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Mobility Improvement Plan for Barasat Municipal Area

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Abstract:
Transportation is the spine of any city. Evolution of transportation has led to changes in urban form. It is seen that cities are growing, because of continuing urbanization. People migrate to cities in search for jobs and better lifestyle, leading to congestion in cities. City limits are continually shifted outwards due to explosive growth Mobility within the city needs to be addressed to tackle these issues of rapid urbanization and to suggest best possible method of developing transport network.
This study primarily seeks to analyze and assess the lack of mobility with its different causes and effects in small municipal town BARASAT. Based on analysis and expected future demand, proposals have been formulated to improve the present situation and to meet the future demand of the commuters within the study area. The entire study is based upon data gathered through reconnaissance surveys, primary and secondary data and analyzing them in the present context.

Keywords: *Congestion, encroachment, By-cycle path, Para-transit, passenger*

1. Introduction

Barasat is an important municipal town in the North 24 Parganas District as well as entire West Bengal The population of Barasat were 283,443 according to 2011 census..Primary studies indicate that, the transportation systems of this town has to meet up about 75,000and of passenger trips on a typical week day (2014).Barasat is an important centre of freight movement in North 24 Parganas district. The district level wholesale market, a number of truck terminals, and several freight-movers offices and warehouse are located within this municipal area. The wholesale market, the truck terminals and the warehouses generate a sizeable number of freight trips every day with their origins and destinations within this town. N.H-34 and NH-35 run through Barasat Municipal area. A number of freight carriers pass through (external to external trip) this stretch of the N.H adding significantly to the daily freight traffic volume of the study area. Like many other similar towns mixing of freight and passenger traffic are of frequent occurrence in this town. With the aforesaid passenger and freight travel demand, Barasat suffer from several acute transportation problems like many other similar towns - sharing of limited ROW by mixed modes, increasing traffic volume, congestion and delay at major traffic corridors and intersections, inadequate public transport system, traffic accidents, environmental pollution are to mention a few. Barasat serves as a district headquarter of North 24 Parganas. There is a prospective proposal of combining Barasat, Madhyamgram and New Barrackpur into one Municipal Corporation. The above background of existing travel demand, future development prospect and the associated transportation problems in Barasat readily reveal the rationale for this study.

2. Aim & Objectives

This study aims at formulating a mobility improvement plan for the areas under Barasat Municipality in North 24 Parganas district of West Bengal.
The aforesaid aim of the study is further sub-divided into the following objectives:

1. To improve mobility along the major transportation nodes within the study area.
2. To improve parking and pedestrian facilities.

3. Scope and Limitations

The scope of the study includes the following:

1. To study and analyze the existing traffic and transportation system and the mobility scenario at Barasat municipality considering both passenger and freight movement.
2. To assess future travel demand in the study area for passenger as well as freight atthe Horizon Year, which is 2030 A.D.
3. Formulation of proposals and recommendations for achieving the study objectives.

4. Limitations

1. The study is largely based on secondary data owing to the constraints of time and resource. However, limited primary survey was undertaken as deemed necessary.
2. The assessment of the existing mobility scenario in the study area is based at the major transportation corridors and nodes.
3. The formulated proposals include broad strategies and recommendations. Detailed action plans and their economic evaluations are not included within the scope of this work.

5. Methodology

All the works have been done in three phases: -

5.1. Pre-field Phase

Pre-field phase constituted the preparation of base map and collection of information available from secondary sources and the electronic data from the Internet. A questionnaire schedule for the study of local peoples' perception.

5.2. Field Work Phase

Fieldwork is conducted mainly for collection of primary data. The data is collected to get the views of the victims as well as the beneficiaries of the development works.

5.3. Post-field Work Phase

Post field phase involved: -

1. Array and analysis of the information gathered.
2. Computation of primary and secondary data and their cartographic representation,
3. Interpretation of the maps and diagrams.

Some difficulties had to face regarding the collection of primary and secondary data and to set proper response from the local people, during the field work.

