Three wheeler	Total	Two Wheeler	Four wheeler	Total
2006-2007	97	119	313	529	7	57	271	328	4251	429	4680
2007-2008	63	117	205	445	17	72	301	373	3600	582	4282
2008-2009	65	101	146	247	2	203	345	548	3925	682	4607
2009-2010	84	204	113	317	2	305	606	911	5414	1091	6505
2010-2011	156	541	230	771	20	333	872	1205	8325	1317	9642
2011-2012	153	673	174	847	21	406	656	1062	9464	2105	11569
2012-2013	81	615	89	704	30	403	467	870	9535	2181	11716
2013-2014	92	283	131	414	77	340	621	961	11417	2486	13903

(Source: DTO, Nagaon 2006-13)

Table 92 LMV and HMV

Year		2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Trucks	Medium	-	-	2	-	-
	Heavy	53	56	64	142	158
L.C.V. Goods	Four wheeler	614	799	1075	1546	1830
	Three wheeler	158	133	173	128	134
	Total	772	932	1248	1674	1964
Bus	Contract carriage	47	71	28	50	36
	School buses	2	7	3	15	7
Taxi	A.A.T.T.	47	33	90	6	37
	Local Taxi	137	84	58	191	267
	Auto rikshaw	719	484	778	834	1077
	Total	903	601	926	1031	1381
Non-Transport Vehicles	Two wheeler	13367	13911	15264	23754	26163
	Four wheeler	2804	2860	3475	4232	4560
	Total	16171	16771	18739	27986	30723

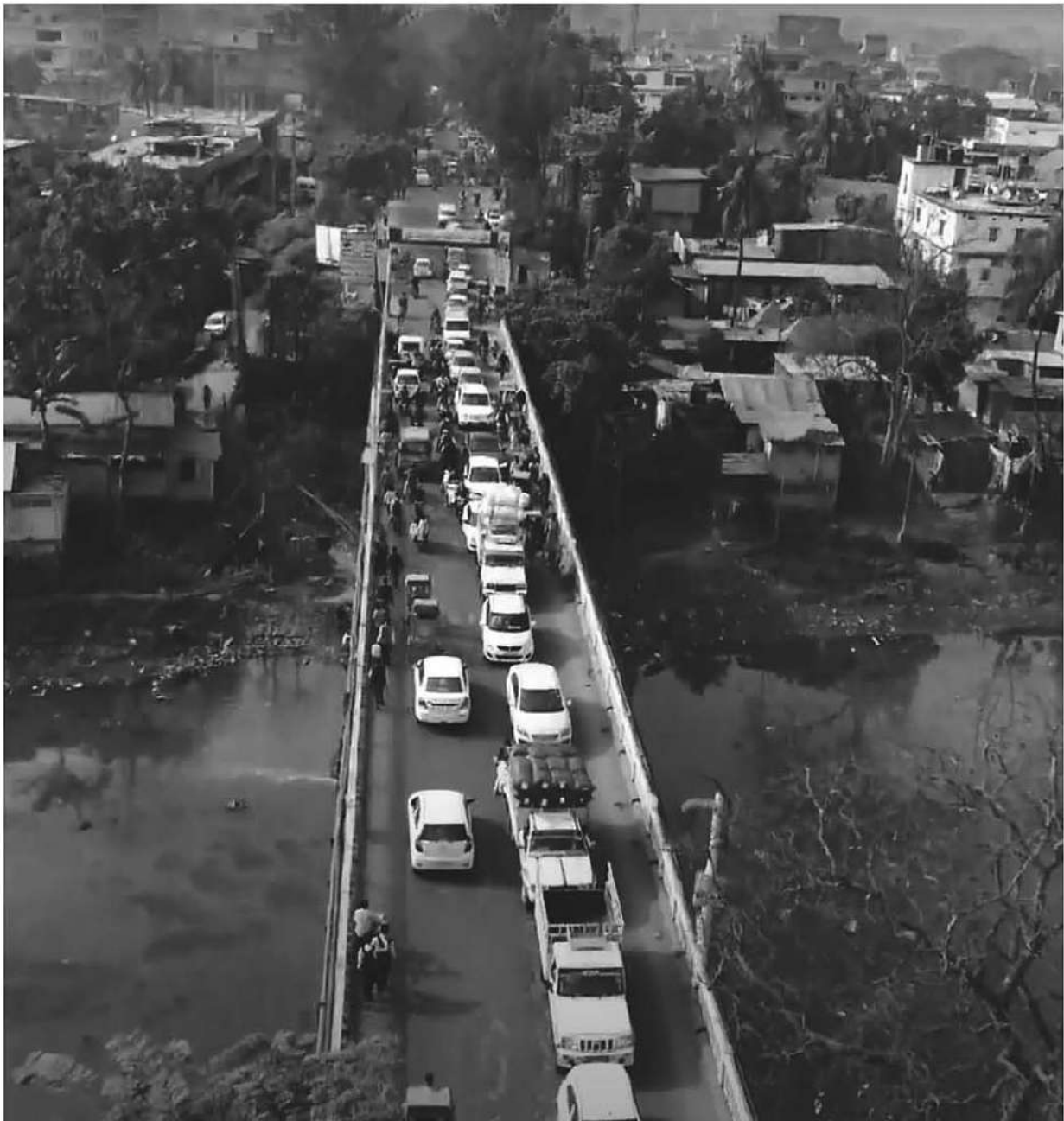
(Source: DTO, Nagaon 2014-19)

It is observed that Non-Transport vehicles are more than the number of Transport vehicles in Nagaon urban areas. The commodities mostly moved in these regional linkages are vegetables and consumption goods (18%-19%) followed by building materials (12%-13%). Many the freight vehicles are observed to be empty (nearly 51%-52%). This indicates a poor state of freight logistics in operation for the movement of goods – further increasing the cost of travel and lowering the demand for freight movement.

6.3 PUBLIC TRANSPORT

6.3.1 PUBLIC TRANSPORT AND ROUTES

The town has both railway and bus terminus which increases the chances of trade and commerce with other towns and free flow movement of people from one place to another. Public transport points as Railway Stations, ASTC Bus terminal, Bus Stand, Bus Stops, Auto stand, and taxi stands are mentioned in the fig 69 below.



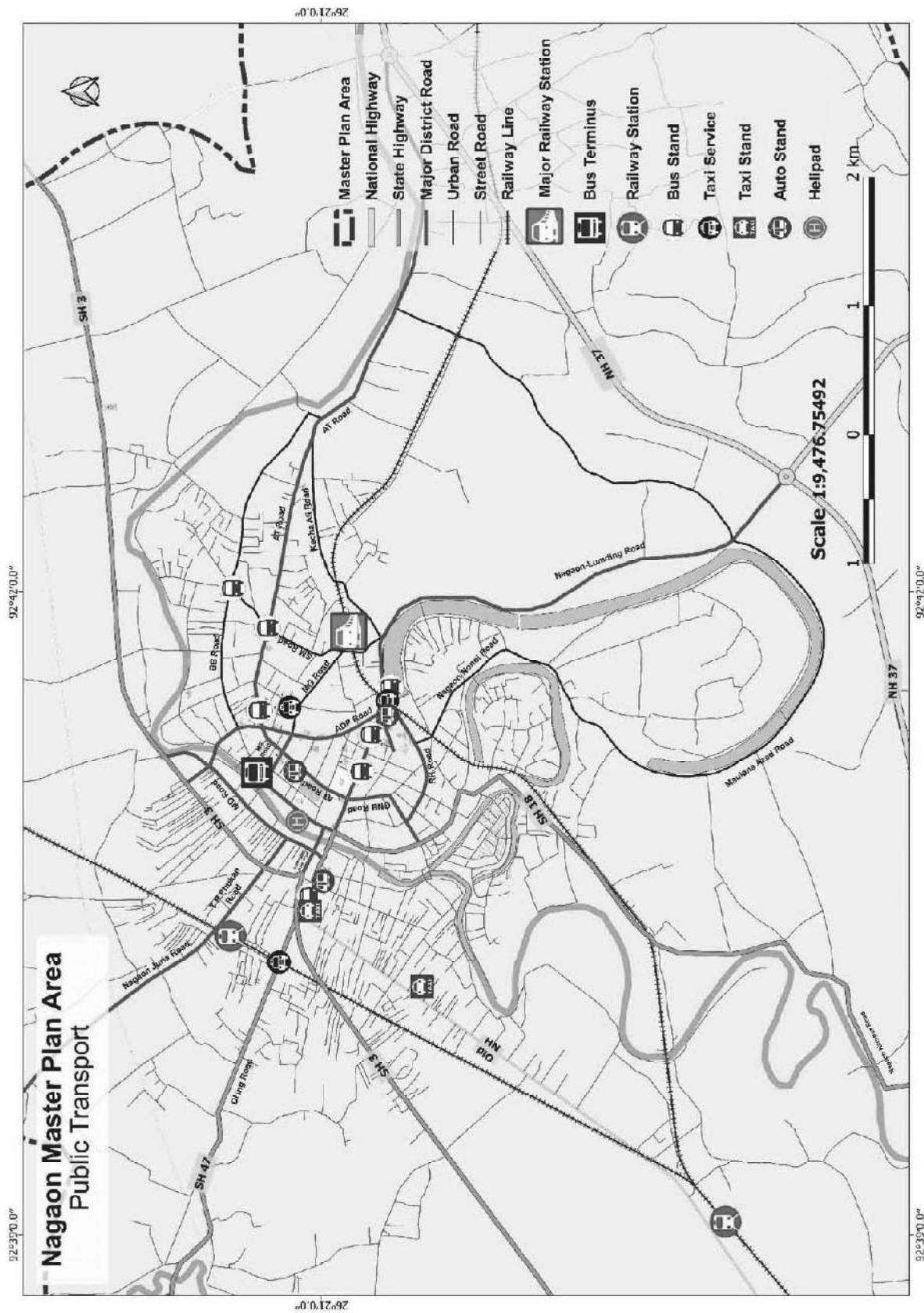


Figure 84. Public transport in Nagaon MP area

6.3.1.1 Bus Terminals

The Assam State Transport Corporation (ASTC) bus depot operates in the city to connect to nearby cities of the district and other major cities of the state, like Nagaon, Guwahati, Digboi. Volvo air-conditioned bus service is also functioning between major cities like Guwahati, Tezpur and Dibrugarh.

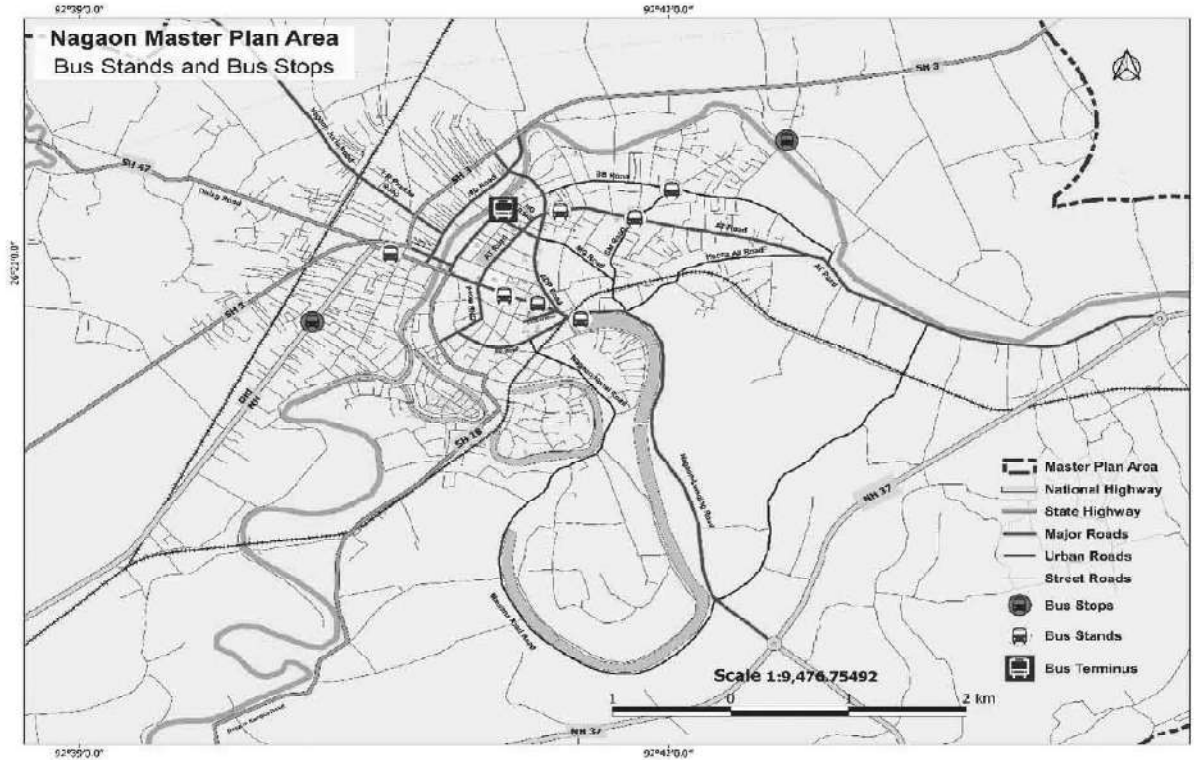


Figure 85: Bus stands in NMPA



The main roads are defined transport corridors in the city. Therefore, primary emphasis should be on consolidation of existing networks and then expanding it; bus depots proposed at suitable intervals along with the other infrastructure for the bus system. Existing bus stops lacks the same. In the integrated transport network concept, terminals are very important components as they enable integration between

the different modes of the system. Expect the existing A.S.T.C bus terminus located in the heart of the town, the other public and private Bus stands are most temporarily located at some busy roadsides which causes the traffic congestion and traffic. The bus stands located at different places of the town and their characteristics are as given below.



The road transport system is dependent upon Buses/minibuses. Following are the bus routes for local and regional passengers. There are three bus terminals in the city, one private and two government bus terminals. The table 93 below shows the name and location of all the bus terminals.

Table 93 Bus stations in Nagaon city

Terminal Centre	Location	Observations
A. Inter city	Bus station	
1. Passenger	A.S.T.C bus station	Centrally located, parking space is not sufficient. Waiting shed, toilet facilities should be extended. Passengers guest house facilities should be provided.
	North-East bus station (Near Manalisha Hotel)	Located at Haibargaon market area campus of the bus station is very narrow, so all the necessary facilities should be improved providing modern technology through proper planning.
	Nagaon- Dhing bus station (near Dhing rail gate)	Unplanned. Waiting shed and toilet facilities are nil. Roadside parking.
	Green Valley Bus Stand (near Sadar Thana)	Very congested, Unplanned. Always overcrowded. No waiting shed toilet facilities are very negligible.
	Dara Travels (709 bus stand)	Unplanned. No waiting shed and toilet.
	Samguri & Jakhalahandha (Tata magic stand)	Always overcrowded. No waiting shed and toilet facility. Roadside parking
B. Intra city	Railway stations	
	Haibargaon railway station	Railway station should be developed providing all modern facilities. Platform awaiting shed should be upgraded. Guest house facilities should be established.
	Nagaon railway station	Platform is open. There is no waiting shed on the platform. Toilet and sanitation facilities are very negligible. Booking and Reservation counters should be opened. Height of the platform should be raised. At all, the platform is required to be upgraded providing all modern facilities.

6.3.1.2 Railway Station

Nagaon has three railway stations and that has been mentioned in the table 94 below with the location. These stations are serving both passenger transportation as well as Freight transportation.



Table 94 Railway station in Nagaon master plan area

Railway Station	Location
Nagaon Railway Station	Pani gaon, Chota Haibor, Nagaon
Haibor Gaon Station	Haibor gaon, Nagaon
Babejia Railway Station	Tukulai Babejia, Nagaon

(Source: Compiled by Consultants)

6.3.1.3 Major Bus Stop

The major bus stop in the city has been mentioned in the table 95 described below. This bus stop is in the Master plan area.

