Following are the list of Proposed Bridge and culverts in Narail:

Table-8.24: Gross List of Proposed Bridge and culverts in Narail

Ward No.	Number of Proposed Culverts	Number of Proposed Bridge
1	20	0
1 (Ext)	12	0
2	11	0
3	13	1
4	37	0
5	27	0
6	15	0
6 (Ext)	5	0
7	9	0
7 (Ext)	17	0
8	22	0
9	30	0
Total	**218**	**1**

Following are the list of phase wise proposed culverts in Narail:

Table-8.25: Phase wise List of Proposed culverts in Narail

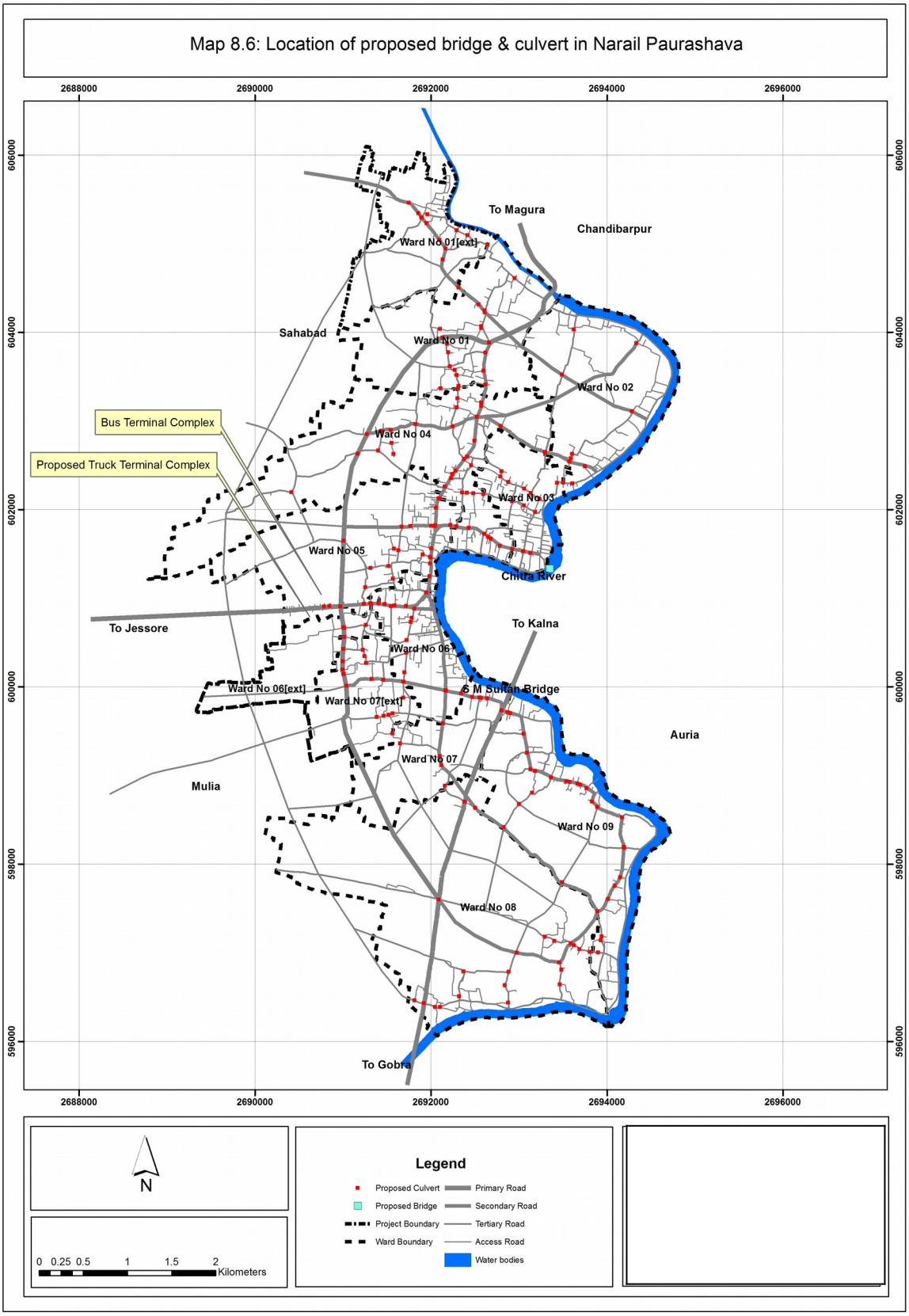
Ward No.	Phase 1	Phase 2	Phase 3	Phase 4	Total
Ward 01	12	3	5		20
Ward 01(Ext)	8	3	1		12
Ward 02	5	2	1	3	11
Ward 03	4	2	4	3	13
Ward 04	16	5	4	12	37
Ward 05	18	2	0	7	27
Ward 06	6	5	3	1	15
Ward 06(Ext)	1	1	2	1	5
Ward 07	4	2	3		9
Ward 07 (Ext)	10		6	1	17
Ward 08	6	6	4	6	22
Ward 09	20	2	7	1	30
Total	110	33	40	35	218