6. Location of the Study Area

Barasat Municipality is the district headquarters of North 24-Parganas.It is situated at a height of 11 meters (approx) above mean sea level. The entire interfluves area is covered by three topographical maps of survey of India (No. 79B/8, 9, 10, 13, 14, 15).Location – Latitude: 88.4829620, Longitude :22.7070020

6.1. The Geographical Boundary

North: Khilkapur Paschim Panchayat., South: Kemia Khamarpara Panchayat / Madhyamgram Municipality., East: Kaira Kadambagachi Panchayat., West: Ichhapur Nilganj Panchayat.
Area: 34.50 sq. km.
No of Wards: 32.

6.2. Demographics

Population is 2, 83,443 according to 2011 census2, 98,950 (approx at present).. Population density12583 per square km. As of 2011 India census,. Males constitute 50.75% of the population and females 49.25%, with 54%, of the males and 46% of females literate. 10% of the population is under 6 years of age.

Population (2001)	Population (2011)	Male population (2011)	Female population (2011)	Population (Project on 2025)	Density of Population (Person / Sq.km.)
2,31,521	2,83,443	143,732	139,711	5,34,101	12583

Table 1: Population of Barasat Municipality
Source: Barasat Municipality

6.3. Transportation Infrastructure

The present scenario of the existing streets and roads within Barasat Municipal area are as follows:

6.3.1. Road Network

Barasat Municipality is connected to the other districts by N.H-34(Krishnanagar Road), N.H-35 (Jessore road) and other state highways (Barrackpur road, Taki road) .City level road network: In the study area it is observed that road accounts for 8.58% of the total area. The inadequacy of road in the study area is readily observed when compared with the *UDPFI* norms, which recommends 10-12% of the total land for use under transportation for similar towns. Table 2 Furnishes the existing road characteristics of the study area.

Sl No	Name of the Road	Type of Road	No. of Lanes	Divided/ Undivided	Maintained by	Connected with
1	**N.H-34**(Krishnanagar road)	Major Arterial Road	four	Undivided	NHAI	Nadia,Murshidabad and other district of North Bengal
2	**N.H.35**(Jessore road)	Major Arterial Road	four	Undivided	NHAI	Bangoan subdivision and Bangladesh
3	**Taki Road**	Major Arterial Road	two	Undivided	PWD	Basirhat subdivision and Bangladesh
4	**Barrackpur Road**	Major Arterial Road	two	Undivided	PWD	Barrackpur subdivision

Table 2: Road characteristics of Barasat Municipality
Source: Primary Survey

6.3.2. Rail Network

Barasat Junction Station and Hridaypur Station are the railway stations on Bongaon line of Sealdah Station (north section),within the study area. The Eastern Railway passes through the aforesaid stations and thus connects the study area to the other parts of the states and other states of the country. The railway stations primarily serve the Local trains. Barasat is the Junction, where Bongaon line and Hasnabad - Basirhat line of Kolkata Suburban Railway Separates.

6.3.3. Air Port

At present there is no airport functioning within the study area. But Netaji Subhas Chandra Bose International Airport is within 8 km from the study area.

6.3.4. Passenger and Freight Terminals

In Barasat Municipality there are two major bus terminals namely, Titumir bus stand and Checkpost bus stand. There is several Autos, Toto, Cycle Van, Cycle Rickshaw and Taxi stands within the study area .The locations of major stands are in Colony More, Champadali More, Dakbanglow More, Helabottala More, Haritala More and near Barasat as well as Hridaypur Railway Station. Auto-rickshaws, taxi, Toto, Cycle Van, Cycle Rickshaw and matador unions have set up stands on either side of the NH 34 and NH-35.