Table 95 Major Bus Stops of Nagaon MP Area

Bus Stop	Location
ASTC bus Terminal	BM Road, Nagaon

(Source: Compiled by Consultants)

6.3.1.4 Freight Zones & Logistics

Table 96 Freight zones and logistics

Bus Stops/Terminus	Logistics	Communication Hubs	Railways
- ASTC, Nagaon	- Inland World Logistics - Ekart Logistics - Myntra Logistics	- All India Radio	- Nagaon Junction - Haibargaon Junction
- Marigaon Bus Stand - Guwahati Bus Stand - Lanka Bus Stand - Dara Bus Stand - Market Bus Stand			
- Natun Bazaar Bus Stop - Soi Ali Bus Stop - Panigaon Bus Stop - Diphalu Tiniali Bus Stop - Lakhinagar Chariali Bus Stop	- Delhivery Courier - Akash Ganga Courier - Flying Courier - Aramex Courier	- BSNL Assam Telecom Circle, Nagaon	- Babejia Junction - Senchoa Junction
- Chakalghat Chariali Bus Stop - Babejia Chariali Bus Stop - Dakarghat High School Bus Stop			

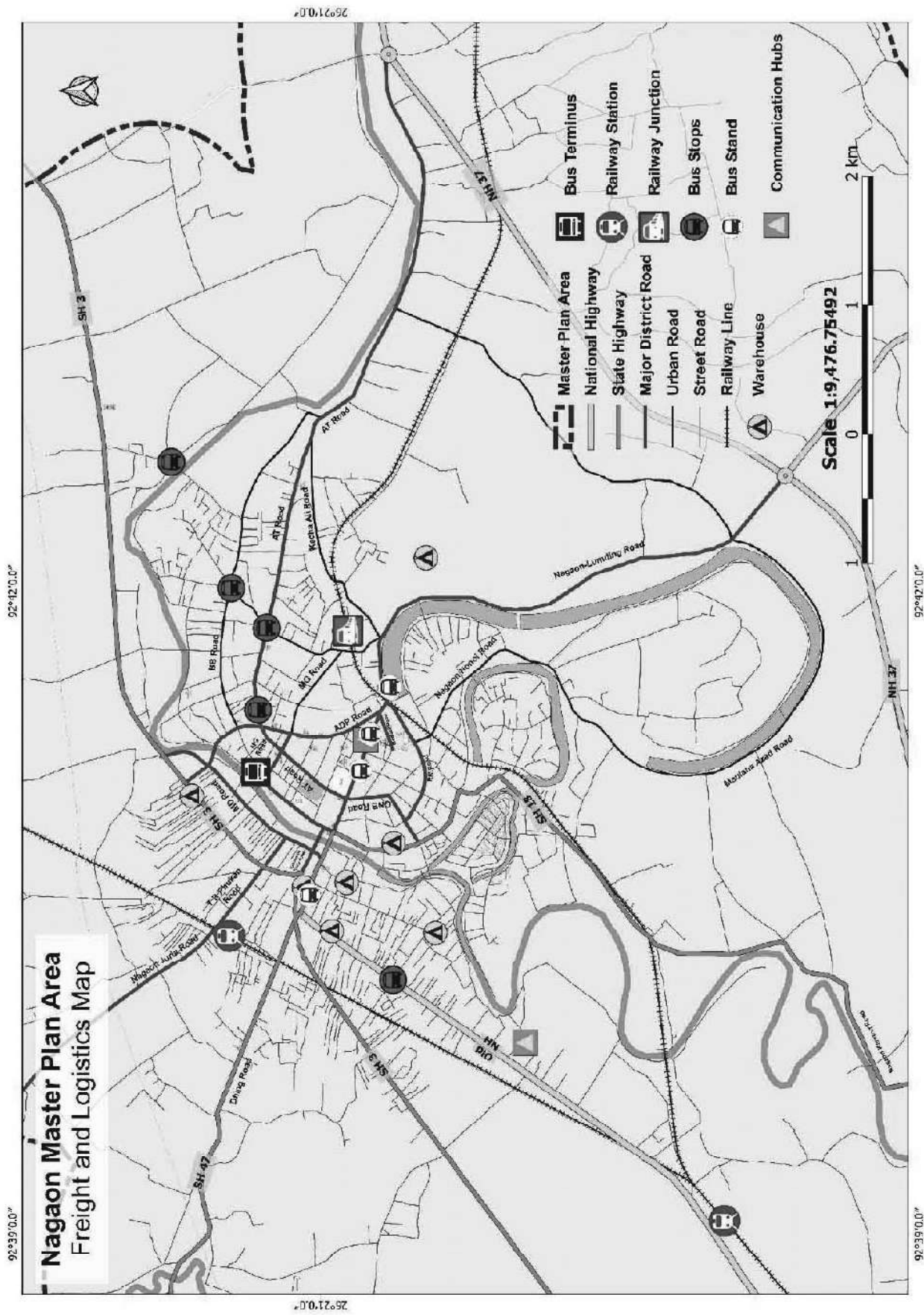


Figure 86: Freight and Logistic location Map

6.4 TRAFFIC SURVEY METHODOLOGY AND ANALYSIS

A comprehensive methodology has been evolved to carry out the work. A stepwise methodology is presented in Figure 87.

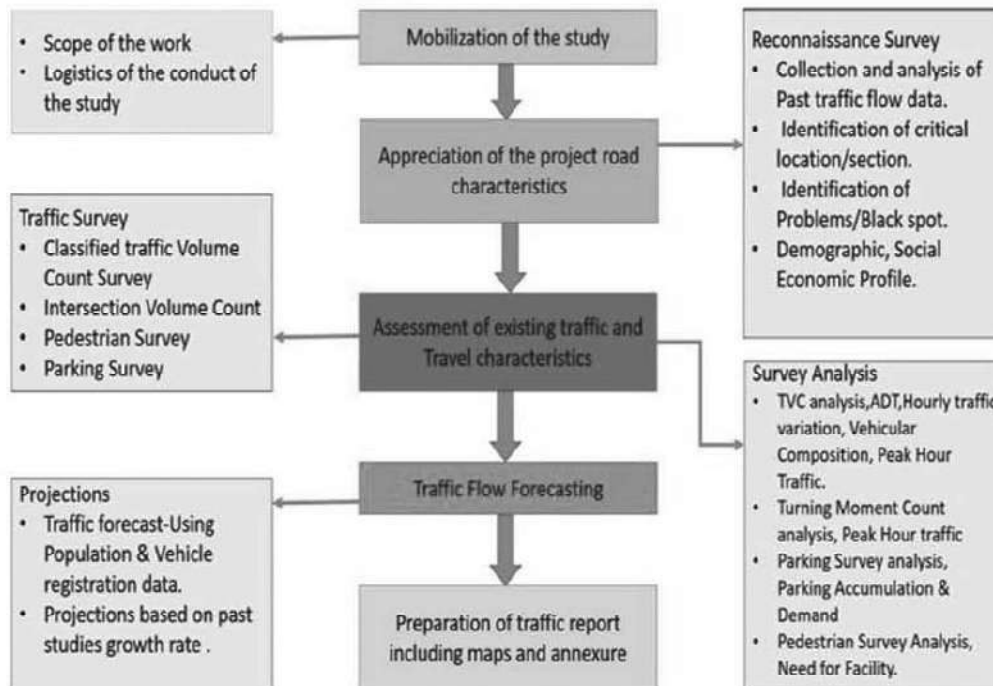


Figure 87: Traffic Survey Methodology

6.4.1 TRAFFIC SURVEY AND SCHEDULE

Classified Traffic Volume Counts (CVC's) have been conducted using manual count by trained enumerators method at different locations. The survey locations are depicted in Figure 91 Traffic survey stations have been selected by the Consultant based on understanding of the road network as well as consideration of the following aspects:

- To represent critical traffic section
- To be a major influence area
- To be located at a level with good visibility

Based on the detailed reconnaissance of the project area, major traffic generators, major intersections and travel patterns, Classified Volume Count (CVC) locations and other surveys were identified at different locations. 3-Day Classified Volume Count (CVC's) and 2-day Origin and Destination (O-D) Survey at a total of 9 locations (CVC at 7 and O-D at 2 locations) in Nagaon Planning Area to understand traffic intensity in the Master Plan Area.

Brief description and analysis of each of the above surveys are presented in the following sections. The schedule of all traffic surveys is presented in Table 97.

Table 97 Traffic Survey Locations and Schedule

Sr. No.	Type of Survey	Location	Date
1	Classified Traffic Volume Count	Haiborgaon Bazar Road	24/12/20, 25/12/20
		ADP Road	24/12/20, 25/12/20
		SH-47 (Dhing Road)	24/12/20, 25/12/20
		SH-3 (Lathabori- Haiborgaon Bazar)	24/12/20, 25/12/20
		Old NH (Nagaon Morigaon Road)	24/12/20, 25/12/20
		SH 3 (Laokhowa Road)	24/12/20, 25/12/20
		Nagaon Lumbding Road	24/12/20, 25/12/20
		GNB Road	24/12/20, 25/12/20
2	Origin-Destination Survey	SH-47, SH-3 and SH-18	21/12/20, 22/12/20
		Old NH	23/12/20
		Nagaon-Lumbding Road and AT road	21/12/20, 22/12/20
3	Turning Movement Count (Junction Analysis)	Dhing Gate Junction	21/12/20, 22/12/20
		Laokhowa Road- Hiborgaon Tiniali	21/12/20, 22/12/20
		Old NH-Hiborgaon Junction	21/12/20, 22/12/20
		Natun Bazar Chariali	21/12/20, 22/12/20
		Dekapatty Chariali	21/12/20, 22/12/20
		Civil Gate Junction	21/12/20, 22/12/20
4	Parking Survey	Barabazar	04/03/21
		DC court	04/03/21
		Haiborgaon Bazar	04/03/21
		Stadium Market	04/03/21
5	Pedestrian Survey	Barabazar	04/03/21
		DC court	04/03/21
		Haiborgaon Bazar	04/03/21
		Stadium Market	04/03/21
6	Speed Delay Survey	Haiborgaon Bazar road	05/03/21
		Dhing Road	05/03/21
		Bara Bazar Road	05/03/21
		GNB Road	05/03/21

(Source: Compiled by Consultants)

6.5 TRAFFIC INTENSITY

The various vehicle types having different sizes and characteristics were converted into equivalent passenger car units. The selected survey stretches comprise both urban and rural areas. Hence PCU values were adopted from IRC 64-1990 for rural areas and IRC-106-1990 for urban areas. The PCU values used are presented in Table 98.

Table 98 Vehicle classification system and PCU factors adopted for study

Sr. No.	Vehicle type	PCU factor for Urban	PCU factor for Rural
1	Car/Jeep/Van	1	1
2	Taxi	1	1
3	2-wheeler	0.75	0.5
4	3-wheeler	1.2	1
5	Minibus	1.4	1.5
6	Standard Bus	2.2	3
7	3-wheeler (Goods)	1.2	1
8	LDV	1.4	1.5
9	2 Axle	2.2	3
10	2 Axle	2.2	3
11	MAV	4	4.5
12	Tractor	1.4	1.5
13	Tractor with Tractor	4	4.5
14	Cycle	0.5	0.5
15	Other (JCB/HCM)	4	4.5

AT Road, ADP road, Dhing road, Sidha Morigaon road, Laokhaw road, nagaon-Lumding road and GNB road have been considered as urban roads. The photographs of survey locations are as shown in Figures below.



Survey at Natun Bazaar Chariali



Survey at Morikolong

Survey at Decapatty Chairali



Survey Haiborgaon Chairali



Survey at Haiborgaon Tinali



Survey at Dhing gate



Survey at Bara Bazar



Road section Measurement



6.5.1 HAIBORGAON BAZAR ROAD

Annual average daily traffic is 10503 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Some LCV were present while heavy goods vehicles like 2-Axle, 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 99.

Table 99 Average Daily Traffic & Annual Average Daily Traffic on Haiborgaon Bazar Road

Vehicle Types	ADT	AADT
Car/Jeep/Van	2635	2683
2-wheeler	4372	4632
3-wheeler	1492	1562
Minibus	240	310
Standard Bus	98	124
3-wheeler (Goods)	708	754
LCV	270	318
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailor	0	0
Cycle	777	830
Other (JCB/HCM)	0	0
Total (Nos)	10592	11213
Total (PCU)	9872	10503

(Source: Compiled by Consultant)

6.5.1.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 100.

Table 100 Directional Distribution of Traffic on Haiborgaon Bazar Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	SH-18 – MD road junc. to Haiborgaon junc. : Haiborgaon junc. to SH-18-MD road	SH-18 – MD road junc. to Haiborgaon junc. : Haiborgaon junc. to SH-18-MD road
Haiborgaon Bazar road	54:48	53:47

(Source: Compiled by Consultant)

6.5.1.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 89. Road section is occupied by mainly two-wheeler and car/utility vehicles which are 41% and 25% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 1% of traffic stream. Goods 3-wheeled vehicles (LCV) comprised 7% of traffic.

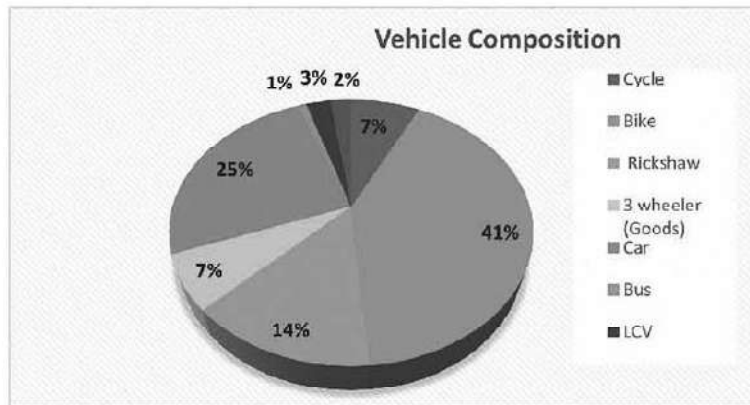


Figure 89: Composition of Traffic on Haiborgaon Bazar Road (Source: Compiled by Consultant)

6.5.1.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at AT Main Road as shown in Figure 90.

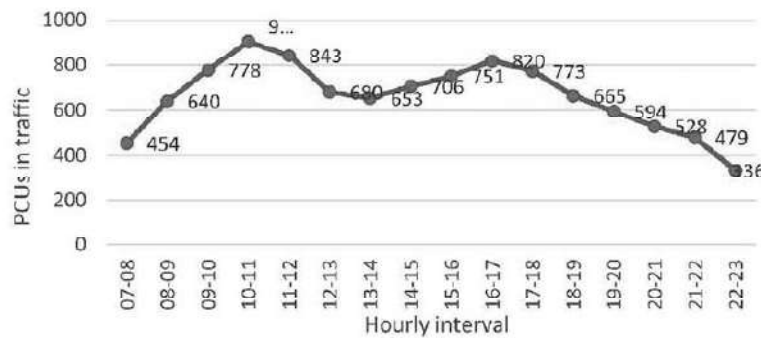


Figure 90: Hourly Variation of Traffic at Haiborgaon bazar Road

6.5.1.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 905 in PCU which is 8.5% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 101.

Table 101 Peak hour traffic on Haiborgaon Bazar road

PCU/hr	Peak Hours	Peak Hour Factor
905	10:00 to 11:00	8.5

6.5.2 ADP ROAD

Annual average daily traffic is 10040 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Some LCV were present while heavy goods vehicles like 2-Axle, 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 102.

Table 102 Average Daily Traffic & Annual Average Daily Traffic on ADP road

Vehicle Types	ADT	AADT
Car/Jeep/Van	2558	2613
2-wheeler	4245	4357
3-wheeler	1456	1499
Minibus	250	297
Standard Bus	95	93
3-wheeler (Goods)	774	769
LCV	256	297
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailor	0	0
Cycle	770	802
Other (JCB/HCM)	0	0
Total (Nos)	10404	10727
Total (PCU)	9720	10040

6.5.2.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 103.

Table 103 Directional Distribution of Traffic on ADP Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Natun Bazar chariali to Nagaon-Lumbding road: Nagaon-Lumbding road to Natun Bazar Chariali	
ADP Road	53:47	52:48

6.5.2.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 91. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 41% and 25% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 1% of traffic stream. Goods 3-wheeler vehicles comprised 7% of traffic, whereas LCV are 3% of total.

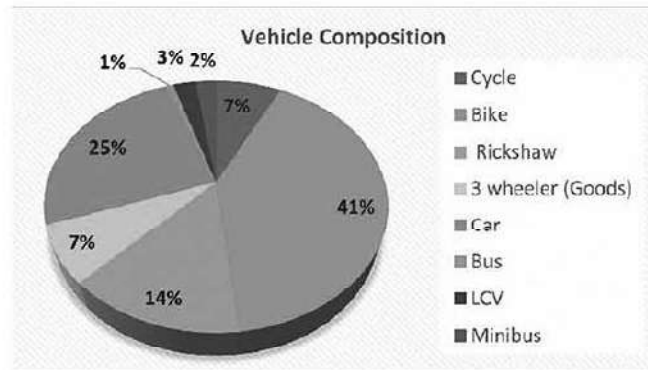


Figure 91: Composition of Traffic on ADP (Source: Compiled by Consultant)

6.5.2.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at ADP Main Road as shown in Figure 92.

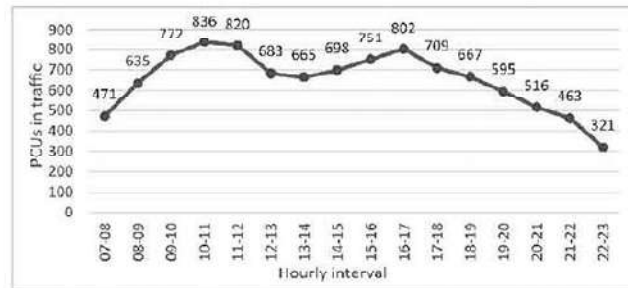


Figure 92: Hourly traffic variation of ADP road

6.5.2.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 836 in PCU which is 8.03% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 104.

