



Chapter

3

INFRASTRUCTURE AND ENVIRONMENT ISSUES

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3.1 DRAINAGE INFRASTRUCTURE

Major Elements & Principles of Drainage System

Unfortunately, minimal importance was given in planning and implementation of storm sewers in our cities. Existing drainage network in Chittagong is not an exception to it. In the existing urbanized areas one will find, tertiary, secondary and primary drains of various sizes having no relationship with the catchments they are serving. In the detail area plan, now being produced, we will try to establish a drainage hierarchy to be followed in the city drainage network. Additionally, following the drainage study of Chaktai Commercial Area, we have adapted basic drainage principles to suit our requirement. These guiding principles will be elaborated in the following paragraphs.

3.1.1 Drainage Hierarchy

We have divided all the drains and khals into five basic categories. They are:

- Open channels like khals and rivers
- Primary drains
- Secondary drains
- Tertiary drains and
- Plot drains

3.1.2 Open Channel (khals & rivers)

Existing khals, rivers and the proposed new khals fall into this category. The khals and rivers are natural water bodies currently being used both as storm sewer and sanitary sewer. The cross sections of the existing khals and rivers are varied in size. New khals has fixed dimensions based on engineering calculations. Chaktai Khal, Rajakhali Khal and Mirza Khals are a few of the major khals draining the city of Chittagong. These khals, eventually, find their way to the river Karnaphuli.

3.1.3 Primary Drains

These are constructed drains, often made of brick masonry and or concrete. Primary drains are the main collector drains of the city. It collects discharges from the secondary drains. A primary drain discharges its load to a khal like Chaktai khal or a river like the Karnaphuli. Drain running parallel to a primary/district distributor road is termed a primary

drain in the proposed detail area plan. The drains were sized keeping a definite relationship with the adjacent road. The width of a primary drain will be in the range of 10 ft to 20 ft depending on the width of the road running parallel to it. All primary/district distributors will have primary drains on both the side of the roads.

3.1.4 Secondary drains

A Secondary drain falls into a primary drain. For the purpose of this report, drain running parallel to a local distributor road is a secondary drain. Secondary drains, in most cases, are made of masonry and or concrete. Tertiary drains fall into secondary drains. A secondary drain is smaller in size compared to a primary drain and bigger in size compared to a tertiary drain. A secondary drain will have a width of 8 ft and will be built on both the side of a local distributor road.

3.1.5 Tertiary drains

Tertiary drains rank fourth in the drainage hierarchy. Tertiary drains are constructed drains and run parallel to access roads. For the purpose of this report, a tertiary drain will have a minimum width of 1.5 ft to 3.5 ft. Tertiary drains, too, are made of masonry and or concrete.

3.1.6 Plot drains

Plot drains are meant for draining a developed or undeveloped plot. In a developed plot these drains are generally made of brick masonry. Earthen/katcha drains are used in undeveloped plots. Plot drains drain the surface run off from the plots to the tertiary drains. Plot owners generally decide the size of these drains.

The restrictions on width mentioned above are applicable to developing areas where city will expand in the future. In the existing densely populated urban areas, since the primary, secondary and tertiary drains are already in existence, the width restrictions mentioned above will not be applicable. Here, the city will try to increase the existing drain sizes to the aforementioned required level by offering some incentive to the plot owners, if possible. By utilizing land re-adjustment technique, the city authorities can implement schemes like widening of roads and drains. In any case, tertiary drains in the existing

dense urban areas should be, at the least, 1.5 ft in width.

3.1.7 Development in Flood Flow and Sub Flood Flow Zones

A river in its flow regime maintains a width within which the flood flows and sub flood flows occur during flooding time. Land development within the designated flood plain areas requires control to avoid obstruction to flood flow, which might otherwise result in adverse hydraulic effects like rise of flood water levels and change in flow direction. Main flood flow zone is the cross sectional area of a river that carries the dominant flood flow whereas sub flood flow zone is that area which conveys the flood water only during high tide and storms. We have discouraged development in the flood flow and sub flood flow zones.