6.4 Travel Characteristics

Following are the salient findings in connection with travel characteristics of the study area, as revealed during primary survey and from other relevant technical documents:

6.4.1. Daily Commuters Trips

1. On an average week day it has been estimated that approximately 1.75 lakhs of household trips (internal to internal) are generated within the study area (Primary survey). External-internal and internal-external trips account for a small fraction of about 4.5% trips (approximately 4500). (Primary survey). Majority of these daily trips originate at the residential areas and ends at the CBD area within Barasat Municipality. The CBD area accommodates the major Govt. offices, schools and commercial areas and thus acts as the major trip attraction zones.
2. The purpose wise trip distribution indicates that work trips account for about 55%, and educational trips account for about 25% and the rest 20% were for other purposes like health trips, recreational trips, social trips and cultural trips etc. (Primary survey).
3. The trip length (time distance) distribution (for work and educational trips) within the study area indicated that majorities (approximately 82%) of the household trips were within 15 minutes and around 13% of the trips were within 15-30 minutes (Primary survey).
4. Amongst the factors affecting the choice of mode, the journey time and cost were predominant.

6.4.2. Tourist

North 24 Parganas district has several famous tourist places, many of which are located within 25 km from the study area. These tourist places attract a large numbers of visitors every year, particularly during October to February. During Kalipuja a large number of tourists come at Barasat. The tourists primarily stay in Barasat Municipality area, as most of the hotels and other tourist amenities located near the CBD. Therefore during the peak season the existing transportation system of Barasat Municipality has to meet up the demand of a significant number of tourist trips.

6.4.3. Freight Movement

The district level wholesale market, a number of truck terminals, and several freight-movers offices and warehouse are located within the Barasat municipal areas. The wholesale market, the truck terminals and the warehouses generate a sizeable number of freight trips every day with their origins and destinations within this town. N.H-34 and NH-35 run through Barasat Municipality. A number of

freight carriers pass through (external to external trip) this stretch of the N.H adding significantly to the daily freight traffic volume ofthe study area. Like many other similar towns mixing of freight and passenger traffic are of frequent occurrence in these two towns. Besides, some short-haul freight trips take place within and around the study area. The flow entity for the above movements mostly comprises of combination heavy commercial vehicles (HCV), light commercial vehicles (LCV), matadors, vans etc.

6.5. Passenger Transport System

The passenger transport system in Barasat Municipality includes public transport system like rail and buses; Para-transit system comprising of cycle-rickshaws, cycle van, toto, and auto-rickshaws; as well as personalized modes such as cars, two-wheelers and by-cycles.

6.5.1. Public Transport System

The rail with its two rail stations (Barasat and Hridaypur) serve the passengers at the regional level. There are too many bus routes which are originating from Barasat Municipality and connecting different C.D blocks of North 24 Paraganas and other districts. People commute from the C.D blocks to the CBD area primarily for work trips, health trips and business trips etc. These bus routes are operated by government as well as private owners. Bus trips are often characterized by overcrowding.

6.5.2. Para-Transit System

Mainly cycle-rickshaws and, quite interestingly, the three-wheeled man-driven "cycle-vans", Auto-rickshaws, Toto ply between Barasat and nearby areas. Several Buses connect the town with Kolkata, other suburbs of Kolkata and the other towns of West Bengal.

Figure 1: Toto Rickshaw

Figure 2: Van Rickshaw

Figure 3: By-Cycle

6.5.3. Passenger Trips by Two Wheelers and By-Cycle

A large number of daily commuters' trips take place on two wheelers and bicycles in Barasat Municipality. The reason for a large share of two wheeler trips is due to shorter trip length for majority of the trips and low trip cost.

6.6. Mobility Scenario at Major Corridors

Mobility defines transportation problems in terms of constraints to physical movement, congestion related indicators of mobility were mainly considered for analysis. Transportation has been paralyzed and suffocated due to the encroachments of roads and crossings, and lack of a proper traffic management system in Barasat Municipality. Traffic congestion is a regular feature of Barasat municipal town. It is really horrible and creates suffocating conditions. Unauthorized encroachments, where auto-rickshaws, van-rickshaw, toto, taxi and matador unions have set up stands on either side of the NH 34 and NH-35 Dukbanglow more to Colony more, Duckbanglow more to Champadali more, Colony more to Helabottala. N H 34(SP office to Duckbanglow more) and NH-35(from Duckbanglow more to Barasat hospital) is occupied by unauthorized vendors. On an average 6,425 vehicles ply on NH 34 and NH-35 daily. By 2020, the number will reach 7,586. The figure will touch 10,729 in 2025 and 13,379 in 2030.