Table 104 Peak hour traffic on SH-47 Road

PCU/hr	Peak Hours	Peak Hour Factor
836	10:00 to 11:00	8.03

(Source: Compiled by Consultant)

6.5.3 SH- 47 (DHING ROAD)

Annual average daily traffic is 15681 PCU in this road section. Passenger vehicles like car/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Some LCV were present while heavy goods vehicles like 2-Axle, 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 105.

Table 105 Average Daily Traffic & Annual Average Daily Traffic on SH-47 road

Vehicle Types	ADT	AADT
Car/Jeep/Van	1890	1957
2-wheeler	4465	4632
3-wheeler	2650	2853
Minibus	780	793
Standard Bus	80	93
3-wheeler (Goods)	2738	2876
LCV	1074	1175
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailor	0	0
Cycle	797	830
Other (JCB/HCM)	0	0
Total (Nos)	14474	15209
Total (PCU)	14874	15681

6.5.3.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 106.

Table 106 Directional Distribution of Traffic on SH-47 Dhing Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Dhing gate to Dhing road flyover: Dhing road flyover to Dhing gate	Dhing gate to Dhing road flyover: Dhing road flyover to Dhing gate
Dhing Road	54:46	54:46

6.5.3.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 93. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 31% and 13% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 1% of traffic stream. Goods 3-wheeler vehicles comprised 19% of traffic, whereas LCV are 7% of total.

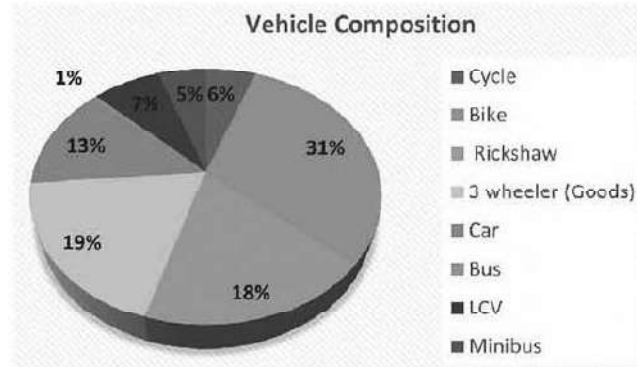


Figure 93: Composition of Traffic on SH-47 Dhing Road

6.5.3.3 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 1228 in PCU which is 8.48% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 107.

Table 107 Peak hour traffic on SH 3 Road

PCU/hr	Peak Hours	Peak Hour Factor
1228	10:00 to 11:00	8.48

6.5.3.4 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Dhing Road as shown in Figure 94.

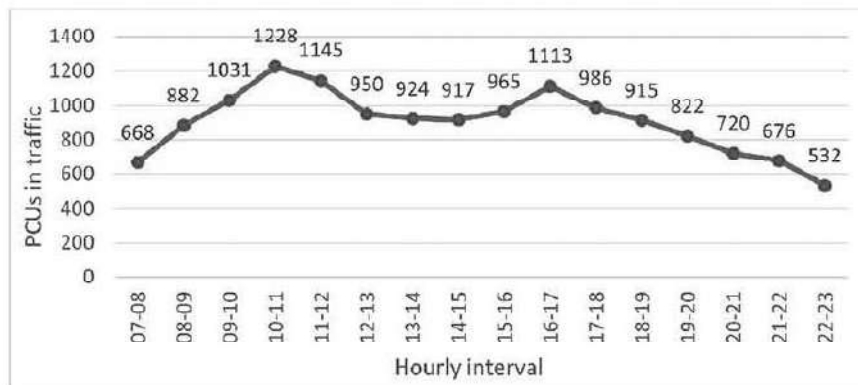


Figure 94: Hourly traffic variation of SH-3 Dhing gate

6.5.4 SH- 3 (LATHABORI – HAIBORGAON BAZAR ROAD)

Annual average daily traffic is 9598 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Goods 3-wheeler vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 108.

Table 108 Average Daily Traffic & Annual Average Daily Traffic on SH 3 road

Vehicle Types	ADT	AADT
Car/Jeep/Van	856	967
2-wheeler	3198	3284
3-wheeler	3233	3487
Minibus	75	84
Standard Bus	40	355
3-wheeler (Goods)	771	784
LCV	588	597
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailer	0	0
Cycle	837	913
Other (JCB/HCM)	0	0
Total (Nos)	9598	10387
Total (PCU)	9494	10746

6.5.4.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 109.

Table 109 Directional Distribution of Traffic on SH-3 (Lathabori to Haibor Bazar Road)

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Lathabori to Haibor bazar road: Haibor Bazar road to Lathabori	Lathabori to Haibor bazar road: Haibor Bazar road to Lathabori
SH-3 (Lathabori to Haibor Bazar road)	49:51	48:52

(Source: Compiled by Consultant)

6.5.4.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 95. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 33% and 9% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.1% of traffic stream. 3-wheeled vehicles comprised 34% of traffic, whereas trucks are 8% of total.

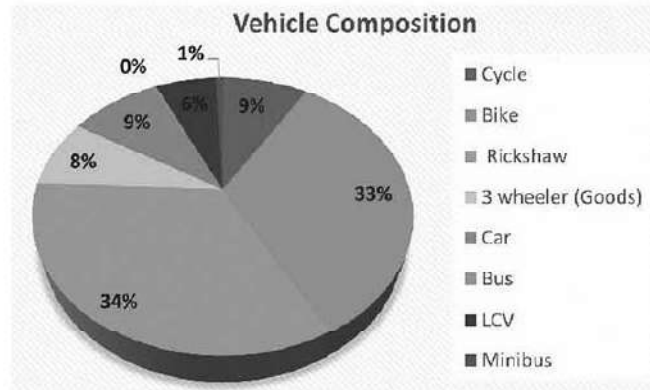


Figure 95: Composition of Traffic on SH-3 (Lathabori to Haibor bazar Road)

(Source: Compiled by Consultant)

6.5.4.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at SH 3 Lathabori -Old AT Road as shown in Figure 96.

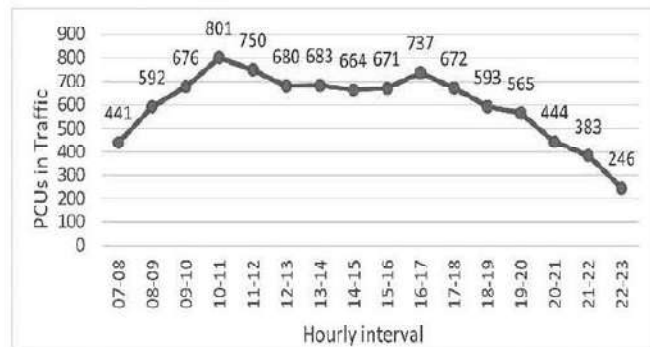


Figure 96: Hourly traffic variation of SH-3

6.5.4.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 801 in PCU which is 8.3% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 110.

Table 110 Peak hour traffic on SH-3 Road

PCU/hr	Peak Hours	Peak Hour Factor
801	10:00 to 11:00	8.3

6.5.5 OLD NH (NAGAON MORIGAON ROAD)

Annual average daily traffic is 9971 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Goods 3-wheeled vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 111.

Table 111 Average Daily Traffic & Annual Average Daily Traffic on Old NH road

Vehicle Types	ADT	AADT
Car/Jeep/Van	886	907
2-wheeler	3663	3714
3-wheeler	3213	3231
Minibus	37	43
Standard Bus	7	5
3-wheeler (Goods)	788	759
LCV	425	413
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Tractor	0	0
Cycle	952	978
Other (JCB/HCM)	0	0
Total (Nos)	9971	10050
Total (PCU)	9573	9619

(Source: Compiled by Consultant)

6.5.5.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 112.

Table 112 Directional Distribution of Traffic on Old NH Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCUW
	Haiborgaon Teniali to Babejia : Babejia to Haiborgaon Teniali	
Old NH Road	47:53	48:52

6.5.5.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 97. Road section is occupied by mainly two-wheeler and car/utility vehicles which are 37% and 9% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.1% of traffic stream. Goods 3-wheeler vehicles comprised 8% of traffic, whereas LCV are 4% of total.

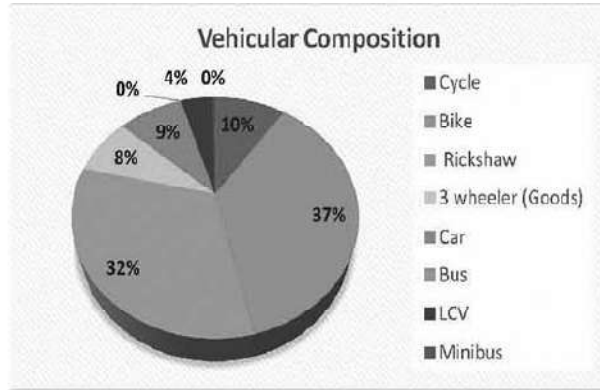


Figure 97: Composition of Traffic on Old NH (Nagaon Morigaon Road)

(Source: Compiled by Consultant)

6.5.5.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Old NH Road as shown in Figure 98.

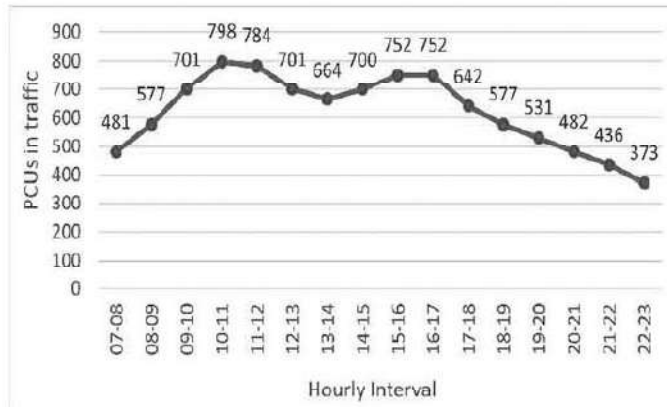


Figure 98: Hourly traffic variation of Old NH

(Source: Compiled by Consultant)

6.5.5.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 798 in PCU which is 8.0% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 113.

Table 113 Peak hour traffic on Old NH Road

PCU/hr	Peak Hours	Peak Hour Factor
798	10:00 to 11:00	8.0

(Source: Compiled by Consultant)

6.5.6 SH 3 (LAOKHOWA ROAD)

Annual average daily traffic is 17238 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in medium volume. LCV vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were observed here due to outer road links with other districts. ADT and AADT by vehicle type is presented in Table 114.

Table 114 Average Daily Traffic & Annual Average Daily Traffic on SH 3 road

Vehicle Types	ADT	AADT
Car/Jeep/Van	4095	4102
2-wheeler	5713	5893
3-wheeler	2779	2813
Minibus	742	805
Standard Bus	125	103
3-wheeler (Goods)	2263	2153
LCV	472	498
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Tractor	0	0
Cycle	1049	975
Other (JCB/HCM)	0	0
Total (Nos)	17238	17342
Total (PCU)	16929	17019

(Source: Compiled by Consultant)

6.5.6.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 115.

Table 115 Directional Distribution of Traffic on SH-3 (Laokhowa Road)

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	MD road to Palasoni road: Palasoni to MD road	MD road to Palasoni road: Palasoni to MD road
SH-3 (Laokhowa Road)	52:48	53:47

(Source: Compiled by Consultant)

6.5.6.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 99. Road section is occupied by mainly two-wheeler and car/utility vehicles which are 36% and 24% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 1% of traffic stream. LCV vehicles comprised 3% of traffic.

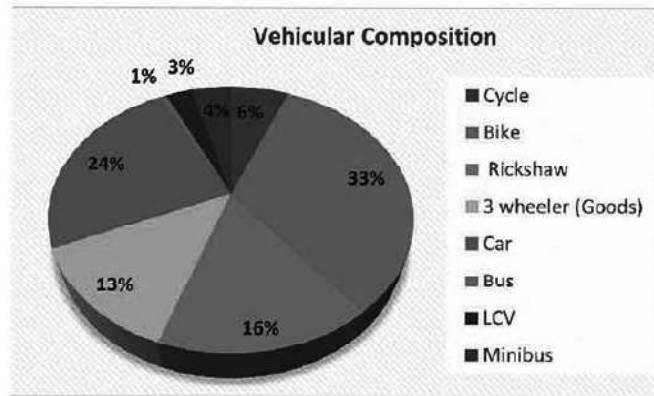


Figure 99: Composition of Traffic on SH-3 Laokhowa Road
(Source: Compiled by Consultant)

6.5.6.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Laokhowa Road as shown in Figure 100.

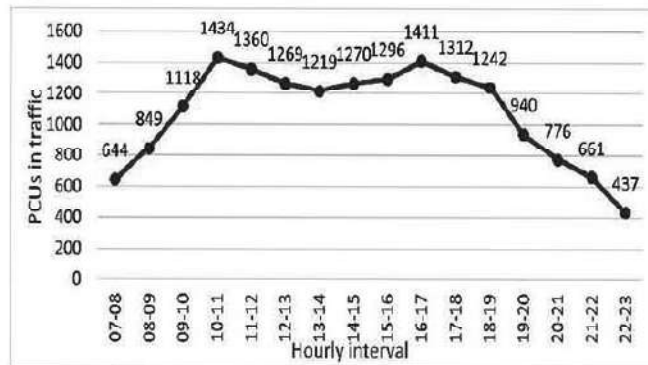


Figure 100: Hourly traffic variation of SH-3

6.5.6.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 434 in PCU which is 8.31% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 116.

Table 116 Peak hour traffic on SH 3 Laokhowa Road

PCU/hr	Peak Hours	Peak Hour Factor
434	10:00 to 11:00	8.31

(Source: Compiled by Consultant)

6.5.7 NAGAON LUMBDING

Annual average daily traffic is 14126 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in medium volume. LCV vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were observed here due to outer road links with other districts. ADT and AADT by vehicle type are presented in Table 117.

Table 117 Average Daily Traffic & Annual Average Daily Traffic on Nagaon-Lumbding road

Vehicle Types	ADT	AADT
Car/Jeep/Van	3438	3422
2-wheeler	4554	4453
3-wheeler	2280	2315
Minibus	570	593
Standard Bus	339	410
3-wheeler (Goods)	657	624
LCV	521	510
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailer	0	0
Cycle	1809	1799
Other (JCB/HCM)	0	0
Total (Nos)	14168	14126
Total (PCU)	13556	13634

(Source: Compiled by Consultant)

6.5.7.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 118.

Table 118 Directional Distribution of Traffic on Nagaon Lumbding Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Morikolong to Borghat point: Borghat point to Morikolong	Morikolong to Borghat point: Borghat point to Morikolong
Nagaon Lumbding	52:48	53:47

(Source: Compiled by Consultant)

6.5.7.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 101. Road section is occupied by mainly two-wheeler and car/utility vehicles which are 32% and 24% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 2% of traffic stream. LCV vehicles comprised 4% of traffic.

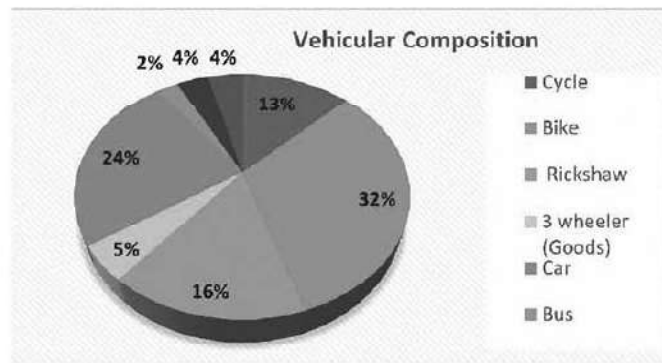


Figure 101: Composition of Traffic on Nagaon – Lumbding Road

(Source: Compiled by Consultant)

6.5.7.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Nagaon Lumbding Road as shown in Figure 102.

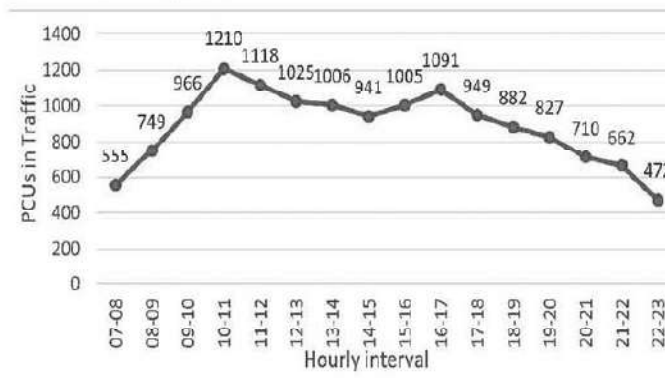


Figure 102: hourly variation of Nagaon-Lumbding road

(Source: Compiled by Consultant)

6.5.7.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 1210 in PCU which is 8.54% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 119.

Table 119 Peak hour traffic on Nagaon Lumbding Road

PCU/hr	Peak Hours	Peak Hour Factor
1210	10:00 to 11:00	8.54

(Source: Compiled by Consultant)

6.5.8 GNB ROAD

Annual average daily traffic is 12949 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in medium volume. LCV vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were observed here due to outer road links with other districts. ADT and AADT by vehicle type is presented in Table 120.