b. Drains

Road side drainage facility need to consider in road design but detailed advice on the design of road drains is outside the scope of the master plan. However, key points to consider in the design are:

- The need for cross drainage, road surface drainage, and sub-surface drainage
- Drain design should prevent siltation (too shallow a fall) and excessive scour (too steep a fall)
- The side slopes next to the road should be flat enough to reduce the risk of errant vehicles overturning (maximum slope of 5 horizontal to 1 vertical)
- Open lined drains should be in the form of shallow dishes rather than steep-sided U or V-sections
- In built-up areas channel drains deeper than 250mm should be covered for the safety and convenience of both pedestrians and vehicles
- The drain should terminate or run-out in a satisfactory manner without risk of causing erosion or other problems
- The drain should be capable of being cleaned and maintained easily.

It is not easy to design drains that can cope with the expected flow and yet are safe, affordable and easy to maintain, so compromises are usually required.


Map 8.6: Location of proposed bridge & culvert in Narail Paurashava
2688000
2690000
2692000
2694000
2696000
606000
604000
602000
600000
598000
596000
To Magura
Chandibarpur
Ward No 01[ext]
Sahabad
Ward No 01
Ward No 02
Bus Terminal Complex
Ward No 04
Proposed Truck Terminal Complex
Ward No 03
Ward No 05
Chitra River
To Jessore
To Kalna
Ward No 06
Ward No 06[ext]
Ward No 07[ext]
S M Sultan Bridge
Auria
Ward No 07
Mulia
Ward No 09
Ward No 08
To Gobra
N
0 0.25 0.5 1 1.5 2
Kilometers
Legend
Proposed Culvert
Proposed Bridge
Project Boundary
Ward Boundary
Primary Road
Secondary Road
Tertiary Road
Access Road
Water bodies

c. Lateral and Vertical Clearances

Trucks are typically just over 4m high. To allow for adequate vertical clearance and the transport of abnormal loads 5.7m headroom should be provided when designing new roads and structures. This also makes some allowance for headroom being lost when road pavements are given overlays. The headroom must be available over the full width of the road formation. There may be special requirements on some roads and this should be checked with the RHD's and LGED field divisions.

The lateral clearance, measured between the outer edge of the shoulder and roadside objects should be a minimum of 1m. In difficult situations an absolute minimum clearance of 600mm can be accepted. Where there is no shoulder, the respective clearances are 1.5m and 1m.

Many accidents happen when vehicles run off the road and hit a roadside object. Collisions with trees are commonplace and often result in death or serious injury. Ideally there should be a 4m wide clear zone beyond the shoulder that is kept free of roadside hazards. For curves with a radius of less than 600m the clear zone width on the outside of the curve should be doubled.

It is also important to check that roadside signs, poles, bridge abutments, trees etc., do not interfere with sight distances on curves. Tree planting alongside new roads is beneficial but care should be taken to reduce the hazard risk.

d. Cross fall

Cross fall is the slope of the carriageway or shoulder that enables water to drain away. Carriageway cross fall must be sufficient to provide good surface drainage but not so steep to cause problems for drivers. On two-way single carriageway roads the carriageway is normally cambered to form an inverted 'V' which may be rounded at its highest point, the crown. On dual carriageway roads the carriageway normally slopes away from the median. The standard cross fall for paved carriageways is 3%.

Shoulders having the same surface as the carriageway may have the same cross fall, but generally shoulder cross falls will be a little steeper - normally 5%.

e. Bus -bays:

The consultant has been proposed public bus service in Narail . Effective bus service need bus bays. Properly designed bus-bays recessed into the curb facilitate loading and unloading of passengers without the vehicles blocking the stream of traffic on the carriageway. The following are the guidelines for the location of the bus -bays:

- the bus stops should not be located too close to the intersections. A minimum distance of 75 m from the intersections is desirable for urban situation and for rural locations a distance of 300 m is desirable. The bus stops should be located preferably on the farther side of the intersection.
- Bus stops should be as far as possible so located as to disembark the passengers at safe places such as curbs or islands.
- For buses intending to turn right at an intersection, the stop should be sufficient away from the intersection so that the bus can be maneuvered from the curb to the extreme right lane well before the intersection.