3.1.8 Hydrology (Flooding & Drainage)

A. ISSUES

Flooding and water-logging are two main concerns of the city authority and are considered as major constraints for the planned development of the city. This, on the other hand, points its finger to the root cause of the problem: in-efficient storm water drainage system of the city. To mitigate the flood and waterlogging problem, the issues that are required to be addressed in the Detailed Area Plan are:

- Encroachment of drainage channels
- Silt load in the drainage channels from hill cutting and denudation of hills
- Pollution: indiscriminate dumping of solid waste in the drainage channels
- Flood retention basin & flood plain
- Tidal flooding & cyclonic surges
- Implementation of Storm Water Drainage & Flood Control Master Plan for Chittagong, 1995

B. POLICIES

Chittagong structure plan, 1995 prescribed policies for flood control and drainage.

Policy FCD-01: Take action related to the ancillary issues covered by the storm water drainage and flood control master plan.

Actions proposed under the above policy were:

- Check encroachment into drainage channels

- Reduce silt load from hill cutting
- Reduce pollution of drains

Policy FCD-02: Encourage implementation of the first phase works of the storm water drainage and flood control master plan.

The following works costing about BDT 89 crores in 1992 market price were proposed as high priority phase-1 works of the Chittagong Storm Water Drainage & Flood Control Master Plan.

Phase -1 works:

- Construction of silt traps in drainage areas 4a, 4b, 5a, 5b, and 7 of the Chittagong Storm Water Drainage and Flood Control Master Plan, 1995.
- Local improvement to drainage channels and removal of obstructions like water supply pipes, service pipes etc. in drainage areas 2, 4a, 4b, 5a, 5b & 7
- Improve main khals and construct storage ponds in drainage area 2
- Supply gates for tidal regulators in drainage areas 2 & 3
- Construct tidal regulators in drainage area 2
- New primary, secondary & tertiary channels in drainage area 3
- Improve primary and secondary channels in drainage area 5a
- Construct new khal and storage pond in drainage area 7
- Construct new khal MCC 3 in drainage area 5b
- Construct tidal regulators in drainage area 3
- Construct embankment and tidal regulators between points A & M in the Chittagong Storm Water Drainage and Flood Control Master Plan, 1995. (Patenga to Dry-dock)
- Supply gates for tidal regulators in Contract 11
- Improve secondary and tertiary channels in drainage area 2
- Improve Mirza/ Mirza by pass junction and Hizra Khal in drainage area 5b
- Improve secondary and tertiary channels in drainage area 3
- Improve secondary and tertiary channels in drainage area 5b West

- Procurement of maintenance plant

C. GUIDING PRINCIPLES / GUIDE LINES

While proposing detailed drainage network for the detailed area plan, we have based on certain guiding principles. These guiding principles/guidelines were derived as an outcome of the case study on Chaktai Commercial Area. Chaktai Commercial area is the oldest business hub of Chittagong. Major Khals draining Chittagong, like Chaktai khal, passes through this area. The River Karnaphuli borders the area on its eastern side. Additionally, it is a commercially important part of Bakalia, which was given the recognition of a thrust area for future development in the Structure Plan for Chittagong, 1995. All this factors were considered while identifying the area for conducting the case study. A location map of the study area is given in Figure 1.2. In the DPZ maps produced as a part of the detailed area plan, these guidelines were applied while proposing the drainage network. For ensuring legibility of the maps, in some cases, some of the details of the drainage network were not shown. In those cases, no matter whether the details are shown in the maps or not, the guiding criteria mentioned below will apply.