Table 120 Average Daily Traffic & Annual Average Daily Traffic on GNB road

Vehicle Types	ADT	AADT
Car/Jeep/Van	4470	4632
2-wheeler	4452	4632
3-wheeler	1484	1507
Minibus	242	269
Standard Bus	100	107
3-wheeler (Goods)	720	723
LCV	271	286
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Tractor	0	0
Cycle	714	798
Other (JCB/HCM)	0	0
Total (Nos)	12453	12949
Total (PCU)	11749	12182

6.5.8.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 121.

Table 121 Directional Distribution of Traffic on GNB Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Decapatty to Bara Bazar: Bara Bazar to Decapatty	Decapatty to Bara Bazar: Bara Bazar to Decapatty
GNB Road	52:48	53:47

(Source: Compiled by Consultant)

6.5.8.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 103. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 36% and 36% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 1% of traffic stream. LCV vehicles comprised 2% of traffic.

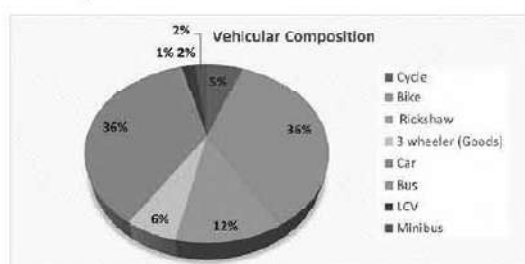


Figure 103: Composition of Traffic on GNB Road

6.5.8.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at GNB Road as shown in Figure 104.

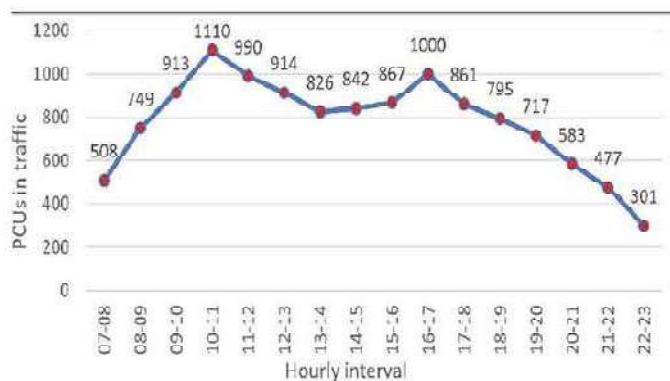


Figure 104: Hourly traffic composition of GNB road

6.5.8.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 1110 in PCU which is 8.91% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 122.

Table 122 Peak hour traffic on GNB Road

PCU/hr	Peak Hours	Peak Hour Factor
1110	10:00 to 11:00	8.91

6.5.9 TRAFFIC CONGESTION

Traffic congestion takes place when traffic spills over than the design capacity of any road. The severity of traffic congestion can be identified using average daily traffic count and volume by capacity ratio method. Ratio greater than 1 indicates sever congestion, 0.75 to 1 indicates heavy congestion, 0.50 to 0.75 indicates moderate congestion and less than 0.5 considered as low congestion.

Form the analysis mentioned in above Table 123 it can be inferred that the patches of Nagaon-Lumbding road, SH-47 (Dhing road) and SH-3 (Laokhowa) are congested with heavy traffic. Another major road i.e., Nagaon-Lumbding road is moderately congested and remaining five roads are less congested.

Table 123 V/C ratio on Major roads

Sr no	Location	ADT	V/C
1	Haiborgaon Bazar road	10592	0.60
2	ADP road	10404	0.59
3	SH-47 Dhing road	14474	0.83
4	SH-3 (Lathabori-Haiborgaon Bazar road)	9598	0.55
5	Old NH (Nagaon Morigaon road)	9971	0.57
6	SH-3 (Laokhowa)	17238	0.99
7	Nagaon-Lumbding road	14168	0.81
8	GNB road	12453	0.71

6.5.10 OVERVIEW OF CRITICAL ROADS

Road capacity in general refers to the maximum traffic flow obtainable on a given roadway using all available lanes. Critical roads depend upon several factors, mainly, traffic conditions, road geometry characteristics, environmental factors etc. The critical assessment of road capacities on major urban roads is carried out by field traffic surveys to capture the classified volume count for primary, secondary, and tertiary roads spread across the city through manual as well as video graphic techniques. Based on the collected data, the existing traffic volume per lane was ascertained during peak hours. This has been compared with the maximum Road capacity values to critically analyse the existing capacity potential of major roads in the city. Based on our study, the critical roads were observed and depicted in Map given below. The critical roads, depicted with blue color, include, SH-47 (Dhing road), SH-3 (Laokhowa) and Nagaon-Lumbding road, indicates that there is need to decongest the roads and propose for road widening in order to ensure free flow of traffic movement in NMPA.



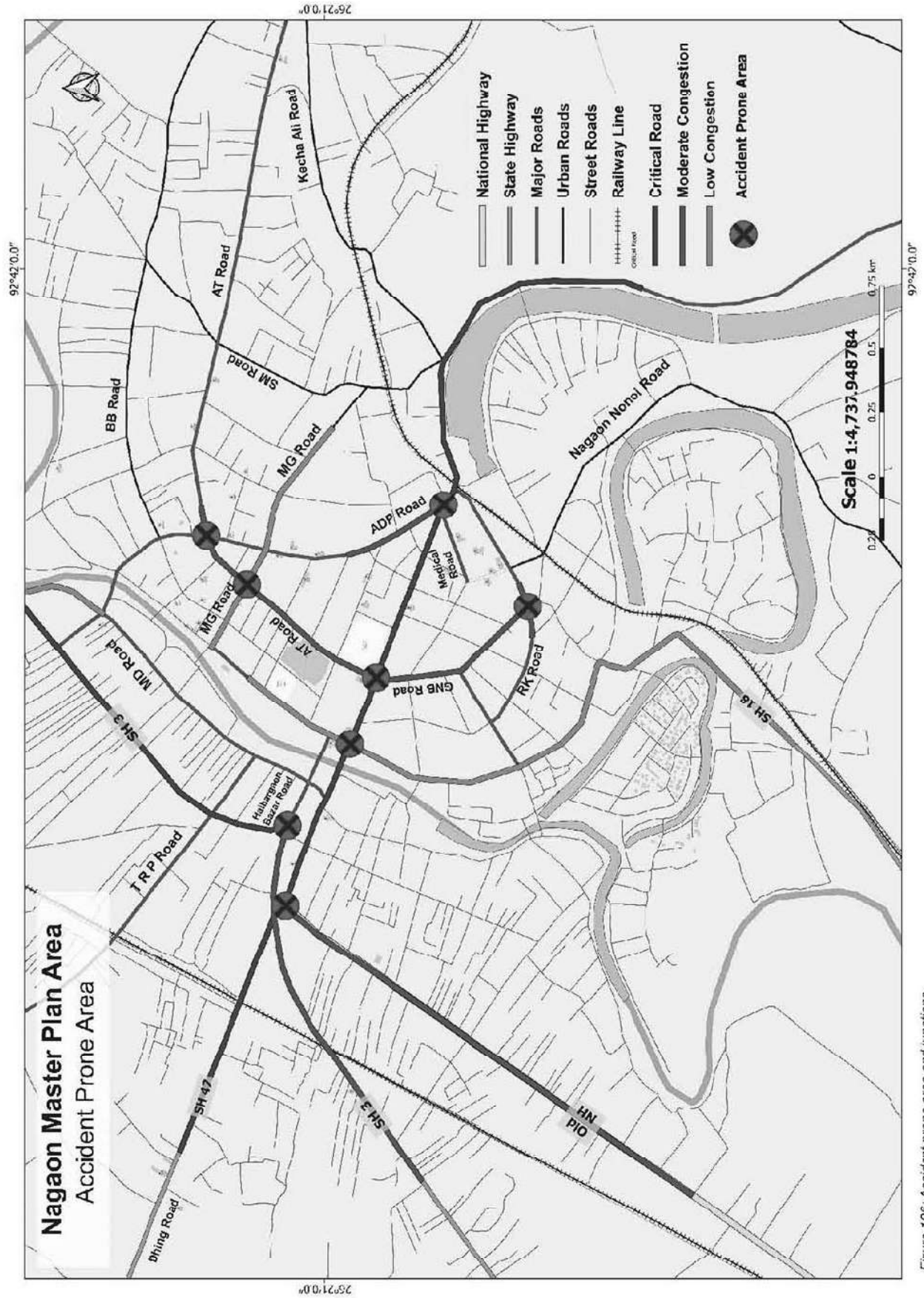


Figure 106. Accident prone area and junctions

6.6 VEHICULAR TRAVEL PATTERN

The travel pattern of vehicles in the project area was studied. The data collected from the field was subsequently grouped according to origin and destination of vehicles, which led to development of the zoning system. The Roadside Interview method, as detailed in IRC: 102-1988, has been adopted for O-D survey. The survey has been carried out for both passenger and goods vehicles for 12 hours (in both directions). For this purpose, cars (including new and old technology cars) and buses were considered as passenger vehicles. Similarly, LCVs, 2-Axle Trucks, 3-Axle Trucks, 4-6 Axle Trucks and ≥ 7 -Axle Trucks were considered as goods vehicles. Trained enumerators under the supervision of Traffic Police collected the travel information.

6.6.1 ZONING SYSTEM

Origin-Destination (OD) analysis is required for designation of the PIA in terms of codified origin and destination zones. It is thus important to code the trips recorded at site for origin and destination zones. The zoning, emanating from the understanding of the surrounding road network and the travel pattern of the vehicles by the consultants, was done in four levels. In the first level, all-important towns located along the study stretches were assigned zone code. Secondly, immediate influence areas of study stretches were considered, and nearby areas/ towns were defined as

6.6.2 DATA CODING AND CHECKING

The collected data were coded and computerized. Checking of data for incorrect entries and coding was carried out by cross checking with original field data sheets. The data were also checked for inconsistencies. The checking included:

- Code number exceeding highest code
- Matching vehicle type with commodity carried
- Vehicle type with their corresponding lead/load/occupancy for any inconsistencies

6.6.3 DEVELOPMENT OF ORIGIN-DESTINATION MATRICES

After coding of Origin and Destination data, expansion factors were calculated by comparing the sample size collected for each vehicle type with traffic count data. After calculating expansion factors, Vehicle wise O-D matrices were developed. Based on O-D matrices, travel pattern of the vehicles moving on the project road was determined. The O-D matrices of all 6 locations were combined to arrive at the project O-D matrix.

6.6.4 COMMODITY ANALYSIS

Commodity movement pattern shows that there is considerable movement of mining products, food grains & other agricultural products, finished & manufactured products and building materials. A large proportion of empty vehicles were also recorded. Mode-wise distribution of various commodities is presented in Table 124.

Table 124 Vehicle Wise Commodity Distribution (In Percentage)

Sr. no.	Commodity Analysis	LCV	MCV	HCV	MAV
1	Food grains, other agricultural products	8	3	0	0
2	Fruits, vegetables - perishables	15	1	0	0
3	Wood, Forest Products	0	0	0	0
4	Petroleum, oil, gas, lubricants	3	0	0	0
5	Minerals, chemicals, fertilizer	2	0	0	0
6	Iron, metal, steel	1	0	0	0
7	Finished & manufactured products	5	1	0	0
8	Building materials	12	3	0	0
9	Mining materials (Sand, Bajri, Coarse Aggregate)	14	4	0	0
10	Cement	4	0	0	0
11	Miscellaneous goods (Livestock, Waste, paper etc)	1	1	0	0
12	Empty vehicles	18	3	1	0

6.7 ORIGIN-DESTINATION SURVEY

6.7.1 PASSENGER VEHICLE

The analysis of passenger vehicles shows that maximum traffic (46%) circulates within Nagaon City. Traffic between Nagaon City and another district also observed 46% where major traffic flow plays between Nagaon and Guwahati as 6%. .and 2% traffic ply between Nagaon and Tezpur. Spatial distribution of passenger trips is presented in Table 125.

Table 125 Major Trip Distribution of Vehicles

Between	% Share
Guwahati	42
Babejia	10%
Dimargurhi	10%
Sensuwa	14%
Samaguri	09%
Nagaon to Rest of Districts	15%

6.7.2 FREIGHT VEHICLES

Analysis of goods vehicles shows that 38% freight trips are within Nagaon City and 42% freight is from Nagaon to another district wherein 17% trip plays to Guwahati city. The trips with Nagaon City and Tezpur were recorded at 3%. Table 126 shows the distribution of freight trips.

Table 126 Distribution of freight vehicle

Between	% Share
Within Nagaon City	38%
Outside Nagaon City	42%
Nagaon to Guwahati	17%
Nagaon to Tezpur	3%

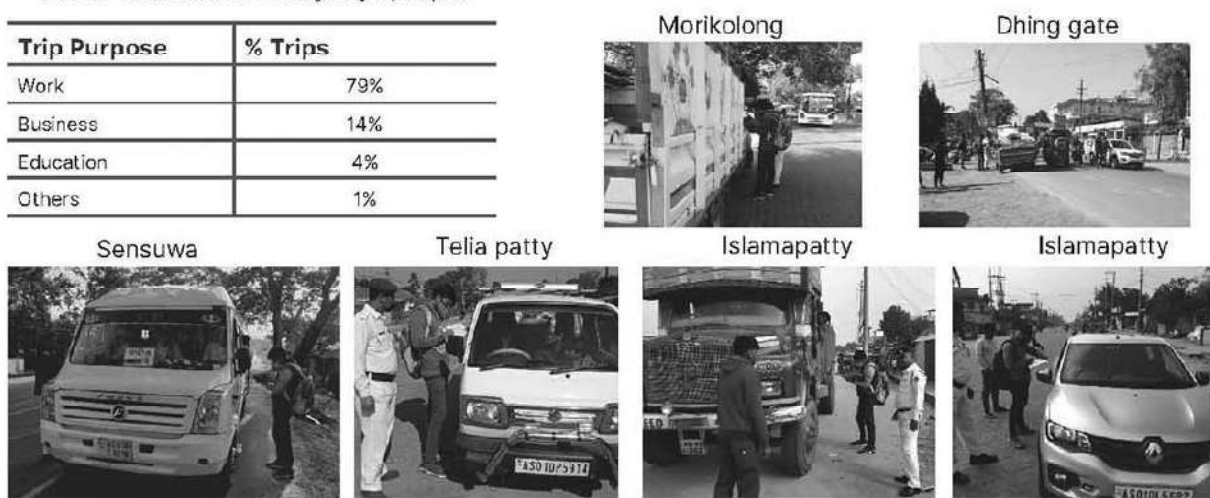
(Source: Consultant Compilation)

6.7.3 OCCUPANCY AND TRIP PURPOSE

The analysis of OD data for passenger cars and buses shows that the average occupancy for these vehicles along the project road is 3 and 32. It is observed that the major share of trips is related to work. The distribution of car passengers by trip purpose is shown in Table 127.

Table 127 Distribution of Car Passengers by Trip Purpose

Trip Purpose	% Trips
Work	79%
Business	14%
Education	4%
Others	1%



6.8 JUNCTION ANALYSIS

The areas with major traffic congestion have been marked with red spots in figure no 107. These are the junctions which observed with frequent traffic congestions due to many haphazard vehicle parking, encroachment by mobile vendors, improper junction designs and insufficient space for vehicle movement. The identified junctions for analysis are Dhing gate junction, Haiborgaon tiniali, Haiborgaon-Laokhowa road junction, Natun Bazar chariali, Marikonlong (Civil Hospital gate) and Decapatty junction.

Table 128: The major traffic nodes of Nagaon city.

Sr. No.	Location of point	Description
1	Nagaon college police point	Entry to the Bara Bazar, DC court, to some banks, educational institute and offices. It is also a connecting point of NH-36 and NH-37. The NH-36 started from this point.
2	Civil Hospital point	Entry to the main market (Barabazar), Civil Hospital and to some Administrative centre such as Sadar Thana, BSNL Head Office and to some private bus stand.
3	Jayasree Cinema Hall point.	It is a commercial centre of the town consisting of major shops, entry to many offices, ASTC bus stand, some educational centre and act as a transfer point of passenger.
4	Natun bazar point	This is a commercial place consist of some shops, daily vegetable market and link with some educational centres.
5	Rajasthan Hotel point	It is also a business centre consist of variety of major shops. Numbers of banks are situated in this area, entry to bus stand, Nurul Amin stadium Govt. Boy's H.S.S.L.C School and Nehru Ball Field.
6	Panigaon Chariali point	Entry to ITI, ITI daily market, polytechnic, B.ED college, central school and entry to some offices and residential areas.
7	Alpinshan Cinema Hall point	Entry to the Barabazar Daily Market, Civil Hospital.
8	Morikalong Chariali police point	Entry to the main town and to some educational institution and offices.
9	Dhing Rail Gate point	It is an important traffic intersection and transfer point. It is also a main appoint entry to the heart of the town and to the Haibargaon main commercial area. A lot of traffic is generated from the railway junction due to its multi-faceted activities.
10	Morigaon Bus stand Chariali point	Entry to the Haibargaon Daily Market and to some residential area, this point also act as transfer of passenger.