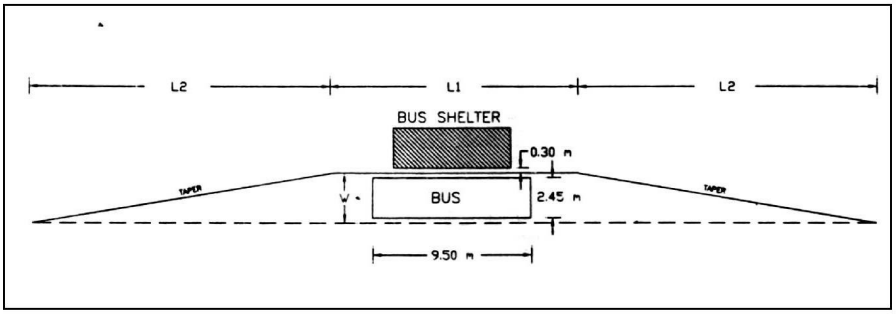


Figure 8.18: Typical Lay out of bus

Where

L 1 = 12 m Minimum for Congested locations of single bus, add 12 m for additional bus
= 15 m desirable for single bus, add 15 m for every additional bus

W = 3 m minimum for congested areas
= 3.5 m desirable

L 2 = 6 W minimum for congested areas
= 8 W desirable

Following are the proposed bus-bay location in Narail :

Table- 8.26: List of proposed Bus-bays in Narail

Proposed ID	Ward No	Location
Bus 01	Ward 05	Infront of Bus terminal
Bus 02	Ward 05	Vaukhalia
Bus 03	Ward 05	Near Narail Sadar Hospital
Bus 04	Ward 04	Durgapur Dumur Tola
Bus 05	Ward 01	Raghunathpur
Bus 06	Ward 01	Magura Road
Bus 07	Ward 07(ext)	Mulia Road
Bus 08	Ward 06	Zila Primary Education Office
Bus 09	Ward 08	Dhopa Khola Bramman Danga
Bus 10	Ward 08	Uzirpur
Bus 11	Ward 01(Ext)	Ghora Khali Ghat Road
Bus 12	Ward 08(Ext)	Narail Gobra Main Road

8.4.3 Waterway Development/Improvement Options

The following are the options of waterway development for Narail :

a) Although Chitra river is not used as water route but in the rainy season this river can be used as an alternative of goods transport. Chitra river should be protected, conserved and maintained properly for present and future means of alternative transport route. This would require regular dredging of the water way channel to keep the paths free.

b) Care has also to be taken to prevent motivated filling, siltation and encroachment of the river front and the river itself by proper river front development and by implementation of the conservation of water reservoir act. River front development must insure and people need to motivate for such type of development.

c) Also the khals (Ragunathpur Khal, Paital beel, Guru chira khal) should be maintained and preserved.

d) Care is also needed to prevent erosion and pollution of river water by the river side industries and sewerage water.

e) The river can also be made for recreation purpose by introducing rivers cruise facilities by construction footpath and park along side the river.