The Barasat Municipality has found that people suffer traffic congestion from 8.00 a.m. to 8.00 p.m. every working day at Colony more, Champadali more, Dackbanglow more, Helabottala and Haritala more. During school and office times, people face horrible situations on NH34, NH-35,Taki road and Barrackpur road. The details of Congested and Encroached Stretches of Roads in Barasat Municipality are compiled in Table 3 People face difficulties on Duckbanglow more where the main road is divided into two ways : NH-34 and NH-35. The narrow roads are gradually becoming congested due to unauthorized encroachments .On the basement of the flyover Colony more and Champadali more are also becoming congested due to unauthorized encroachments. According to a survey conducted by the Barasat Municipality civic body, more than 8,000 van-rickshaws are playing every day in Barasat town, creating traffic congestion. Yet the official figure of registered van- rickshaw under Barasat Municipality is 4712.Unauthorized Toto also causes traffic congestion in Barasat town. There are more than 1000 of unlicensed Toto that ply every day creating problem in traffic management. There is a similar problem on Station road (from station to Champadali more) where footpaths have already been grabbed, narrowing the space for the main roads. Due to unauthorized vendor people are suffering a lot across the town, encroachments on footpaths and roads in many places which have narrowed down the main roads in the heart of the town. Pedestrians are facing problems in front of the Borobazar where a part of roads and footpaths have been encroached on for setting up unauthorized vendor, food stalls and other businesses.

Sl. No	Street Name	Width of the Street	Encroached And Congested Stretches	Issues/Problem
1	Jessore Road(NH-35)	30 Feet	Jessore Road(NH-35)	Narrow road width with encroachment, traffic congestion, poor surface condition,
2	Krishnanagar Road(NH-34)	30 Feet	Krishnanagar Road (NH-34)	Narrow road width with encroachment, traffic congestion, poor surface condition
3	Taki Road	28 Feet	Taki Road	Narrow road width with encroachment, traffic congestion, poor surface condition,

Table 3: Congested and Encroached Stretches of Roads in Barasat Municipality
Source: Primary Survey

6.6.1. Mobility Scenario at Major Intersections

Roads are encroached with unauthorized construction. Due to unplanned growth, proper space for construction of new roads is difficult. Absence of necessary flank or unclean flanks roads cannot get drained out naturally and thus causes water logging. Due to improper level in roads, water logging on roads is very common. Roads are excavated for various infrastructural services viz. cable operators etc. in an unplanned manner. The Carriageways become narrower as there is no proper parking space, thus creating Traffic congestions. The Current Standard of Road is Unable to Take the Pressure of Heavy Vehicle and Highly intensive traffic movement. Heavily damaged road are stretch by the side of ponds or water bodies, Poor condition of roads, which hinders smooth movement of pedestrian as well as vehicles. Inadequacy of pedestrian way i.e. footpath is also one of the causes of congestion on road. Illumination of the existing system is not up to the required satisfaction and its maintenance rate is high. Due to non-existence of pole and street plan service cannot be provided in different areas, especially slum areas need more attention.

6.6.2. Signalized Intersections

In Barasat Municipality major intersections, namely Duck bungalow More, Colony More, Champadali More and Helabottala More are signalized. However it is observed during primary survey that delay occurs in the aforesaid intersections as existing traffic signal remain defunct in majority of the time. They are compiled in Table 3 This situation makes the citizen of the Barasat Municipality subject to risk and hazard at such intersections.