Guiding principles/ guidelines

- C.1 Chittagong Storm Water Drainage and Flood Control Master Plan, 1995 will be followed in planning a storm sewer network for the city. Rehabilitation of khals, excavation of new khals, building of embankments, sluice gate, regulators, navigation gates, excavation of retention ponds and silt traps will be incorporated in the detail area plan as proposed in the aforementioned Chittagong Storm Water Drainage and Flood Control Master Plan, 1995. In areas not covered by the Chittagong Storm Water Drainage and Flood Control Master Plan, 1995; new proposals by the DAP study team were incorporated in the Detail Area Plan.
- C.2 While rehabilitating an existing khal, the areas of illegal encroachments will be decided by comparing old Mouza maps like R.S. & B.S. Maps with the present physical feature survey maps produced by the DAP team. While rehabilitating khals, all endeavors are to be made to maintain a minimum width of sixty feet and forty feet in all primary and secondary khals respectively in

the rural and semi-urban areas. In the built-up area within the city, khal sections provided in the Chittagong Storm Water Drainage and Flood Control Master Plan, 1995 is to be followed.

- C.3 Water bodies like rivers, khals, retention ponds, flood plains, drains etc. should occupy at least ten percent of the area covered by each zone. It will be necessary for delaying the flood flow reaching the main drainage channels and also for recharging ground water table. Water bodies may become a part of mandatory open space.

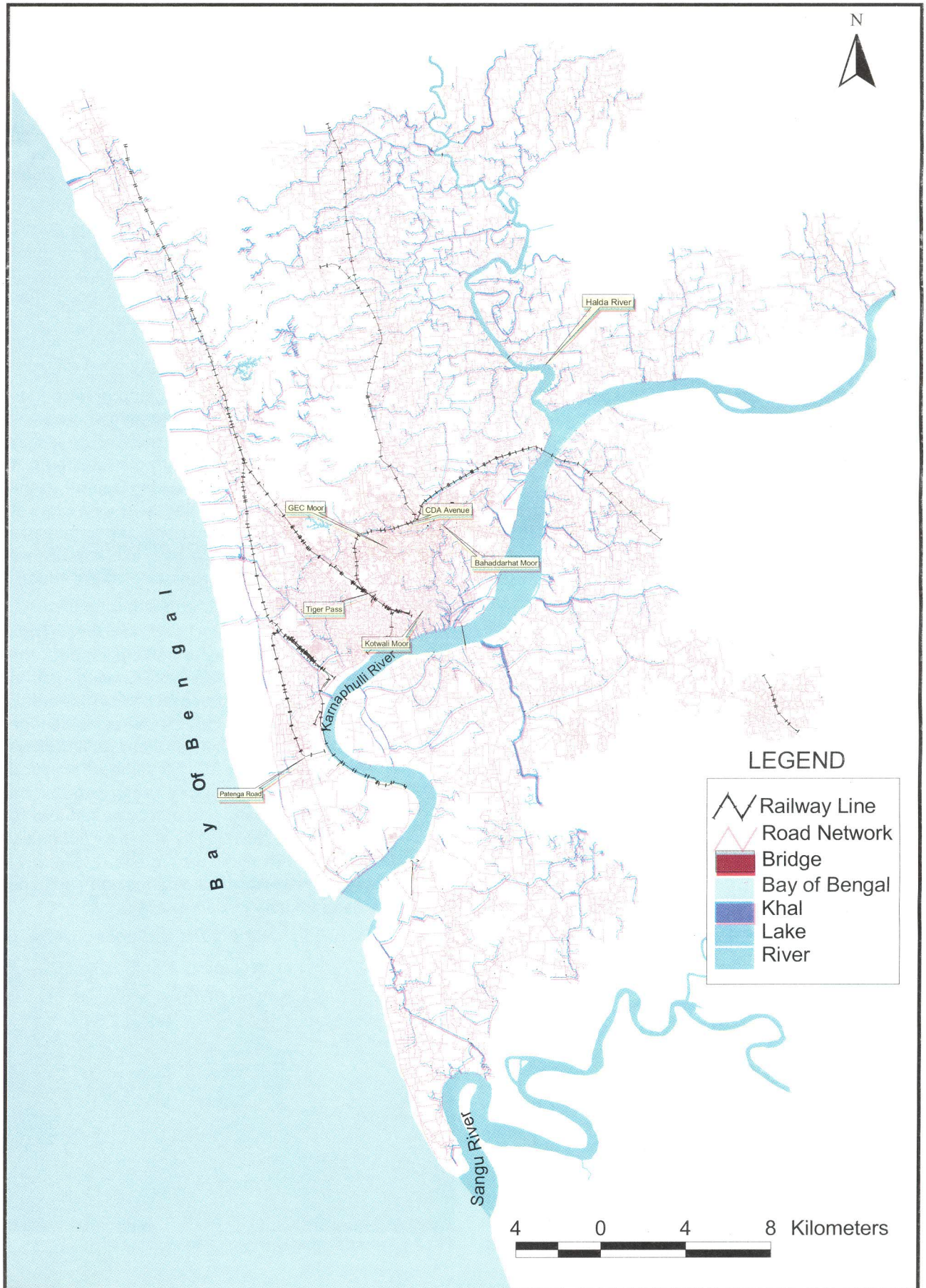
Basing on the contour maps, appropriate low-lying areas for locating the retention ponds will be identified. The retention ponds will be mainly used for retaining water during heavy rains. It will delay the discharge of surface run off to the storm sewer system. Coupled with a fore bay at the entry of the retention pond, the system may also work as a silt trap. A park like atmosphere can also be created centering these floods retention ponds.