8.5 Transportation System Management Strategy (TSM)

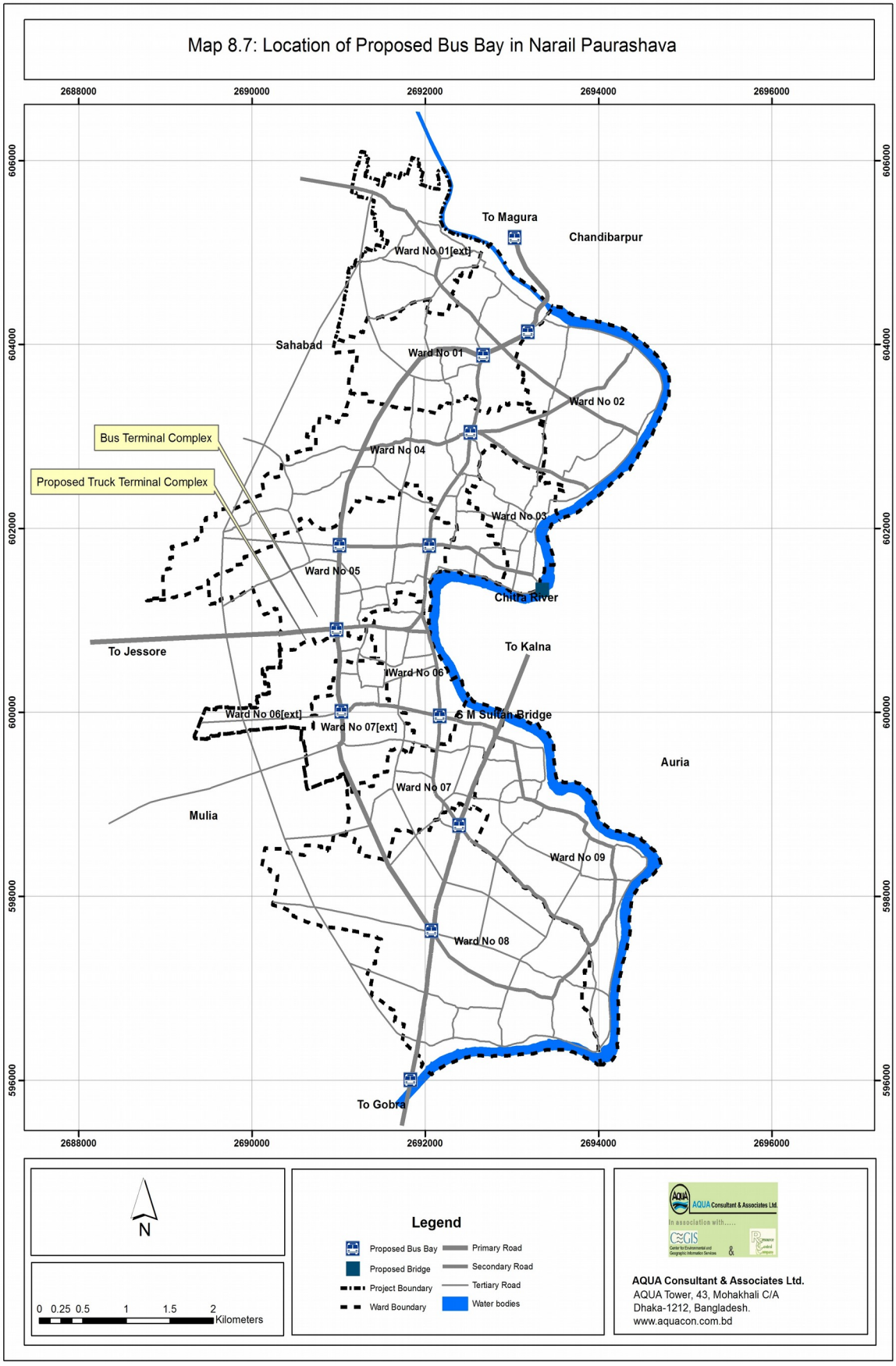
8.5.1 Strategies for Facility Operations

The Issues to be considered during the operational phase:

The local people should be motivated about road safety while using the road. The Upazilla road safety community formed by the people's representatives, in particular the UP chairman, UP members, teachers of school, Girl Guides', and Boy Scouts', owners of transport and members of committees should launch road safety campaigns and community road patrolling (once in three months) to ensure proper use of roads already completed and to be completed.

The road safety campaigns will consist mainly of rallies on road safety, meetings, seminars and documentary film shows etc.

The community road patrolling activities will take measures to remove any unauthorized new erection on the road, Beel boards and the like that hampers the circulation of traffic. The cost will be borne out of the funds for maintenance. Further, the following is a compulsory to-do list.


Map 8.7: Location of Proposed Bus Bay in Narail Paurashava
2688000
2690000
2692000
2694000
2696000
606000
604000
602000
600000
598000
596000
To Magura
Chandibarpur
Ward No 01[ext]
Sahabad
Ward No 01
Ward No 02
Bus Terminal Complex
Proposed Truck Terminal Complex
Ward No 04
Ward No 03
Ward No 05
Chitra River
To Jessore
To Kalna
Ward No 06
Ward No 06[ext]
Ward No 07[ext]
M Sultan Bridge
Auria
Ward No 07
Mulia
Ward No 09
Ward No 08
To Gobra
N
0 0.25 0.5 1 1.5 2 Kilometers
Legend
Proposed Bus Bay
Proposed Bridge
Project Boundary
Ward Boundary
Primary Road
Secondary Road
Tertiary Road
Water bodies
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In association with.....
AQUA Consultant & Associates Ltd.
AQUA Tower, 43, Mohakhali C/A
Dhaka-1212, Bangladesh.
www.aquacon.com.bd

a. Black spots, indicating accident-prone spots on the road or where maximum number of accidents has already occurred up to the present should be identified.