6.8.1 ALL OBSERVED JUNCTIONS

Major intersections within Nagaon Masterplan area have been categorized in five different types viz. 1. Roundabouts/ Rotary 2. Cross – intersection 3. Y – intersection 4. T – intersection 5. Skewed T – intersections. All identified junctions are mentioned below according to their categories. Tables below represents the roundabouts, cross junctions, Y-junctions, T junctions and Skewed T junctions in Nagaon Master plan area.

Table 129 List of Rotaries in Nagaon MP area

Sl. No.	Roundabouts/Rotary
1.	NH 37 – NH 36
2.	AT road – NH 37

Table 130 List of cross junctions in Nagaon MP area

Sl. No.	Cross Junctions
1.	Laokhowa road- Tarun Phukan road
2.	Dhing road – Old NH
3.	MD Road – ADP road
4.	Haibor Bazar Road – MD road
5.	SH 18- MG road
6.	GNB Road – AT road
7.	MG road – ADP road
8.	Nagaon Lunding road – AT road
9.	ADP road – AT Road
10.	MC Road – AT road
11.	GNB road – Nagaon kampur road
12.	GNB road – Bimla Bora road

Table 131 List of Y - Junctions in Nagaon MP area

Sl. No.	Y - Junction
1.	ADP road – Bara Bazar road
2.	Medical road- Das road
3.	AT road – Kecha ali road
4.	MC road – SM Road

Table 132 List of T - Junctions in Nagaon MP area

Sl. No.	T - Junction
1.	Laokhowa road-ADP Road
2.	BB road – ADP road
3.	MG road- Neherubali Park road
4.	MD road –Tarun Phukan Road
5.	SH-18 – Kampur road
6.	At road – Dimorugiri Junction

Sl. No.	Skewed T - Junction
1.	BB road – BMC road
2.	MD road –Lakhaowa road
3.	SH-3 – LNB road
4.	Old NH – Dhing Road

(Source: Compiled by Consultants)



Figure 108: Three and Four arm intersections

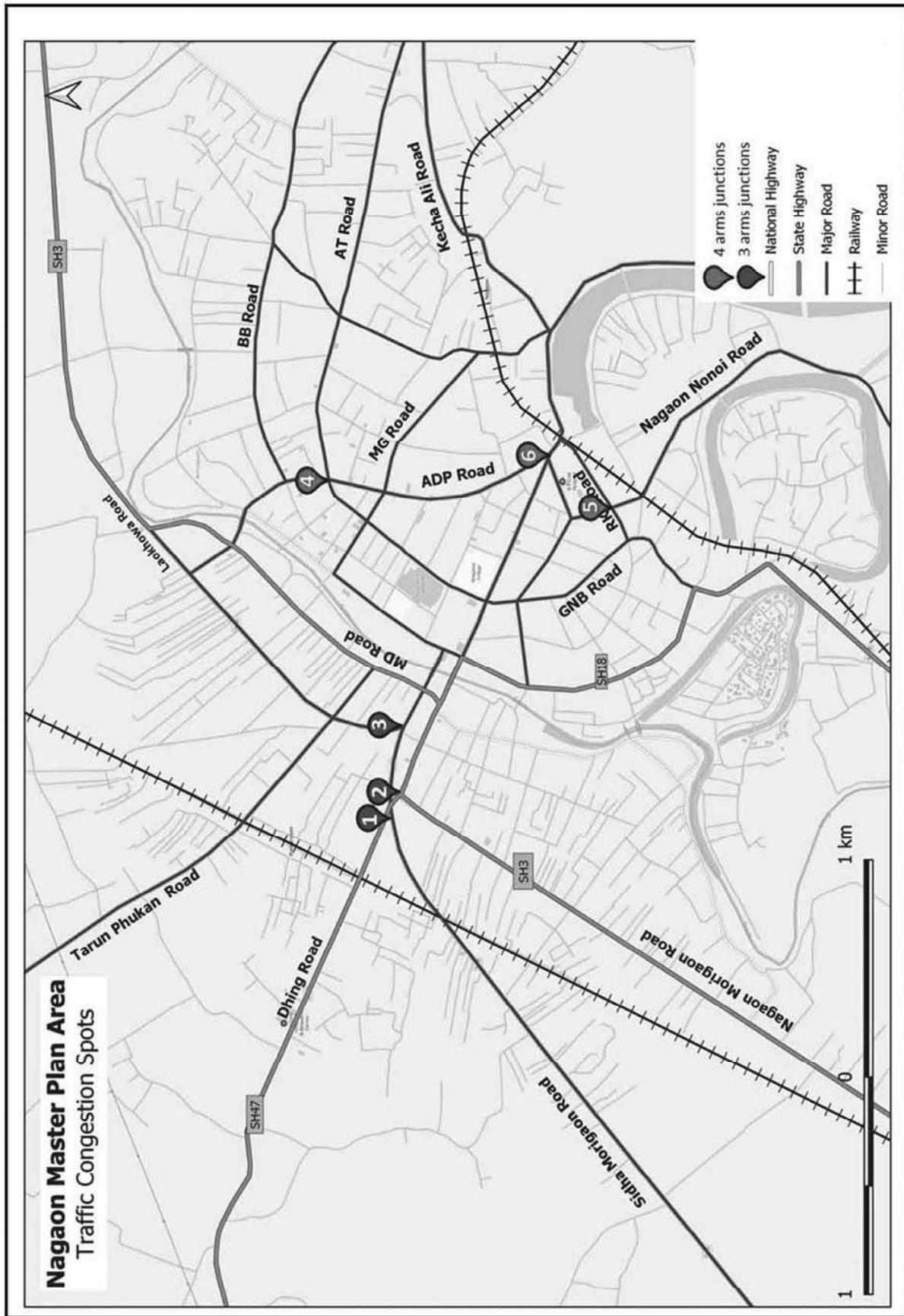


Figure 109: Major nodes of intersections

6.8.2 INTERSECTION - 1 (DHING GATE JUNCTION)

Table 133 Intersection 1 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
SH- 47 (Dhing road)	8	2 lane Undivided Two-way	2.5	10:30 hrs. &16:30 hrs.
SH- 3 (Lathabori to Old AT)	12	2 lane Undivided Two-way	4	



This Junction is a 3-arm junction and the total daily traffic at SH-47 and on SH3 Junction is 14874 PCU. The peak hour and peak hour traffic at the junction are presented in table no. 134.

Table 134 Peak hour traffic at Dhing gate Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	905

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement and signalisation.

Table 135 Veh/Day at Dhing gate Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
SH-47 (Dhing road)- SH-3 road junction	9598	14474

(Source: Compiled by Consultants)

6.8.3 INTERSECTION - 2 (HAIBORGAON TENIALI)

Table 136 Intersection 2 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
Old NH	12	2 lanes undivided Two-way	4	10:30 hrs. & 16:30 hrs.
SH-3 (Haibor Bazar – Lalhaow Junction)	12	2 lanes undivided Two-way	2.5	
SH- 47 (Old AT road)	8	2 lane Undivided Two-way	2.5	



Figure 110: Haiborgaon tiniali junction

Haiborgaon Tiniali is a 3-arm junction and the total daily traffic at this junction is 14874 PCU. The peak hour and peak hour traffic at the junction is presented in Table 137.

Table 137 Peak hour traffic at Haiborgaon tiniali Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	1228

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization and signalisation.

Table 138 Veh/Day at Haiborgaon tiniali Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Haiborgaon tiniali	9971	14474

(Source: Compiled by Consultants)

6.8.4 INTERSECTION - 3 (HAIBORGAON JUNCTION)

Table 139 Intersection 3 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
SH 3 (Haibor Bazar to MD road)	12	2 lanes undivided Two-way	2.5	10:30 hrs. & 16:30 hrs.
SH 47 (Old AT road)	8	2 lane Undivided Two-way	2.5	

(Source: Compiled by Consultants)



Figure 111: Haiborgaon junction

Haiborgaon Junction is a 3-Arm junction and the total daily traffic at this junction is 16929 PCU. The peak hour and peak hour traffic at the junction are presented in Table 140.

Table 140 Peak hour traffic at Haiborgaon Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	1434

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment and electricity poles along with geometric improvement, channelization, and signalisation.

Table 141 Veh/Day at Haiborgaon Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
SH-47 – Laikhowa road intersection	14474	17238

(Source: Compiled by Consultants)

6.8.5 INTERSECTION – 4 (NATUN BAZAR CHARIALI)

Table 142 Intersection 4 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
ADP road	6	2 lanes undivided Two-way	2	10:30 hrs. & 16:30 hrs.
AT Road	10	2 lane Undivided Two-way	2.5	

(Source: Compiled by Consultants)

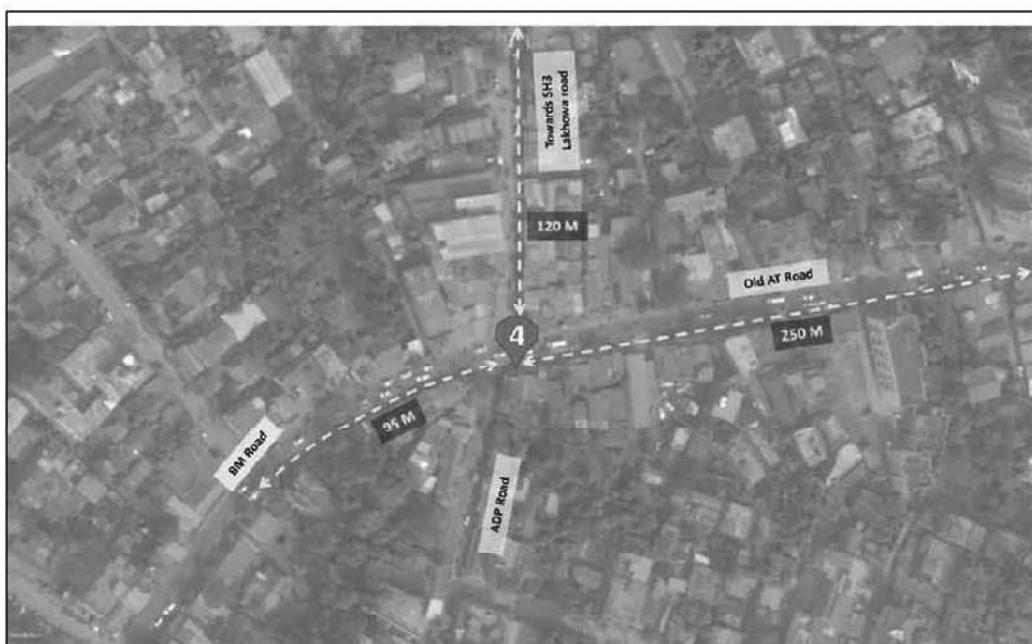


Figure 112: Natun Bazaar Chariali junction

Nutan Bazar Junction is a 3-Arm junction and the total daily traffic at junction is 9872 PCU. The peak hour and peak hour traffic at the junction are presented in Table 143.

Table 143 Peak hour traffic at Nutan bazar Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	905

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization, and signalisation.

Table 144 Veh/Day at Nutan bazar Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Natun Bazar chariali	10404	10592

(Source: Compiled by Consultants)

6.8.6 INTERSECTION – 5 (MARIKOLONG)

Table 145 Intersection 5 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
Nagaon Lunding Road	10	2 lanes undivided Two-way	2.5	10:30 hrs. & 16:30 hrs.
GNB Road	8	2 lanes undivided Two-way	1	

(Source: Compiled by Consultants)



Figure 113: Morikolong junction

Morikolong Junction is a 4-Arm junction and the total daily traffic at Morikolong Junction is 13556 PCU. The peak hour and peak hour traffic at the junction is presented in Table 146.

Table 146 Peak hour traffic at Morikolong Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	1210

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization and signalisation.

Table 147 Veh/Day at Morikolong Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Nagaon Lunding -GNB intersection	12453	14168

(Source: Compiled by Consultants)

6.8.7 INTERSECTION - 6 (DECAPATTY)

Table 148 Intersection 6 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
AT Road	10	2 lanes undivided Two-way	2.5	10:30 hrs. &10:30 hrs.
GNB Road	8	2 lane undivided Two-way	1	

(Source: Compiled by Consultants)



Figure 114: Decapatty junction

Decapatty Junction is a 4-Arm junction and the total daily traffic at the Junction is 11749 PCU. The peak hour and peak hour traffic at the junction is presented in Table 149.

Table 149 Peak hour traffic at Decapatty Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	1110

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment and electricity poles along with geometric improvement, channelization and signalisation.

Table 150 Veh/Day at Decapatty Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Decapatty	10592	12453

(Source: Compiled by Consultants)

6.9 PEDESTRIAN SURVEY

Pedestrian survey was conducted both along the road and across the road near New market area on Barabazaar, DC court, Haiborgaon Bazar and Stadium Market.

Haiborgaon Bazar road



DC Court road



Bara Bazar Market road



Stadium Market road



Table 151 Pedestrian Survey Data, NMPA

Location	Peak Hour	Passenger Flow	Existing Footpath width (m)	Required Footpath width (m)
Barabazar	16:00 – 17:00	1045	1.5	2
DC court	16:00 – 17:00	895	1.2	1.5
Haiborgaon Bazar	16:00 – 17:00	1255	1.3	2
Stadium Market	16:00 – 17:00	990	2	1.5

IRC 103 recommends the min. footpath width as 1.5m. Hence it is recommended that the footpath width on Bara Bazar and Haiborgaon Bazar road to be increased to 2m.

Pedestrian-vehicular conflict can be effectively studied through the indicator PV2 suggested in IRC 103, 'Guidelines for Pedestrian Facilities'. The code suggests some form of control measures at mid blocks and intersections where the indicator PV2 is greater than or equal to 1×10^8 for undivided carriageways where 'P' is the peak hour pedestrian volume and 'V' is the number of vehicles in that peak hour. Analysis of the peak values for PV2 and the hour in which the same is observed is presented in Table 152.

Table 152 Pedestrian Cross traffic survey

Location	Peak Hour	P	V	PV ² /10 ⁸
Barabazar	16:00 – 17:00	1045	874	7.9
DC court	16:00 – 17:00	895	798	5.6
Haiborgaon Bazar	16:00 – 17:00	1255	751	7.0
Stadium Market	16:00 – 17:00	990	650	4.1

(Source: Compiled by Consultants)

Huge pedestrian traffic volume is observed along the links and intersections within the core areas – as walking is one of the dominant modes of movement.

Most of the links do not have adequate footpaths on both sides to accommodate the high pedestrian volume. Many Streets observed with huge encroachment on footpaths by local vendors and commercial facility owners which forcing pedestrians to move along the carriageway. The major deficiencies are:

1. Inadequate/irregular riser and tread
2. Poor surface condition
3. Poor illumination
4. Lack of railing and landing facilities for long flight of steps

As walking is the only effective Non-Motorized Transit (NMT) mode, management of pedestrian facilities along with steps and accessibility on footpaths can significantly boost the patronage for NMT movement within NMPA.



6.10 SPEED DELAY SURVEY

The survey was conducted along four major travel corridors. Journey and Running speeds derived from the survey in the two directions of travel are presented in Table 153.

Table 153 Observed Speed along Project road

Sr. No.	Road Section	Direction	Journey Speed (kmph)	Running Speed (kmph)
1.	Haiborgaon Bazar road	SH-18 – MD road junction to Haiborgaon junction	13.9	23.5
		Haiborgaon junction to SH-18 – MD road junction	15.6	28.6
2.	Dhing Road	Dhing gate to Dhing road flyover	27.8	35.4
		Dhing road flyover to Dhing gate	28.2	32.5
3.	GNB Road	Decapatty to Bara Bazar	24.8	35.6
		Bara Bazar to Decapatty	25.6	39.3
4.	Lumding road	Civil Gate to Morikolong	18.5	32.4
		Morikolong to Civil Gate	18.3	33.5

(Source: Compiled by Consultants)

The low values of Journey and Running speeds indicate major congestion. Thus, intervention is required to relieve congestion through capacity augmentation and traffic management.

6.11 PARKING STUDY

The parking of vehicles needs extensive and exclusive land area. On street parking is found all over Nagaon, parking usually spills over to other use areas like road carriageway and footpaths, open spaces. In turn they affect safety and environmental quality. Parking characteristics within the town vary by areas, by land use activities and by time period. In residential areas it is by private vehicles and of long-term duration during the night hours. In central areas it is of mixed type – private and public vehicles, passenger and goods vehicles and of short term and long-term needs. In industrial, warehousing and wholesale market areas it is predominantly of goods vehicles.

A space occupied by vehicle for a particular period of time when it is not under any use can be known as parking. If any vehicle comes on road, it always requires a parking to rest as a human requires bed to rest for a particular time period, so it is recommended in these days for any busy landuse activity to come up with proper parking plans for required number of vehicles. The parking in urban areas is found to be of two types namely on-street parking which is done on the side of streets with space provided and other is off-street parking which is a modern concept and is done when there is a lack of space in the urban area.