- C.4 A mandatory green corridor/pedestrian area/drainage reserve is to be kept on both the sides of the natural khals. Since unlined khals in the rural areas are exposed to bank erosion, this mandatory reserve should be at least one hundred feet on each side of the khals and rivers in the rural areas. In the semi-urban rural settlements, this mandatory green corridor on each side of the natural khal may be reduced to fifty feet. In the existing city and in exceptionally dense areas, this mandatory green reserve may further be reduced to twenty feet on each side of a natural khal.



Pic. 3-1 A green to be kept on both sides of the canal.

Figure 3.1 Existing Canal/ Khal Rehabilitation and Protection



- C.5 There should be provisions for drains on both the sides of all primary distributor roads, district distributor roads, local distributor roads and access roads. A drainage reserve equivalent to 1/8th of the road width should be kept on each side of the road. This drainage reserve will be in addition to the proposed road reserve/width. Total right of way should be calculated by including carriageway, drainage width, utility duct space, footpath space etc. Where it is not possible to allocate enough space for drains as outlined above, particularly in the existing built up area within the city, drains can be provided within the right of way of the existing road. It can be covered for simultaneous use as footpath
- C.6 An interceptor khal may be thought of at the base of the hills, at the least one hundred yards from the base of the hills. Basing on the physical feature survey map, the bases of the hills are identified in the detail area plan. These interceptor khals, in addition to slowing down the surface run off, will also work as silt trap, eventually reducing the silt load coming to the drainage system.
- C.7 At the base of the hills, at the confluence of tidal khals and on flat lands, because of sudden reduction in flow velocities siltation is expected. Since the topography will not permit it, construction of self-cleansing channels and drains is not possible within the city. Therefore, even without hill cutting, siltation is expected in Chittagong. We cannot stop siltation completely. Under the circumstances, we will have to adopt measures to reduce silt load in our drainage system. Regular de-silting, maintenance of khals and drains are to be practiced. There should be budgetary provision in the city budget for yearly de-silting of khals and drains within the city.
- C.8 All existing ponds (including par) of 0.5 acre and above are to be retained and preserved. Construction of residential, commercial and industrial structure will not be allowed on the pond embankments (par). Existing mosque or religious structures, if any, may remain on the pond embankments (par). Use of these ponds and water bodies will be guided by the DPZ proposals applicable for the area. These ponds are identified in the zoning maps. These ponds should have specific identification numbers. If for ensuring clarity of drawing, the identification numbers can not be shown in the proposed land use map, then a database with this information is to be created and preserved for future reference. The database should become part of this document.
- C.9 Natural khals and drains are being used as open sewer in Chittagong. This is an unacceptable practice. Eventually, we will need reticulated sewer system. When required, green corridor/drainage reserve proposed to be kept by the side of the natural khals may be used for installing underground sewers. This will save the city from the costly exercise of digging existing metalled roads for installing underground sewage lines.
- C.10 Dumping of solid waste in the natural khals and drains is a common practice in Chittagong. It is a behavioral problem. Massive campaign for creating awareness against indiscriminate dumping of solid waste in our drainage system is necessary. Chittagong City Corporation may consider ten to twenty percent reduction in holding taxes for the owners of dwelling units maintaining year long waste free environment surrounding their properties.
- C.11 Hills in and around Chittagong do not have any forest cover. There should be a massive plantation program for these hills. Trees in the hills will delay surface runoff reaching the city khals and drains.
- C.12 Uncontrolled and unplanned hill cutting is to be stopped. Hill sand eroding out of these hills during rainy season after an irresponsible hill cutting and leveling is one of the major causes of siltation of khals and drains in Chittagong.
- C.13 For controlling quantity of surface run off coming to our storm sewer system, a green roof or an overhead rainwater reservoir can be made mandatory in all new developments. In the face of looming risk of shortage in the supply of potable water, these overhead reservoirs harvesting rainwater might bring immense benefits to the city dwellers.
- C.14 Possibilities of building earthen dams for storing flood water within the hill range expanding towards north from the city centre are to be explored. These Flood Storage Ponds,