b. Strict vigilance should be in force not to let anyone stack hay on the road. The local people should be motivated to avoid the habit of drying wood chips, hay, paddy sheaves, cow dung etc. on the road by explaining the harmful aspects of these practices.

c. Strict vigilance should be in force in order that no one can cut the earth from the embankment and shoulders of the road and nothing is done to cause harm to the embankment and shoulders.

d. Grass grown on the side of the road is very beneficial to prevent the earth from eroding and the people should be motivated that at no cost should this grass be mown for other alternative uses. At the same time proper care should be taken in respect of the trees and other plantations along the road — in particular, from the domestic animals grazing in the field.

e. The people should be motivated to give up the use of the iron rim for the tractor, and wooden frame for the cartwheel drawn by cows or buffaloes — instead they should be encouraged to use rubber wheels.

f. Care should be taken to remove stranded vehicles (bus, truck & other vehicles) as far as possible from the road

g. People should be encouraged not to overload the bus and additionally, they should also be informed about the hazards of trucks loaded beyond their carrying capacity to dissuade them from such practices.

h. Care should be taken to dissuade people from digging irrigation canals on the shoulder or slope

i. Roads should be inspected following the occurrence of storms or floods or any other natural calamity. Measures should then be taken for the immediate removal of trees lying on the road after a storm or flood.

8.5.2 Strategies for Traffic Flow and Safety

Issues to be considered during the Planning and Implementation of a Road:

The following technical matters should be considered on a priority basis at the planning and implementation stage to ensure road safety.

a. Straighten sharp curves as much as possible in order to convert it into an easy curve.
b. The level & grade should match at the point where LGED roads are meet national & regional roads and if necessary, divider/roundabout should be provided in order to bifurcate the circulation of traffic. Provisions for super elevation in compliance with the curvature
c. Provision for prescribed shoulder on either side of the road.
d. All measures to be taken to provide "safe sight distance"
e. The roads should be kept free from all unauthorized obstructions. In this regard, all markets, shops, Beelboards, utility lines such as telephone lines, street lights, electricity poles, gas connection lines etc. must be relocated.
f. Upon an occurrence of an accident on LGED roads, the attached "Road accident form" should be completed and forwarded to the "Road safety unit". Following an analysis of the information obtained measures should be taken to avert accidents.
g. Undesirable hump on the road, if exists, should be removed. In case of speed needs to be regulated, then the hump should be replaced by properly constructed rumble strips
h. Grass can be grown (in particular on bridge approaches) and tree plantation programmes should be taken up following the construction/ maintenance of a road. However care should be taken that in no way the sight distance is obstructed. Plantation of trees is to be avoided on the inner side of the curve.
i. Measures should be taken to prevent water stagnation on the road surface.
j. Subject to availability of funds pedestrian crossings/ boundary walls etc. can be constructed in order to ensure safety of the students at schools, colleges, madrasas adjacent to the road.
k. Railing/ rail posts of each bridge should be painted. In addition each alternate rail post should be provided with retro reflecting markings.

l. The opposite direction of the bend (curve) of a bridge, bridge approach and market area should be provided with guide posts and each alternate guide post should be provided with retro reflecting markings
m. Kilometer posts are put up on each road in accordance with the approved design, drawing and specification.
n. It is compulsory that the following signs & markings are provided:
    - Regulatory *"STOP" sign* or *"Give Way" signs* with retro reflecting markings should be erected at the Intersection of each road
    - Regulatory speed limit signs with retro reflecting markings should be erected at major intersections, built-up areas, markets, schools, colleges, madrasas, religious institutions, broken down bridges, narrow bridges and dangerous curves.
    - Warnings and guide signs should be erected at intersections, large bridges, (>30 meters), narrow bridges, built-up areas and permanent hazard obstructions.
    - If possible, rumble strips (a series of rough textured surface patches) should be installed at intersections, narrow bridges, built-up areas, and crossings.
    - Sticker of retro reflecting material should be attached to the rear of non- motorized vehicles like rickshaws, rickshaw vans and bicycles.