SL NO	NODE	INTERSECTING ROADS
1	Colony More	NH-34 and Flyover
2	Champadali More	NH-35 ,Taki Road and Flyover

Table 4: The major roads intersections in Barasat Municipality Sl. No. Name of the Intersecting Roads
Source: Primay Survey

Parking: Parking is a major and an emergent issue in the Barasat Municipal Area. The tendency in the Area is of commercialization along the main roads. Initially, the plots along these roads were both residential and commercial in nature but with increasing land value and traffic on these roads, they got fully commercialized. The commercialization led to an increase in parking demand along these roads which in turn reduced the effective carriage way.

Figure 4: Toto parking

Figure 5: Road side encroachment

Figure 6: Car Parking

On Street Parking: On-street Parking is a very common phenomenon and is highly responsible for the decrease in the width of the Carriageway. Taxies, Van -Rickshaws, Toto and Auto-Rickshaws not only have their Terminal points on the streets but also at

important and populated public places giving rise to congestions. Not only had these, Buses and Mini-buses also had their terminus on the major Arterial.

Road	From	To	Travel Speed	
			PEAK HOUR	OFF PEAK HOUR
NH-34	Duckbanglow more	Colony More	10	18
NH-35	Duckbanglow more	Champadali More	10	17
TAKI ROAD	Champadali More	Kazipara Railgate	12	20
BARRACKPUR ROAD	Colony More	Nilgunge	15	28

Table 5: Mobility assessment at selected nodes
Source: Primary survey

6.7. Mobility Scenario at selected Transportation Nodes
For better understanding of the Mobility scenario of Barasat municipality some selected locations are conducted as survey.

6.7.1. Location: 1: Colony More
It is the location where the regional traffic and city traffic meet together. The big trailers are taking more time to pass because the junction is very busy during peak hour. Several parking palaces are formed in highway. For this reason Auto, Toto, Van-rickshaw etc are standing on the N.H. and causing jam.

6.7.2. Location: 2: Champadali More
Problem: Narrow width of the road, congestion, encroachment, traffic jam. The N.H-35 runs across within Barasat Municipality with its two lanes. Nevertheless, these two lanes are converted into single lanes due to encroachment. However, the carriage capacity is not fulfill their requirements. Immigrant and out-migrant of Barasat Railway Station and Barasat Titumir Bus Stand are still waiting for their buses in Champadali more. Because of it, the buses are still waiting for their passenger into the Champadali more and they take more time to fill up it. So, they stand on theN.H-35 and cause jamming situation. The Auto and Van –rickshaw are also standing on N.H-35 for the passenger of station as well as Champadali More. However, the situation is that there are more than 30 taxis are still standing on this N.H. For this the there was a traffic conflict with regional traffic and city traffic and causing traffic congestion.

Figure 7: Champadali More

Problem: Central Location and congestion of buses. Central location of the bus stands with in the Municipality. As for this, the movement of vehicles generates traffic congestion. The outer buses are coming within this district and run across the municipality and the conflict of local and regional transportation.

6.8. Major Findindings
From the existing scenario the major mobility related issues are summarized below-
1. Rapid Population Growth: The population of the study area is growing at significant rate which is higher than the state average.

Figure 8: Bad Condition of road suface

2. Steady Vehicular Growth: The number of vehicles, particularly two-wheelers and By-cycles are steadily increasing in the study area.
3. Inadequate Road Network: The area under road is inadequate. Leaving aside the N.H and S.H majority of roads are narrow in width, suffer from encroachment and exhibit the symptoms of poor maintenance. There is no established hierarchy of roads in Barasat Municipal areas.
4. Narrow width: The lane width to carry present and future traffic volume is insufficient. Major corridors of the city do not have the capacity to sustain the present traffic volume and thus creates high congestion.
5. Unplanned Public Transport Bus Routes: Unplanned Bus routes and services results in delay, overcrowding and inaccessibility within the study area. Private as well as the transport (Govt. owned) bus terminals are situated in central Business District (CBD) which compels the buses to ply through the congested corridors.
6. Unfettered off Street & on Street Parking: There is no regulation for off-street and on-street parking in Barasat Municipalty. This is a chronic problem in core areas. There is a lack of parking spaces, vehicles are parked on road and creates traffic block:
7. Road accidents: There is no proper segregation of pedestrian and motorized vehicles and this result in high road accidents.
8. Deterioration in air and noise quality- The noise pollution is more along the N.H-34, NH-35 and the CBD.