in addition to its recreational potential, can be used as a source of surface water by Chittagong Water and Sewerage Authority (CWASA). Water from these ponds, if allowed to be discharged under gravity, can also be utilized for generating electricity by running small scale hydroelectric power plants.

3.2 TRANSPORTATION NETWORK

3.2.1 Road Transportation

Chittagong is the major port city, the main commercial capital of the country and the gateway for Bangladesh. Productivity of the port depends partly on the efficiency as to how the port is operated, but it also depends on the efficiency of transport connectivity to and from the port to inland destinations. Chittagong port has a unique geographical location, with respect to the hinterland countries and regions, namely Nepal, Bhutan, Northeast India, Northern Myanmar and Yunnan province of China. The importance of Chittagong could increase tremendously if regional traffic is allowed to use the port, for which capacity augmentation in terms of port facilities, through both public and private sector investment would be essential. Considering the importance of the Chittagong city and the port from both national and regional points of view, its transportation system ought to be developed efficiently to cater to the future transport demand. To this end, some policies need to be adopted, to address some of the existing deficiencies. In order to serve both the city and the port traffic, as well as the regional traffic, it was found that many of the road links recommended by the Chittagong Metropolitan Master Plan (CMMP, 1995-2015) were also supported by the JBIC study of 2005.

Further studies undertaken as part of Chittagong Detailed Area Plan, revealed that most of the links suggested by the above mentioned two studies are in fact required to be developed in a phased manner. To facilitate smooth circulation of traffic within the city as well as over long distances, under the Detailed Area Plan (DAP), it is proposed to promote two ring roads in the city. These could be called the "inner ring road" and the "outer ring road". Most of the road links for the two ring roads are already in place, except the following links.

For the inner ring road

- The road along the proposed Karnaphuli riverside flood protection wall, connecting Strand road to the new crossing of the Karnaphuli at Shah Amanat Bridge (Recommended by CMMP & JBIC)

For the outer ring road

- The section between Dhaka Trunk road and Baizid Bostami road (CMMP). For this section of the road, a right-of-way of around 36 metres has already been acquired and earth work is under way.
- The section between Chittagong Hathazari road and Kaptai road (CMMP). The right-of-way for this section has already been acquired for a width of 18 metres.
- The section between Kaptai road and the proposed Karnaphuli Bridge-4 (beside Kalurghat bridge), (JBIC)
- A road from Karnaphuli Bridge-4 (beside Kalurghat bridge) to Shah Amanat Bridge (JBIC)

The northern part of the outer ring road will also serve as the Chittagong bypass road. The outer ring road, when completed, will therefore, serve both city and regional traffic and will greatly reduce traffic congestion on the inner city roads. The inner ring road, when completed, will help in distributing traffic around the city and thereby reduce traffic congestion in the city centre. The missing links of these two ring roads naturally deserve priority in terms of resource allocation and emphasis on their early implementation.