8.5.3 Strategies for Traffic Management

An overall traffic management improvement program would typically be comprised of several elements, including:

a. Traffic Engineering — Enhancements to enable more effective use and management of existing physical infrastructure. These enhancements typically include better road markings, signs, traffic signals, channelization at intersections, turn restrictions and separation barriers, space for bus stops, and parking or waiting areas for public transport vehicles (buses, rickshaws, auto-rickshaws, taxis, etc.).

b. Driver Training - Improved testing and licensing procedures for all drivers and re-training for offending drivers. Since most drivers work for someone else, the influence that owners exert by either condoning or reinforcing poor driving habits or insisting and demanding good driving habits is substantial and should not be under estimated.

c. Roadside Interference — Measures that move in a positive and definitive manner to reclaim the full potential capacity of the existing road by relocating or removing inappropriate and illegal non-transport related activities from the public right-of-way. In some cases this may involve the need to help relocate or establish alternative sites for such activities.

d. Public Awareness - Initiatives to improve the ability of road users (motorists and pedestrians alike) to adopt behavioral patterns which lead to more efficient and safer transport services. Typically, this will involve programs to alter community attitudes and invoke a greater willingness to accept better discipline by all users and providers of the transport services.

e. Enforcement — increased level of enforcement of traffic rules to ensure a greater compliance with community desired road user behavior. Enforcement actions can involve formal policing as well as informal pressure on individuals to adopt community norms of behavior and should include the involvement of community leaders.

For traffic management of Narail the consultant proposed various engineering measures like

1. Bus Bay at 12 different locations,
2. Parking place at 7 locations.

8.6 Plan Implementation Strategies

8.6.1 Regulations to Implement the Transportation Plan

In Bangladesh, it is a common phenomenon that the Plan proposal is just a policy document, lack of implementation is observed in all sectors. Transport sector is also familiar with this phenomenon. Roads are developed without considering laws and regulations especially internal roads of the town. The violation of laws has been commenced from the micro level Building Plan Approval. Therefore, in implementation of Transportation Plan, it is required to follow the relevant rules and policies. Building Plan Approval Building Construction Rule, 1996, Bangladesh National Building Code, 1993 (amended in 2006), National Land Transport Policy (2004) which has been already explained in different design phase of preparation of Master Plan of Narail . Besides, to develop the Road Network it is required to acquire the land as per requirement of Right of Way (ROW). The issues regarding acquisition of Land is also mentioned in National Land Transport Policy, 2004.

Land Acquisition as a Legal Instrument for Construction of Roads

Land acquisition is a process in which a public agency or non-profit land conservation organization purchases all the ownership rights vested to the land from a willing seller. In every case, land acquisition must mean the transfer of ownership. Thus, it is the act by which a person acquires a property.

Land Acquisition Act

For implementation of any urban development program, availability of land and its control are necessary. Acquisition of land for creating an adequate stock of urban land is necessary not only for future growth but also for a large number of public uses. One of the most important legal tools is to acquire the land by the Land Acquisition Act, 1894 was subsequently amended in 1961. The right of acquiring land by the country for the public utility has been recognized all over the world. The basic Principle of this Act is that is to give priority to the welfare of the community and provide compensation to the owner for the loss of property rests with the state to be settled. To provide the advantage of Land Requisition, the Land Acquisition and Requisition of Immovable Property Ordinance, 1982 has come into force.

Table 8.27 shows the possible regulations to implement the Transportation Plan of Narail Paurashava.

Table-8.27*: Regulations to implement Transportation Plan*

Type of Development	Nature of Planning	Policy instrument to control development	
Obtaining individual plots under planning	Building Adjacent Road Preventing illegal Encroachment of Road	Follow up the Section-8-12 including clauses of Building Construction Act, 1996	
		Implementation Agency: , AC land Office	
Planned development of undeveloped areas	New Roads and walkways	Compulsory Acquisition of land	Involvement of Implementation Agency LGED and RHD for Regional and National Road network
Redevelopment of already developed areas	Road Widening	Land Sharing/ Readjustment	Respective Authority: RHD, LGED, BWDB (embankment road) and .
Other Measures	Parking Measures Bus Stoppage Street Lighting Tree Plantation Traffic Control Channelization Infrastructure development such as Bridge	Compulsory land Acquisition for tree plantation and other measures will be implemented by . RHD and LGED will be involved to construct Bridges and Channelization. Traffic Control by Traffic Police	

8.6.2 Implementation, Monitoring, Evaluation and Co-ordination of the Plan

8.6.2.1 Evaluation

This is a very important stage in the planning process that puts together facts and values in comparison of possibilities-how well they achieve the objectives specified and at what level. In preparing the Land use Plan, specific objectives of the plan have been attempted to obtain. Table 8.28 shows the Evaluation of the Land Use Plan in light of the specified goals and objectives.