6.11.1 EXISTING PARKING AVAILABILITY

The parking areas are an important component in the urban transportation network. The parking areas become very important in the Central Business District areas (CBD) and public activity area, where the traffic movement is very heavy. At present around 0.27 hectare of open land on Lumding road near Morikolong river has been utilized as formal private unorganized parking specifically for LMVs. There is no such Municipal identified parking area designated for public parking within planning area. Presently, one open plot on SH-3 Shani Mandir road of size 0.13 hectare has been utilized as HMV vehicle parking area.

Table 154 Parking Spots and their Area Coverage

Parking Space/ Area	Location	Type of Parking	Area (Hectare)
Pvt. Car Parking Area	Lunding road	unorganized ground level parking	0.27
ASTC Parking	Nagaon Morigaon Bus stop	unorganized ground level parking	0.1
Truck Parking (Pvt.)	SH-3, Shani Mandir road	Private parking, unorganized ground level parking	0.13

At present there is no multilevel organized parking facility been provided within CBD area urban local body control. There are 2 organized paid parking facility available in public spaces like Nagaon Railway Terminus and at Nagaon ASTC terminal.

Apart from mentioned unidentified area, the on-street parking also practiced in the entire Nagaon town area where heavy traffic movement or public activity is observed.

Bara bazaar road street



On-Street parking



DC Court road street



Stadium Market Road



6.11.2 PARKING SURVEY

High ownership pattern and excessive dependence on private mode of movement, i.e., two-wheelers and cars exert huge parking demand. As most of the parking demand is met by on-street facilities due to absence of designated off-street facilities, leading to traffic congestion in the core area.

Parking survey was conducted at on street locations where vehicular parking was observed. On-street parking is observed to be high on Bara Bazar Road and Stadium Market Road. The percentage of vehicles parked for long-term (>1 hr) is high at the two locations constituting 93% at Bara Bazar and 84% at Stadium Market Road. Analysis of parking demand is presented in Table 155.

Table 155 Existing Parking Demand in Equivalent Car Space

Sr. No.	Location	Parking Type	Peak Accumulation (ECS)	Peak Hour
1	Barabazar	On Street	165	16:00 - 18:00
2	DC court	On Street	145	13:00 - 14:00
3	Haiborgaon Bazar	On Street	123	11:00 - 16:00
4	Stadium Market	On Street	154	11:00 - 16:00

Table 156 Parking Demand Capacity Analysis

Sr. No.	Location	Demand (ECS)	Capacity (ECS)	Demand/ Capacity
1	Barabazar	165	60	2.75
2	DC court	145	-	-
3	Haiborgaon Bazar	123	-	-
4	Stadium Market	154	-	-

As evident from the above table 156, the parallel parking spaces on Bara bazar is fully saturated and leading to sever encroachment on street, however that on Haiborgaon Bazar Road, DC court road and Stadium market road there is no designated parking space available which leads to encroachment on most patches. After haphazard parking of vehicles, about 5m space is only available as roadway at the mentioned locations. Interference to through traffic is caused during parking, un-parking operations. Thus, the on-street parking lots result in considerable congestion. During reconnaissance survey, On-street Parking has been observed at various locations like AT Road, Laokhowa road, Old NH Road, SH 47 intersection, and MG Road in Nagaon Planning Area leading to massive congestion and decreasing the road capacity. In view of this, there is dire need for providing off street parking facility in potential commercial areas or in proximity in CBD area. Multi-level parking can be resorted to provide the needed parking facilities.



6.12 ISSUES AND REQUIREMENTS

6.12.1 ILLEGAL VENDING ZONE

- One of the major issues is of illegal vending on walking shoulders on the main streets.
- Due to this illegal vending sometimes the actual accessible patch of road decrease to half lane only.
- If proper spaces are being allocated to street vendors in every zone the issue can be eliminated.
- Due to illegal possession of shoulders the pedestrian come down to road for their local trip and some time proves unsafe on congested area.
- Narrow road network with restricted capacity, particularly due to the illegal vending, resulting in congestion and loss of productivity.
- The problematic areas include Intersection Natun Bazar Chairali, Decapatty Area, Bara bazaar road and Stadium market have this illegal vendings.
- The photographs below depict the current scenario of the illegal vending zones which restricted the capacity of road which in result lead to congestion.
- The illegal vending zone locations have been marked on the map (Fig. 115)

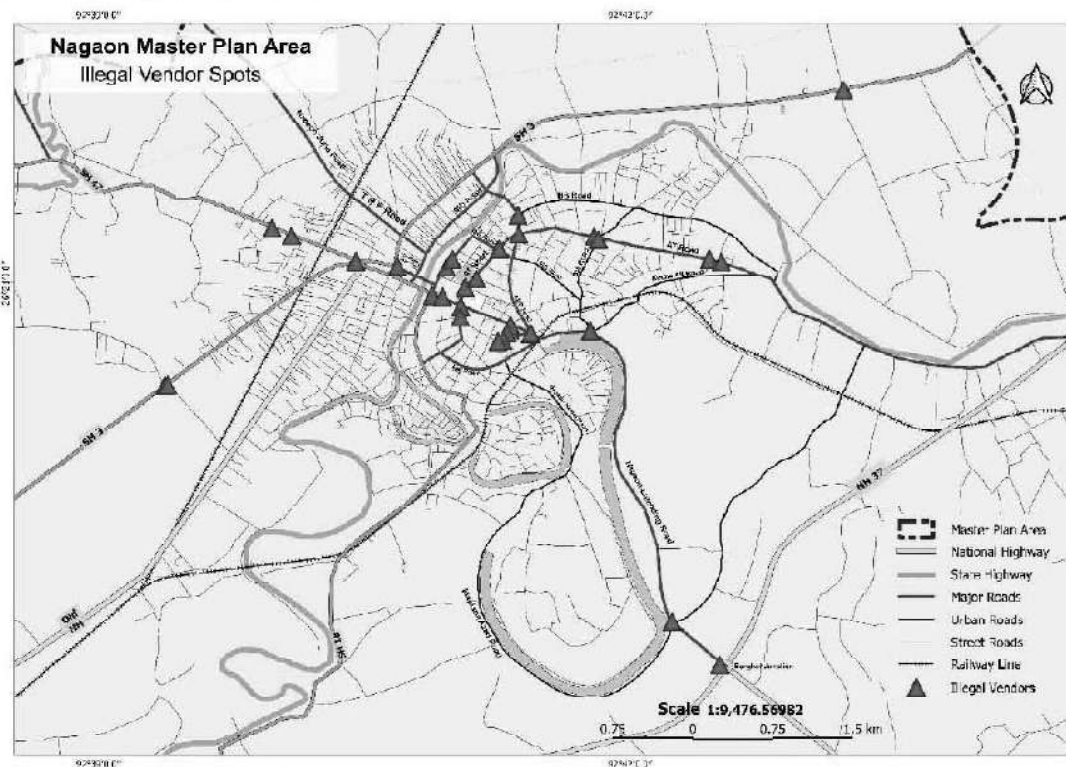


Figure 115. Illegal vending zone locations

6.12.2 TRAFFIC CONGESTION

- Traffic congestion is quite common, and it takes a lot of time to commute for the commuters.
- At many places geometry of roads and intersection are not adequate and absence of functional hierarchy of road network leads to the traffic congestion.
- The average roads width of the town is very less as they have not followed any norms and standards for the road pattern as well as for other related things like road cross sections, etc.
- Observed encroachments on the footpath by vendors, which acutely rise the traffic congestion between include Intersection **Haiborgaon Chairali, DC court Area, Bara bazaar road and Stadium market have this illegal vendings.**and parking on both sides of the road and the resultant traffic need to resolve.
- Many vehicles, due to lack of adequate parking facilities, were parked on the CD Court road, causing inconvenience to people who use the field for recreational purposes like walking and playing and people



had to face inconvenience as that road leads to many important places like **Bara Bazaar, stadium market and Haiborgaon chairali.**

- Other roads having traffic congestion are SH-47 (Dhing road) (11mt.), SH-3 (MD to Palasoni road) (18mt.), GNB road (8.7mt.) and Nagaon- Lumding (19mt.)
- The highlighted light Red dots on map within town area shows the frequent congested road patches (Fig. 116)

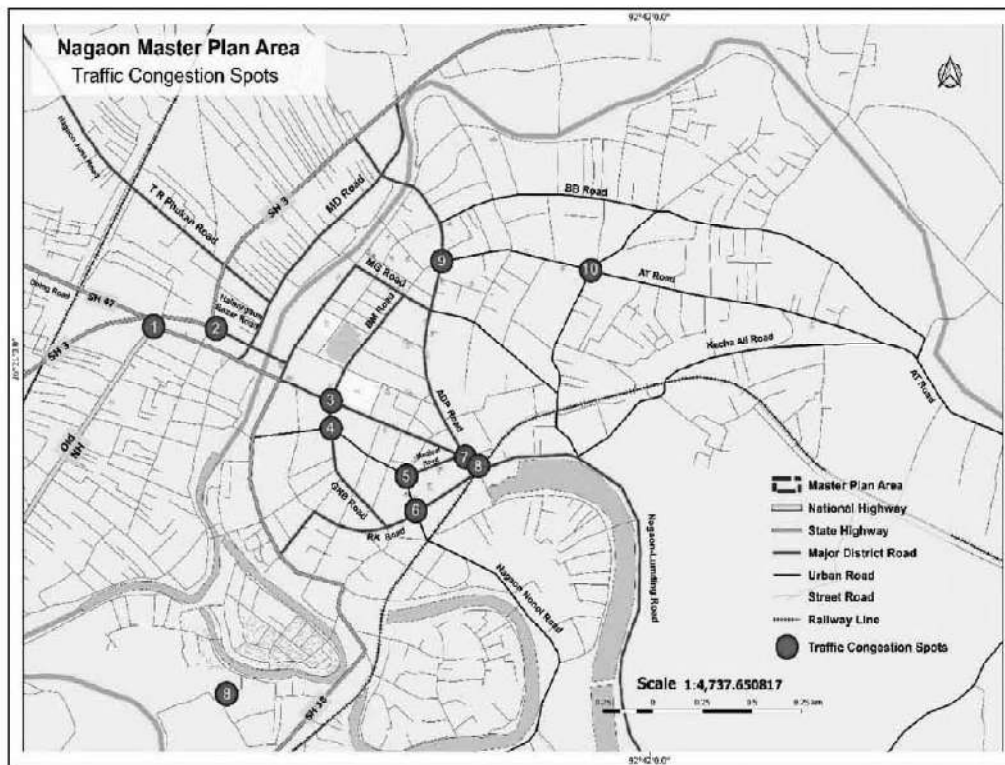


Figure 116: Traffic congestion spots

6.12.3 ROAD ENCROACHMENTS

- Many factors can be listed out for such happenings, but few observations are mentioned below, which are
- Unauthorized parking of vehicle on pavement only.
- Many spots with exposed electric poles on pavement sides which leads to make space dead and potential for parking wheels.

Haiborgaon road



Civil gate



Decapatty chairali



- The town suffers from parking problems due to encroachment by vendors on road and off-street parking. As a result, the road width decreases and there is no space remaining to pass the vehicles or to give space to other vehicles.
- There is no designated space for parking in whole town.
- There are encroachment issues in areas namely both sides of Haiborgaon road, Civil gate road, and Decapatty road.
- Due to lack of space, it is difficult for vehicles to pass on.
- Also, Proper facilities are needed for loading, uplifting, and downloading.
- Encroachment on both sides of the road decreases the effective width which may cause road accidents and disturbs the smooth flow of traffic.
- The map shows the road network of planning area with identified spots of encroachment within NMPA.



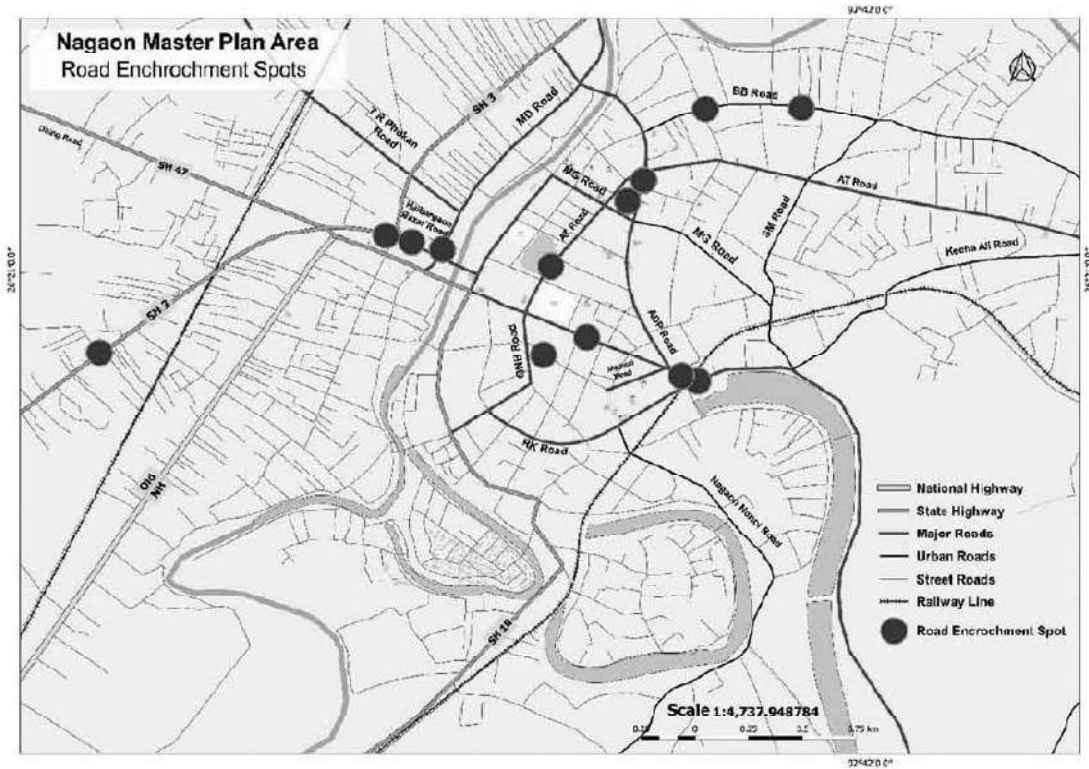


Figure 117: road encroachment spots



6.12.4 HAPHAZARD PARKING AREA

- With increasing number of vehicles, narrow roads, absence of parking spaces within majority of built areas, parking becomes critical for planning and development.
- There is more of commercial area, so the shopkeepers park their vehicles outside the shops leading to decrease in the width of the road.
- There is no proper arrangement for parking vehicles which results into roadside parking.
- Some of the streets are observed by frequent haphazard parking on side of the pavements.
- Low accessibility and traffic congestion are resulting due to such happenings.



- As per the temporal study the town is growing at fast rate leads to more and more traffic problems like todays it does not have sufficient parking and also number of vehicles are increased rapidly which will lead to the parking shortage in the town.
- **The areas with illegal parking are near BM Road, ADP road, Laokhowa road, Bara bazar road, Haibor bazar road, opposite Stadium along Stadium Market Road, MG Road, AT Road, Civil gate, Medical road, DC court road and along Decapatty area,**
- The marked spots on map are regular area for illegal parking (Figure 118).