The other road links which deserve priority attention, and which could contribute a lot in reducing pressure on the inner city roads of Chittagong, are as follows :

- (1) Construction of a coastal road to run parallel to the existing embankment starting from the mouth of the Karnaphuli river, and construction of an interchange to link the coastal road with the Chittagong port access road (JBIC)
- (2) A new road linking the Chittagong bypass with Zakir Hossain road (CMMP)
- (3) A new road linking the Chittagong bypass with Arakan road (CMMP)
- (4) Widening and improvement of short-cut link between the Coastal road on west side of the city to Agrabad Access road (CMMP)

- (5) A major East-west link on either side of the new Karnaphuli bridge approach road to open up the southern part of Bakalia Detailed Area Plan (DAP)
- (6) Another major road to link Bahdderhat intersection with New Karnaphuli River road and Flood Protection Construction Project to open up the northern part of Bakalia Detailed Area Plan (DAP.)

A number of additional road links have also been proposed by the Detailed Area Plan (DAP) of Chittagong Metropolitan Area to open up some of the new areas. The DAP has emphasized the need to develop an effective and efficient arterial road network which could provide a grid-iron system with lots of alternative links available for movement in north-south and east-west directions. Development of a number of these additional road links as primary roads could provide such a grid-iron system.

The old part of the city may be divided into two areas with differing characteristics. On the western part, there are many Bus and Tempo routes and there are several dual carriageways and 2-lane roads of moderate width. There are several shopping centres on the main network of the roads in this area. The traffic is a mixture of motorized and non-motorized vehicles that flow steadily but rather slowly.

On the eastern part, which is close to the river Karnaphuli, the original import, export, wholesale and commercial district of the city is located there. There are thousands of small businesses located here. Roads are narrow thus commercial vehicles have no access and there are acute loading and unloading problems in that area. The eastern part is partially accessible to river traffic via the Chaktai and other canals. There is little motorized traffic here. Rickshaws and other non-motorized transport dominate that area.

The traffic survey undertaken by JBIC in 2005, found that baby taxis and rickshaws together account for about 80-90% of the total volume of public transport vehicle on the streets of Chittagong. Buses, including mini-buses account for only 8% on average, in terms of number of vehicles on the road.

However, as buses carry about 25 times more passenger than rickshaws and 17 times more than baby taxis, buses contribute greatly in carry up large number of passengers, compared to baby taxis and

rickshaws. It is, therefore, important to improve bus transport operation in the city, until, the city can afford to go for the development of a Mass Rapid Transit (MRT) System. Initiative for MRT shall have to be taken, based on the experience of Dhaka city, where, it is expected that rail based MRT will be installed, say within the next 7-10 years.

Meanwhile CDA should consider seriously the question of introducing Bus Rapid Transit (BRT), along wider roads, where ROW (right of way) of 100 feet or more is available. Some of the existing roads, where BRT could be introduced, may include, Bahdderhat bus terminal to Patenga, along CDA Avenue, Sk. Mujib road and Port road; Baddarhat to Shah Amanat Bridge Approach road, and all new roads above 100 feet (ROW).

While the emphasis should be on improvement of public transport system in the city on priority basis, it would be necessary to provide adequate support to the Non-Motorized Transport (NMT) as well, particularly as a feeder system to the major road corridors, where buses are expected to operate.

Due to the presence of a large volume of Non-Motorized Transport in the city, the major traffic intersections cannot function properly and efficiently. It was also observed that most of these intersections are not properly designed for smooth functioning. This issue needs to be addressed urgently, and important traffic intersection designed properly making provisions for "Rickshaw Stands" and "Baby Taxi Stands" near the intersections.

In Chittagong city, there is serious shortage of organized parking space. As a result; vehicles are parked along different roads, and near the intersections occupying one or more traffic lanes. This causes severe traffic congestion at the intersections and at other places along the road. For efficient transport movement in the city, organized vehicle parking both on-street and off-street, should be available in different parts of the city.