Table-8.28*: Evaluation of Land Use Plan*

Goal	Description of Activities performed	Objectives Attainment
To provide a safe and dependable transport service	Proposal of about 9% roads where existing road coverage is only 2.2% including Road Widening and New Road Proposal of three category of Road Hierarchy: Primary, Secondary and Tertiary, 7 Designated Parking Spots,	To develop a future road network system with necessary infrastructural facilities.
Introduction of an integrated as well as alternate transport system	Bus Terminal Complex with accommodation of bus related different services, Truck Terminal Complex with accommodation of truck related different services.	To provide future options for other mode of transport development such as roadway.
Creating awareness through proper traffic management and control	Strategies for Traffic Flow and Safety (Parking Management, Bus Stoppage/ Bus Bay) Strategies for Facility Operations (Restriction on Particular Mode, Restrictions on type of movements, Road Signs and Markings, Linked traffic Signals, Speed Control Strategies for Traffic Management (Road Hierarchy measures, Segregation of different Modes, Bus/ Motorized priority measures, Pedestrian/ Non-motorized measures)	To guide the possible Traffic Management System (TSM)

8.6.2.2 Implementation

Once the decisions are made, procedures for implementing the chosen policies and programs begin. The term 'implementation' embraces such a multitude of varied activities that there is no one technique, or even group of them to ensure the effective implementation. The implementation of any plan can not be possible within a day. It is a process and requires proper monitoring, co-ordination among the responsible Organizations. To implement the Transportation and Traffic Management Plan of Narail Paurashava, following system is required to be developed:

8.6.2.3 Co-ordination among organizations and link with

Paurashava is the highest authority for implementing the Master Plan as per Act, 2009. The Master plan must coherent with the existing rules and regulations of Bangladesh. The Paurashava will be responsible for:

1. Any new roads construction and maintenance
2. Development, expansion and improvement of any road infrastructure
3. Without permission of no development activities can be conducted

Besides, any site development schemes, Community Development projects, land acquisition, Building Control, Parking Management, Parks, Traffic Control and other basic urban services (such as street lighting) are provided by .

Other Development Organizations responsible for implementation

BRTA: BRTA is a regulatory body to control, manage and ensure discipline in the road transport sector and road safety related areas in Bangladesh. The function of BRTA is oriented with Vehicle Registration, Route Permit etc. Depending on forecasted travel demand BRTA will be responsible for motorized vehicle registration.

BRTC: The function of BRTC is oriented with Comfortable and safe Travel, Subsidies for different group of passengers such as Students, Old persons etc. Thus, to ensure efficient service for the passengers is the main focus of this Organization.

LGED: An Engineering Cell was established in the Local Government Division (LGD) under the Ministry of Local Government, Rural Development and Cooperative (MLGRD&C) in 1970s to oversee the rural works program. LGED is responsible for Upazila, Union and Village Road, Bridges Construction and maintenance. Thus, such roads and other infrastructure connecting are constructed by LGED.

RHD: The Roads and Highways Department (RHD) was created in 1962. RHD is responsible for the construction and the maintenance of the major road and bridge network of Bangladesh. RHD is mainly responsible for Construction of National, Regional and Zila/ Feeder Roads of Bangladesh.

Land Registration Department: In 1989, Land Record and Survey Management Evaluation Committee recommended that at the Zila level, Zila Land Officer, Additional Zila Land Officer, Additional Zila commissioner and Assistant Commissioner (Land) will form Land Registration Committee which will be responsible for land registration. This Registration department records land mutations arising through sale, inheritance or other forms of transfer, reports changes to the Ministry of Land, and collects the Immovable Property Transfer Tax.

Computerized Land Information System

An efficient system for land administration and geographic information is an important tool for planned development and economic wellbeing for . This system can provide information on real property rights, values and use of land, building for business activities, management of real properties and development and implementation of land and Transport policies. At present, the system of land recording is traditional handwriting documentation suffering with the problem of storing, retrieving and analyzing. Therefore, advantages will be occurred in some specific issues are as follows:

- Land Tenure (land ownership)
- Land Value
- Information on "khas" land
- Existing Land use intensification and Road Network Map
- Information on unauthorized and non-conforming land uses

Thus, the digital database for lands within has been already built up which will ultimately build up the connection among all responsible organizations with . The development of corridors, densification and infilling, and transport planning must guide land use and development planning, and vice versa.