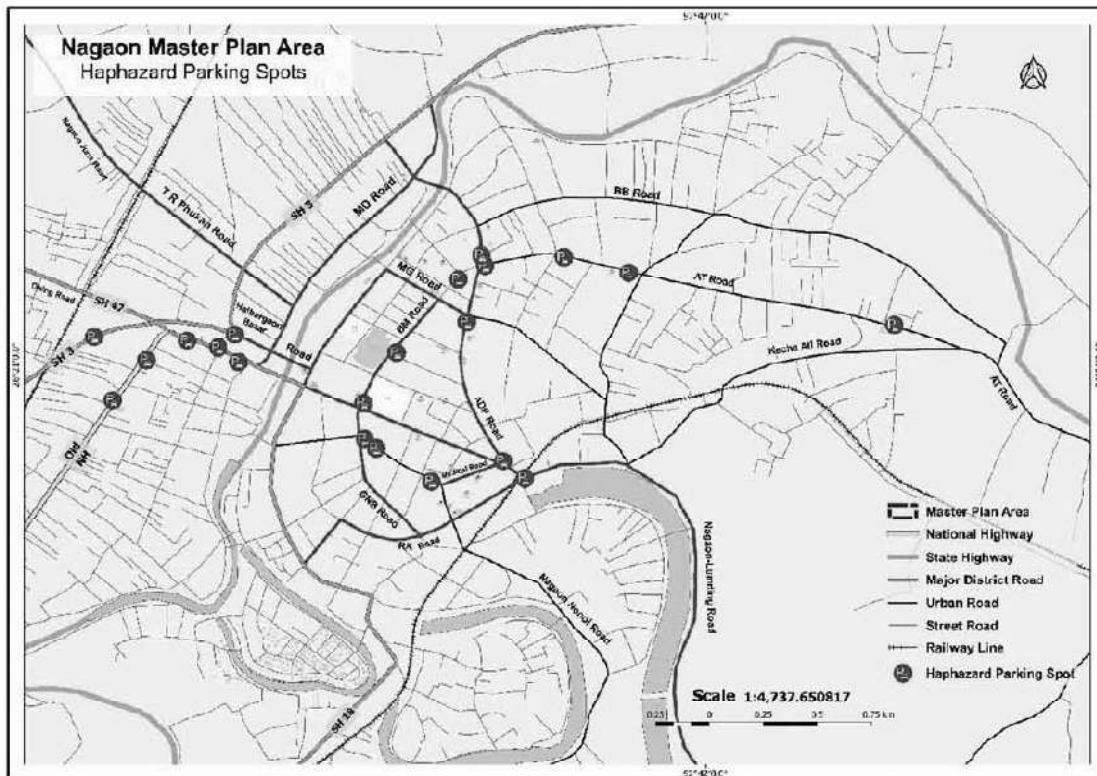
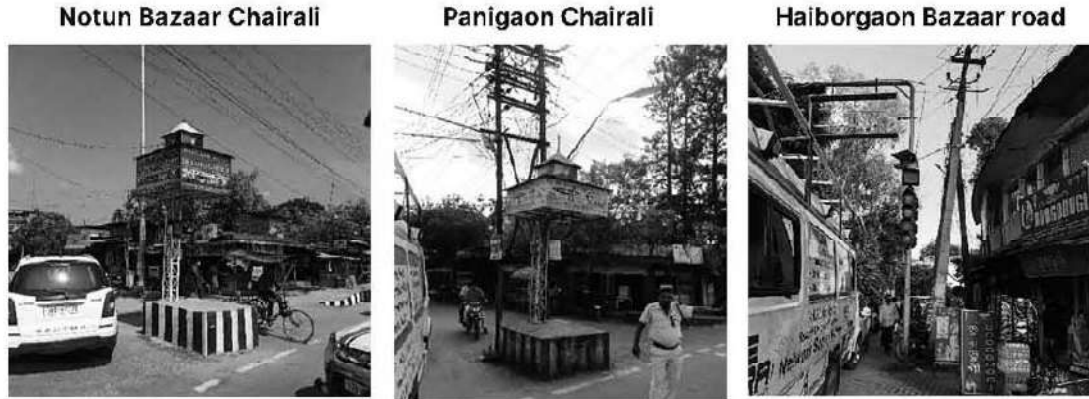


Figure 118: Haphazard parking locations

6.12.5 JUNCTIONS WITHOUT TRAFFIC SIGNALS

- Many traffic intersections observed with insufficient traffic control facility
- The below mentioned are junction with Non -working traffic signals
- Resulting in unnecessary traffic jams and more requirement of traffic brigade occurs.



- Various junctions without traffic signals are there in town like Civil hospital gate, Natun Bazar Chariali, AT Road, Decapatty tiniali, Panigaon Chariali, Haibor gaon bazar road junction, Dhing gate junction, ADP road – AT road junction, MG road – SH 18 junction, etc. As no junction is signaled which leads to the poor infrastructure of the road.
- The marked spots on map are junctions without traffic signal (Figure 119).

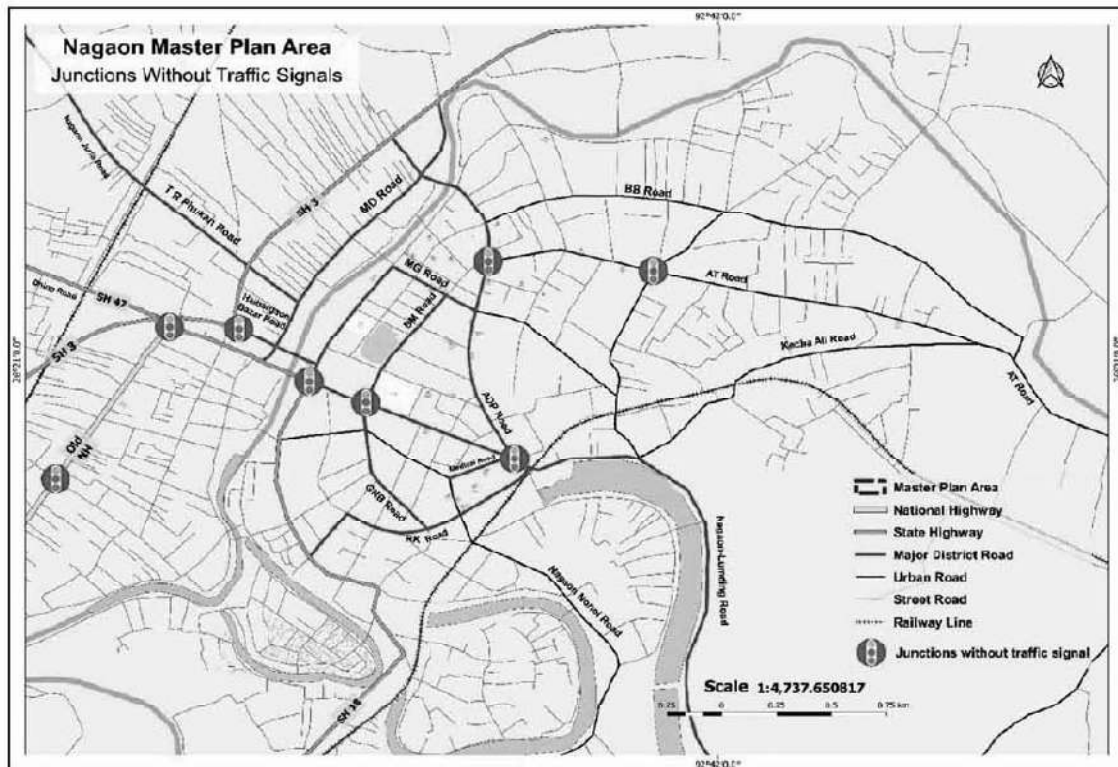


Figure 119: Junctions without traffic control facilities

6.13 PROPOSALS AND RECOMMENDATIONS

6.13.1 GRADE SEPARATION PROPOSAL

Grade separation is the separation of the levels at which roads cross one another to prevent conflicting rows of traffic or the possibility of accidents. Here the existing road is single lane with the 7 m of carriage way which is proposed to be a 4-lane road. The proposed location of grade separator is depicted in figure 120.

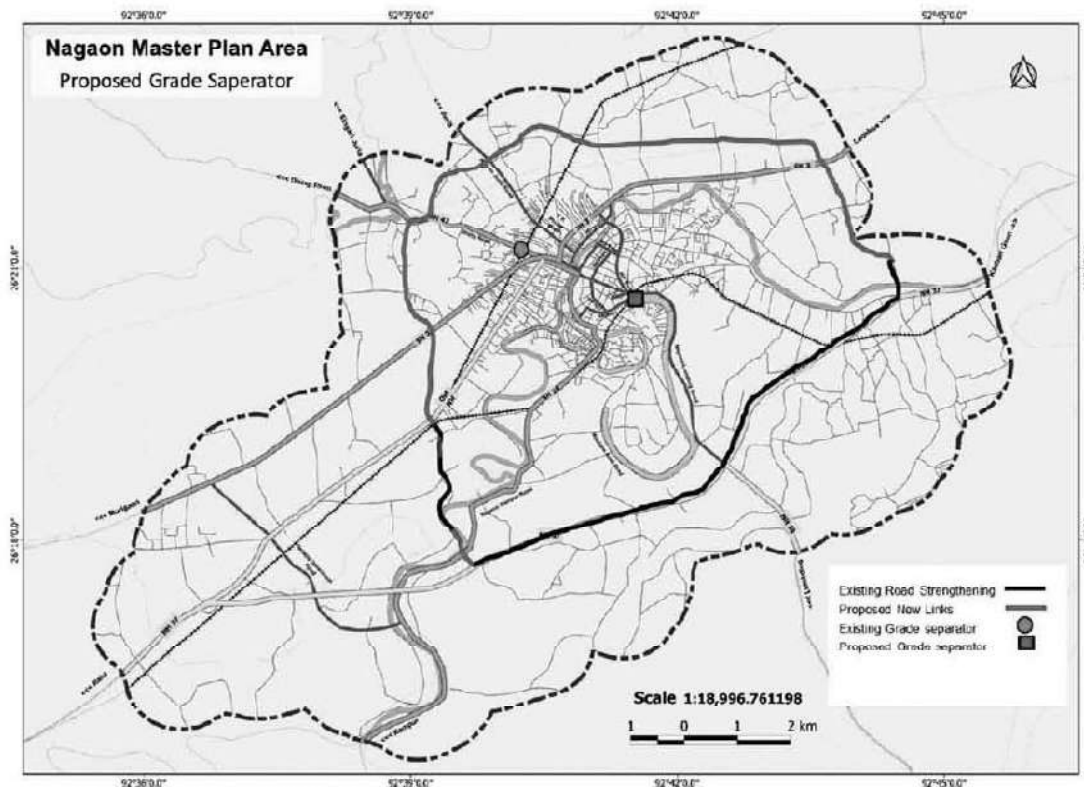


Figure 120: Proposed grade separator location

6.13.1.1 Road Over Bridge (ROB)

A grade separator has been proposed on Nagaon- Lumbding Road which will divert the traffic and solve the issue of congestion due to railway line barrier. This is proposed on the NH-37 and bypass road intersection. Refer figure 121 where the elevated section is shown with blue colour and the ram is shown in pink color.

Table 167 Road details of Intersection 1 - Grade Separation Proposal

Road	C.W. Width (m)	Lanes
Nagaon-Lumbding Road	7.5	2 lanes undivided Two-way
Civil Gate Road	7.2	2 lanes undivided Two-way

The proposal of flyover is given as per the traffic congestion observed and considering the analysis conclusions. The possibility of construction of overbridge from Nagaon town Civil Hospital Gate to Morikolong allocated Bus Parking area to ease out the traffic blocking and bottleneck situation in daily peak working hours.



Figure 121: Proposed ROB at Railway Crossing near Civil Gate

6.13.2 RING ROAD PROPOSAL

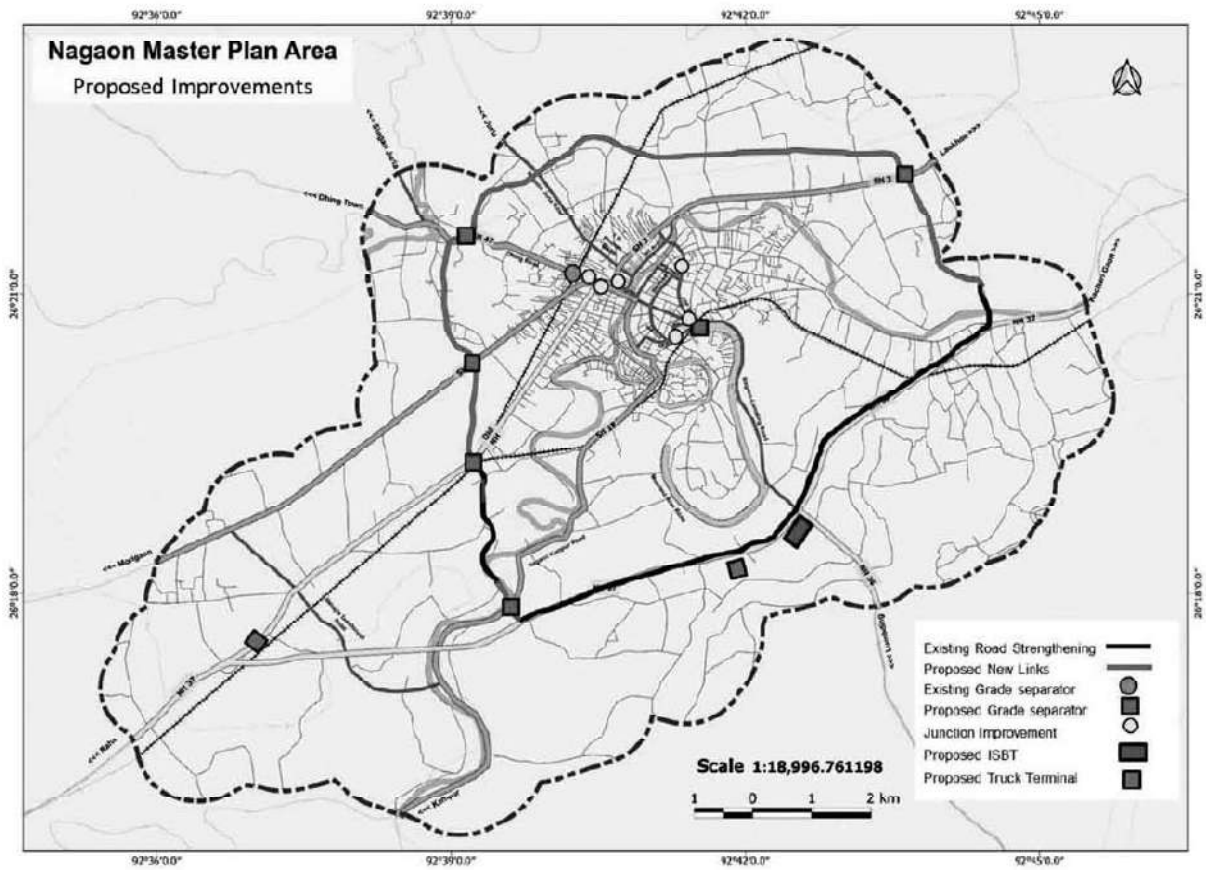


Figure 122: Proposed Improvements in Transport Infrastructure

6.13.2.1 Widening and Acquisition in Proposed Ring Road

Table 158 Ring Road Description

Sl. No.	Road Section	Length (km)	Existing C. W. (m)	Available Road Width (m)	Proposed Road Width (m)	Proposed Configuration
2	NH 37	10.4	20	40	60	6 lanes divided (widening required)
3	Sensuwa Road	2.4	5	6.7	45	4 lanes divided (widening required)
7	New Link 1	16.45	-	-	45	4 lanes divided (land acquisition required)
8	New Link 2	0.75	-	-	45	4 lanes divided (land acquisition required)
Total		30.00				

6.13.3 PROPOSED IPT STANDS AND ROUTES

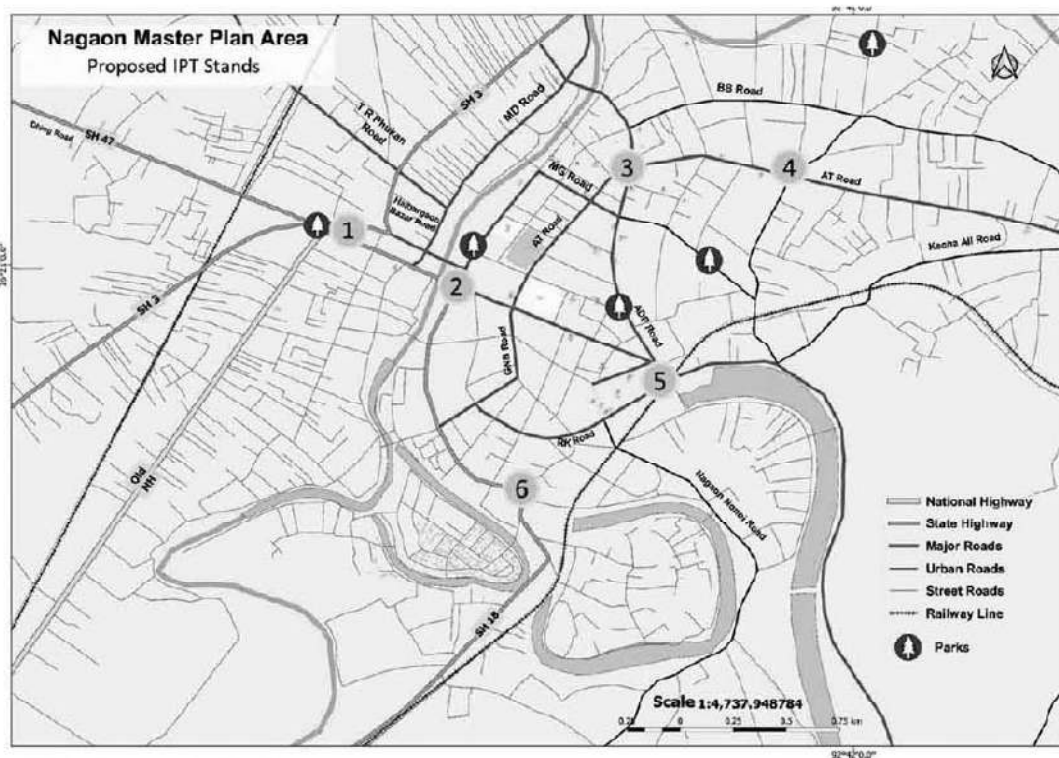


Table 123: Proposed IPT stands

Intermediate Public Transport (IPT), sometimes known as Paratransit, refers to road vehicles used on hire for flexible passenger transportation, which do not follow a fixed time schedule. They may or may not follow a fixed route. It will be much viable if proper space allocation being done for the passanger transfer movement at prime locations. Here, mentioned in map are identified IPT stand for passanger's safe trasfer for one mode to another mode.