Figure 9: Road Accident on NH-34

7. Proposal and Recommendations

Proposals and recommendation formulated for mobility improvement of Barasat Municipality are furnished in this chapter along with broad policy guide lines wherever applicable. Proposals are formulated in three phases as outline below:

- Short term proposals (up to 2017) [S]
- Medium term proposals (up to 2020) [M]
- Long term proposals (up to 2025) [L**]**

7.1. Short Term Proposals (Up To 2017) [S]

Short term mobility-improvement actions which could be taken in immediate future are the following:

1. Improvement scheme are proposed for important road sections (mid-block sections) intersections within the study area. [S1]
2. The schemes proposed are road widening, signalization and improvement of intersections, [S2]
3. parking management by marking different parking zones, determining parking fees, [S3]
4. Encroachment in the bus stop to be removed [S4]
5. Removal of encroachment [S5]
6. Relocating para transit stands (auto, cycle rickshaw, toto)... [S6]

7.2. Medium Term Proposals (Up To 2020) [M]

Following are the medium term proposals which could be implemented within 2020:

1. Development of facilities for Bi-cycle trips by separate lane [M1]
2. Development of pedestrian facilities by pavement , foot over bridge and subway [M2]
3. Improvement of bus stop facilities [M3]
4. Allocation of new parking facilities. [M4]

7.3. Long Term Proposals (Up To 2025) [L]

Following are the long term proposals suggested for mobility improvement of Barasat Municipality:

1. Construction of four lane at NH-34 and NH-35. [L1]
2. Construction of flyover over 11 no railgate. [L2]

8. Conclusion

8.1. Summary & Concluding Remarks

The present study attempts to formulate a mobility improvement plan for Barasat municipal town of North 24 pgs District. The proposal for setting of a municipal corporation including Barasat Municipality acted as the motivation for taking up the said town as the study area. Like many other similar municipal towns, Barasat Municipality suffer from acute transportation problems like poor accessibility, inadequate road space and other infrastructure, unplanned passenger transport system, road encroachment, increasing travel demand and subsequent traffic volume, mixed mode traffic lacking traffic management system, lack of pedestrian facilities, all of which lead to poor mobility characterized by congestion, delay, traffic accidents and environmental degradation particularly air and noise pollution. The scope of these work included study of mobility scenario at the existing major corridors, intersections and transportation nodes largely based upon secondary data. Limited primary survey was undertaken to overcome the hurdles of the data gap, which is frequent in many similar municipal towns. Analyses and projections included identification of relatively inaccessible areas, assessment of congestion at major arterial roads, delay in passenger trips, assessment of future travel demand at major corridors etc. It is revealed that the demographic profile in last two decades indicates that population of this town are increasing at a rate which is marginally higher than the State (West Bengal) average. Therefore the travel demands of Barasat Municipal town is also expected to grow further in near future and the mobility status is also going to worsen in absence of appropriate planning measures. The proposals and recommendation made in this work include several road and junction improvement schemes; development of existing fixed facilities through construction of new roads, setting up of bus and truck terminals, construction of grade separated intersections; introduction of traffic and parking management schemes; augmentation of existing para-transit system and improvement of ancillary facilities of existing bus transit system. Proposals has also been formulated for encouraging transportation by bi-cycle which appeared a very effective and promising mode for daily commuters trip in the study area considering the observed trip length frequencies, socio economic conditions of the people living within the study area, and the merits associated with the said energy saving and environment friendly mode.

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