8.6.2.4 Monitoring

For the efficient implementation, proper and up to date land records are prerequisite. Success of town planning schemes, land readjustment and transfer of development rights depend upon efficacy of land records – Revenue Mouza maps, Physical Feature Maps, Land Use Maps, Transportation Network Maps. Regular monitoring and supervising is the vital step in planning process after the preparation of plan phase.

According to Urban Management Policy, 1999, Land use plans shall be prepared by s in consultations with local communities and shall be periodically updated. Such plan shall form the basis for all property and land development and the assessment of taxes. Each Paurashava shall endeavor to appoint a full time qualified Urban Planner to its staff for this purpose, and until such appointment is executed; such services shall be contracted out. In Narail Paurashava, at present a Town Planner is working which is one of the implications of this policy in practical field of planning.

In light of this policy, it would be prudent to initiate improvement and coordination in the databases of existing agencies. The maintenance of land records is the statutory responsibility of the A.C Land Office (Settlement Office). This also forms the basis of land taxation. The responsibility of granting development permission or building plan approval is with the Master Plan where Development Plans or Proposals are prepared. The local authority has to use same data base for assessment of properties for property tax. Besides, other government agencies (LGED, RHD etc.) should use the same database. It is therefore necessary to establish interactive data base - Revenue and developmental - with the concerned agencies. In this regards, Geographic Information System (GIS) is the most applicable tool which can assist the continuous updating of database and enhance the Land management system of the .

8.7 Traffic Calming

8.7.1 Purpose of Traffic Calming to reduce Speed

Most accidents on rural roads in Bangladesh happen in towns and villages, and the accidents almost always involve a vehicle which is speeding through the Center. Projects which improve roads through towns and villages may make the accident situation worse because speeds will increase. In order to prevent this it is essential that traffic calming be applied. Traffic calming is the term used to describe self-enforcing engineering measures that reduce the speed of motor vehicles. Lower speeds reduce both the likelihood of an accident happening and the severity of injuries if it does occur. Effective traffic calming results in a better environment for all and improved safety for vulnerable road users (pedestrians, cyclists, rickshaw users). The engineering measures that can be used to calm traffic include:

- false roundabouts (a roundabout where there is no junction)
- speed humps
- road narrowing and deflections
- footway widening
- using upright signs / kerbs / planting / carriageway markings to form “gates” at the entrance to the town or village
- rumble strips that make a noise and give a slight jolt when vehicles go over them.

To have any chance of being effective the individual measures must be implemented as part of an overall traffic calming plan for the . Preparing these plans requires specialist experience, and assistance should be sought from RHD’s and LGED’s Road Safety Division.

8.7.2 Volume of Traffic of acceptable level

Types of Traffic Calming Measures:

Traffic calming measures can be separated into two groups based on the main impact intended. **Volume control measures** are primarily used to address cut-through traffic problems by blocking certain movements, thereby diverting traffic to streets better able to handle it. **Speed control measures** are primarily used to address speeding problems by changing vertical alignment,

changing horizontal alignment, or narrowing the roadway. The distinction between the two types of measures is not as clear as their names suggest, since speed control measures frequently divert traffic to alternate routes, and volume control measures usually slow traffic.

Traffic calming is intended to slow or reduce motor-vehicle traffic in order to improve safety for pedestrians and bicyclists and improve the environment for residents. Urban planners and traffic engineers have many strategies for traffic calming.

There are 3 "E"s that traffic engineers refer to when discussing traffic calming: engineering, (community) education, and (police) enforcement. Because neighborhood traffic management studies have shown that often it is the residents themselves who are contributing to the perceived speeding problem within the neighborhood, it is stressed that the most effective traffic calming plans will entail all three components, and that engineering measures alone will not produce satisfactory results.

A number of visual changes to roads are being made to many streets to bring about more attentive driving, reduced speeds, reduced crashes, and greater tendency to yield to pedestrians. Visual traffic calming includes lane narrowing (9-10'), road diets (reduction in lanes), use of trees next to streets, on-street parking, and buildings placed in urban fashion close to streets. Physical devices include speed humps, speed cushions, and speed tables, sized for the desired speed. Such measures slow cars to between 10 and 25 miles (15–40km) per hour. Most devices are made of asphalt or concrete but rubber traffic calming products are emerging as an effective alternative with several advantages