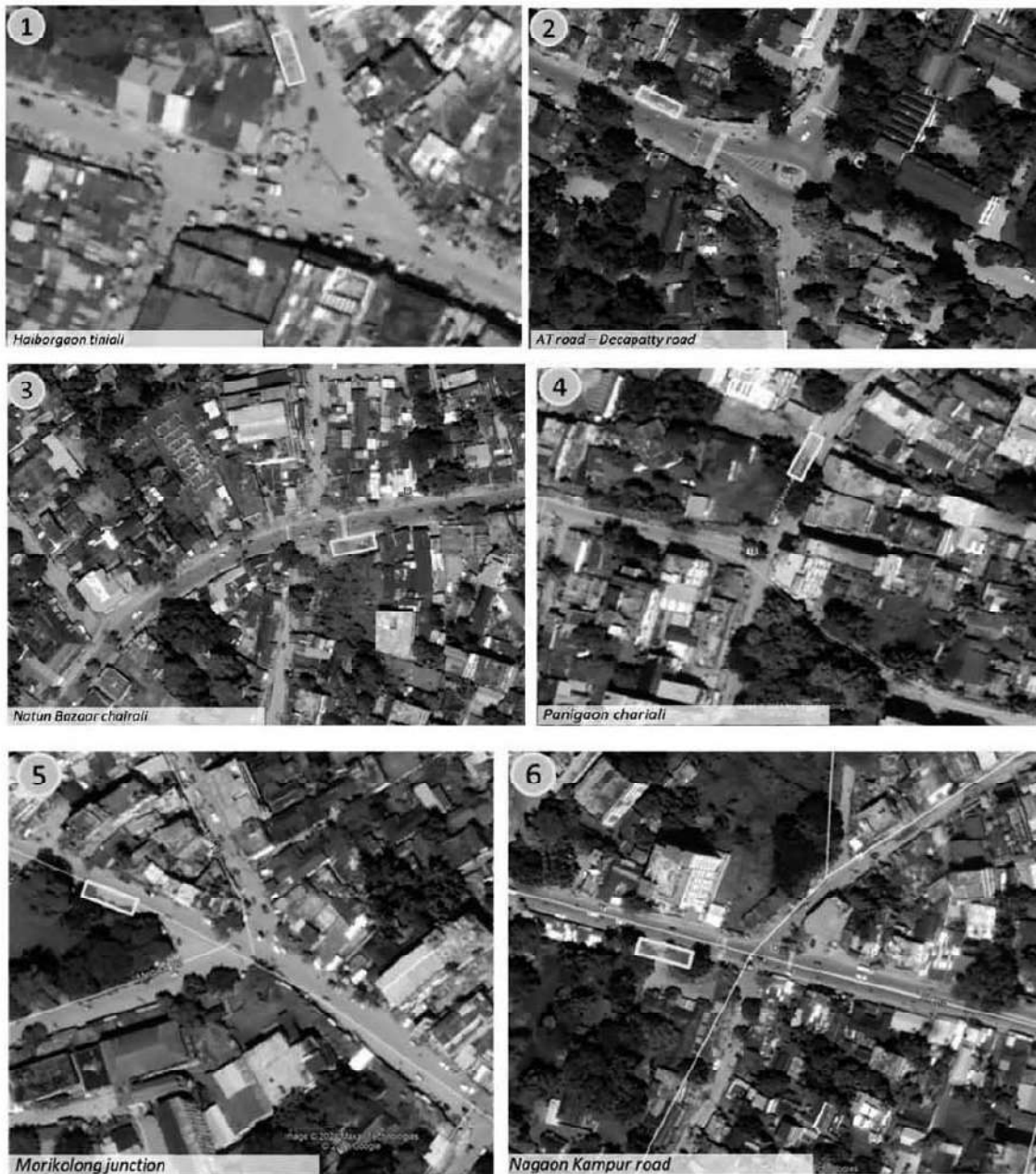
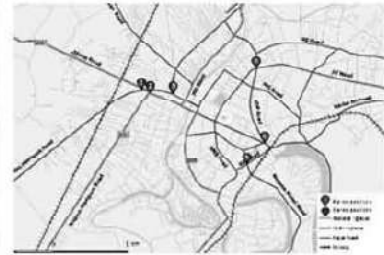


Figure 124: Proposal for IPT stands location

6.13.4 JUNCTION IMPROVEMENT

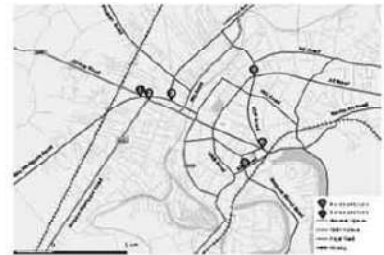
6.13.4.1 Intersection - 1 (Dihing Road- Lathabri – AT road)

The current capacity of junction may be improved by widening the road width of Dihing road by 24 mt. with divided 4 lanes, removing electricity poles and vendors along with geometric improvement and signalisation. Widening of SH-3 Road will ease out maneuvering movement of vehicle around junction.



7.13.4.2 Intersection - 2 (Haiborgaon Junction)

The current capacity of junction may be improved by widening the road width of AT Road by 24 mt. with divided 4 lanes, removing electricity poles and vendors along with geometric improvement and signalisation. Widening of Haibor bazar road up to 18 mt will ease out maneuvering movement of vehicle around junction.



7.13.4.3 Intersection - 3 (Haiborbazar- Laokhowa Road)

The current capacity of junction may be improved by widening the road width of haibor bazar Road upto 24 mt. and Laokhowa road upto 24 mt. with divided 4 lanes. Additionally, removing electricity poles and Adhoc vendors along with channelization of junction, geometric improvement and signalisation will ease out the traffic condition at junction



7.13.4.4 Intersection - 4 (Natun Bazar Junction)

The current capacity of junction may be improved by widening the road width of AT Road by 18 mt. Additionally, removing electricity poles and vendors along with geometric improvement and signalisation. Widening the road width of ADP road upto 15 mt. with median provision will ease out maneuvering movement of vehicle around junction.



6.13.5 ROAD HIERARCHY

It is important to devise a street classification which is in consideration with the proposed landuse. The roads are classified into the following 3 categories according to their function and activities that take place along the road.

Table 159 Road Category Proposed for Nagaon Planning Area

Sr. no	Category	Characteristics	ROW
1.	Arterial	<ul style="list-style-type: none"> • City to City linking • Largest volumes of traffic • Commercial/Mixed residential uses are predominant along the road 	60 m
2.	Sub-Arterial	<ul style="list-style-type: none"> • Mixed residential Use along the road • Feeding traffic to arterial roads 	24 m & 30m
3.	Major Roads	Connecting residential areas with sub arterial roads/arterial roads	18 m & 24 m

6.13.5.1 Arterial Road

A typical cross section of an arterial road is given in the figure below. It shall have carriageways, median, Multi Functional Zones (MFZ), service lanes and footpaths. Multi functional zone is a zone to accommodate street components such as tree planting, auto rickshaw stand, hawkers zone, bus stop, traffic police booth, fire hydrants, street lights etc. as per the requirement. The RoW of the arterial roads varies between 45m and 60m

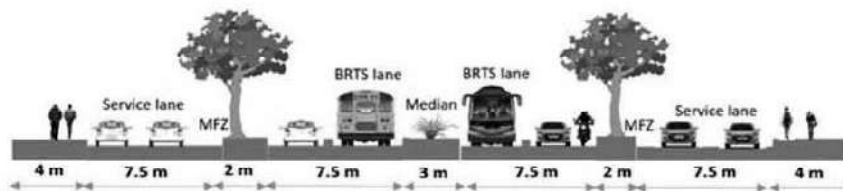


Figure 125 Cross Section of 45m wide Arterial Road

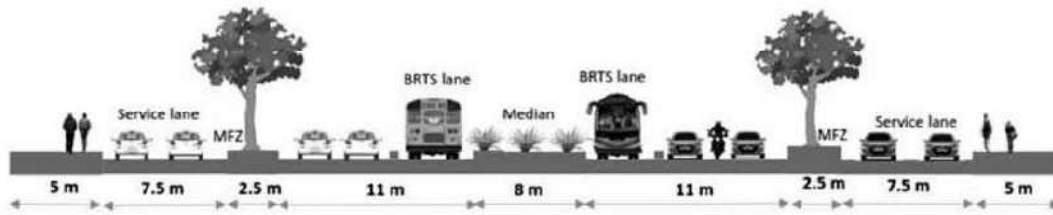


Figure 126: Cross Section of 60m wide Arterial Road

7.13.5.2 Sub-Arterial Roads

Sub arterial roads shall have carriage ways, median, service lanes, Multi-Functional Zones and sidewalks as shown in the figure 126. As mentioned earlier, the RoW of the sub-arterial road is between 24m or 30m.

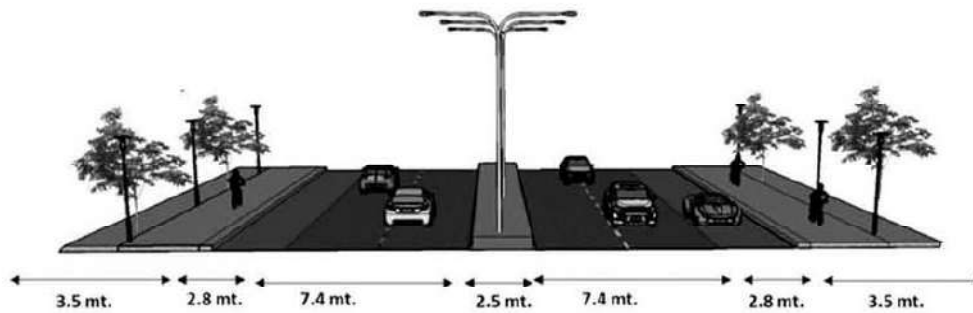


Figure 127: Cross Section of 30m wide Sub-Arterial Road

7.13.5.3 Major Roads

Major roads shall have Carriage ways, median, Multi Functional Zones and sidewalks as shown in the figure 128. As mentioned earlier, the width of the major road is either 18m or 24m.

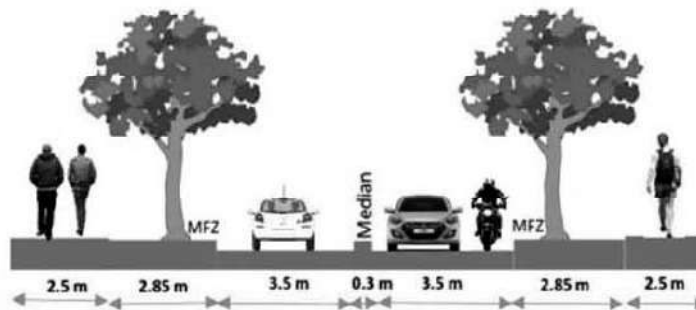


Figure 128: Cross Section of 18m wide Major Road

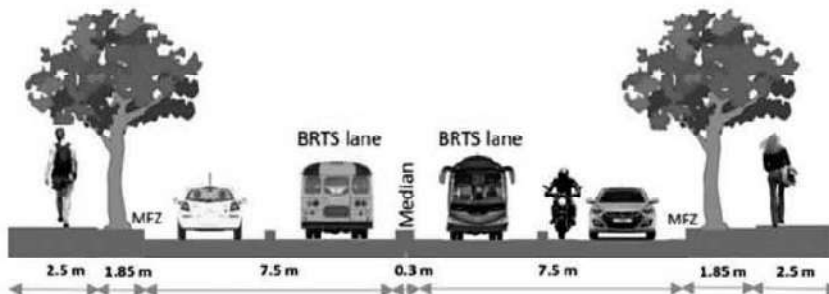


Figure 129: Cross Section of 24m wide Major Road

6.13.6 PROPOSED ROAD NETWORK FOR NMPA



Figure 130: Proposed Road Network for NMPA

6.13.7 MULTILEVEL, ON-STREET AND OFF-STREET PARKING

As discussed above in section 6.12 Issues, there is no dedicated parking space available in Nagaon Planning Area. Due to the dier need of parking spaces, Multi-I evel Car Parking facilities are proposed at one location. Multi-Level Car Parkings are proposed at space of present Lanka Bus Stand near Civil Hospital. The need of Multi Level Car Parking will also be required near Existing Railway Station. Multi-Level Car Parking is also suggested to be proposed on the existing site of Railway Station. Rest of the locations are identified for on street and off street ground parkings. The Locations are as mentioned below.

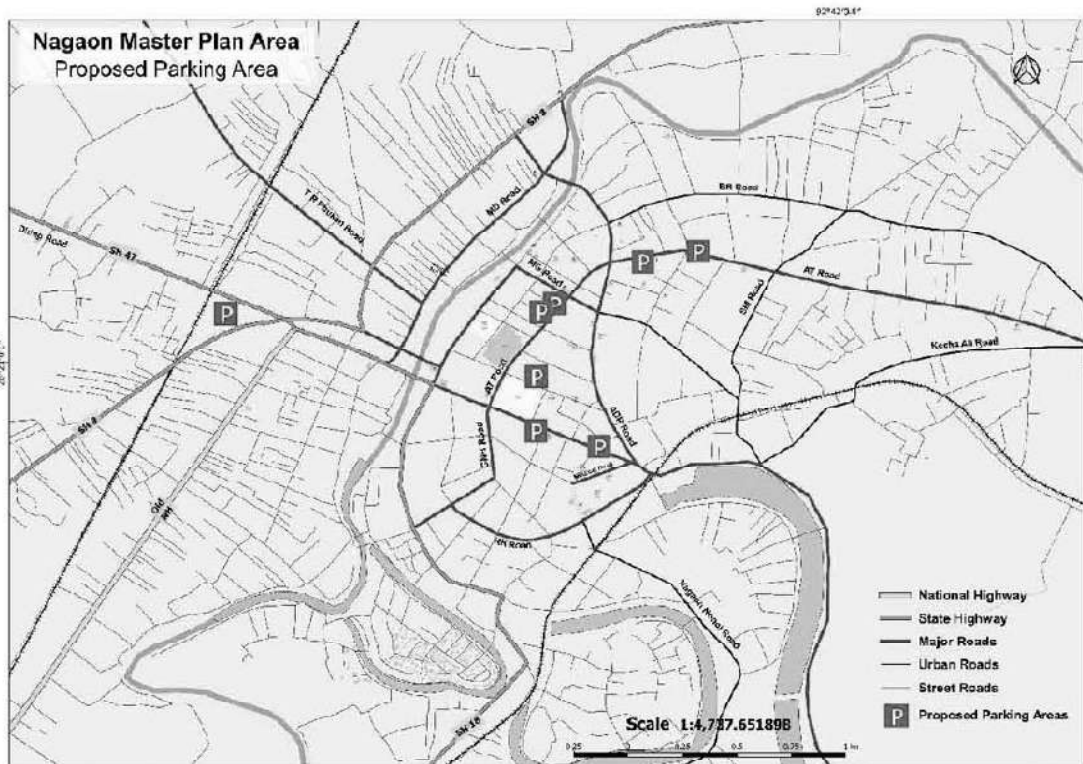


Figure 131: Proposed Parking Area within Municipal Board Area

Two on-street parking locations have been identified on streets between AT Road and BM Road in core city centre area. This paid parking bays will cater the parking demand emerges due to ongoing commerial and retail activity on AT Road market streatch area. Four off street parking locations identified, namely FCI godown (rehabilated at proposed WTC), closed Morigaon Bus stop, Private Guwahati Bus stand and open plot at AT Road.



6.13.8 PUBLIC TRANSPORT PROPOSALS

6.13.8.1 BRTS (Bus Rapid Transit System)

Bus Rapid Transit System (BRTS) are generally a high-quality bus based transit system that focuses its operations in large urban areas with fast, comfortable, cost effective services catered for larger commuter populations. BRTS achieves it through the adoption of dedicated lanes with bus bays and bus stations typically aligned to the center of the road, off board fare collection and fast and frequent operations.



Figure 132: Bus Rapid Transit System

BRTS is similar to a light rail system, it is considered to be more reliable, convenient and faster than regular bus services due to the fact that they run on dedicated bus bays and hence not delayed by the regular city traffic.

The Nagaon City bus system needs to be improved to attract a large portion of the commuters to avoid the use of private vehicles in favour of public transport. For this the prevailing city bus system needs to be strengthened, this can act as a support for the mass rapid transit systems which are elaborated above. BRTS is a successful system adopted by many Indian cities like Ahmedabad and Indore. Due to faster implementation, lesser capital investment BRTS is a good alternative for sustainable transport solution for the planning area. BRTS can be implemented along the major transit corridors like NH-37, SH-3,, SH-18, Old NH and other major roads like Laokhowa Road, AT Road, Nagaon-Lumbding Road. Due to the non-contiguous nature of the planning area BRTS on these said roads might have to pass through normal traffic in areas which falls under core city centre, this might affect the operational advantage of BRTS systems.