The bus stops are also not properly planned or designed. In the absence of organized bus stops in adequate number, buses stop here and there and loading/unloading of passengers are carried out at several points, along the road according to the drivers will. This situation is also true for Tempos. To facilitate smooth movement of traffic, bus-bays should be built along all major roads.

All the measures indicated above if adopted and strictly implemented, the Chittagong city's transport system will improve tremendously. To this end some of the policies, which are required to be adopted and implemented, are indicated below:

ROAD POLICIES

1) DEVELOPMENT OF 2-RING ROADS FOR BETTER DISTRIBUTION OF TRAFFIC

The Issue: In the absence of well defined network of roads in the city, certain roads which could have made valuable contribution in efficient distribution of both local and long distance traffic, within the city, they cannot do so at this moment

The Policy-TR/1: Two ring roads, one "Inner Ring Road" and the other "Outer Ring Road" need to be developed in Chittagong City by properly linking the existing roads and by completing some of the missing links.

Policy Implementation: CDA needs to take the initiative, supported by Chittagong City Corporation, to develop these ring roads, which will make the traffic distribution much more efficient

2) DEVELOPMENT OF MAJOR ARTERIAL NETWORK OF ROADS TO ESTABLISH A GRID-IRON SYSTEM

The Issue: In the absence of several alternative roads for East-west and North-south movement in a city, traffic tends to get concentrated in a few roads, thereby creating congestion.

The Policy-TR/2: It is important that the major road networks of Chittagong City, together with some of the links proposed under CMMP, JBIC and Detailed Area Plan (DAP), be developed in such a way that a grid-iron pattern of roads emerge. Under DAP, these networks /links have already been identified

Policy Implementation: CDA should take the initiative to develop the "Grid-Iron" pattern of road system in line with the recommendations made in DAP

3) ROAD CLASSIFICATION, ADOPTION OF GEOMETRIC DESIGN STANDARDS AND IMPLEMENTATION OF R.O.W.

The Issue: In the absence of a proper road classification, the city road network is not developing in an organized manner. CDA has not adopted as yet any geometric standards for different classes of roads

in the city. Roads are, therefore, being developed haphazardly. Over and above, the right of way (ROW) for all major new roads are not being strictly earmarked, as a result lot of compensations shall have to be paid for major road development in the city in the future.

The Policy-TR/3: Road classification needs to be properly established, together with adoption of proper geometric design standards for different classes of roads, as recommended under the DAP. The right of way (ROW) for all new primary and secondary roads to be earmarked, and incremental road development to be encouraged towards achieving the final network of roads.

Policy Implementation: CDA will be required to establish a proper road classification based on a specific study to identify the primary and the secondary as well as other important roads. In order to earmark the ROW for all new primary and secondary roads, road geometric standards proposed in this Detailed Area Plan (DAP) should be adopted officially by CDA, and initiative taken to implement these strictly, including earmarking the ROWs, where no other type of development other than roads should be allowed. For implementation of primary and secondary road networks, it would be cost efficient to adopt incremental road network development towards achieving the final network.

4) SERVICE LANES ALONG PRIMARY ROADS

The Issue: In the absence of strict traffic Management, a substantial portion of major roads are being used for parking, storing building materials, garbage collection or for selling goods. This situation drastically reduces the traffic carrying capacity of the major road network. It is, therefore, important to find a proper solution to this problem.

The Policy-TR/4: All new primary roads should have service lanes, to serve the local needs, so that medium traffic remains undisturbed.

Policy Implementation:

1. While strict traffic management should continue & receive emphasis, as part of permanent solution, service lanes should be introduced on both sides of primary roads, so that the middle portion of the road could be fenced out and made available for faster movement of traffic. While the fast moving through traffic and city buses will be using the

middle portion of the road, all other movement to serve the land uses on both sides of the road will take place along the service lanes. Bus bays should be provided at certain intervals along the middle portion, so that buses do not block fast moving traffic. There should be limited number of access, say at an interval of around 1 km or more from service lanes to the middle portion of these primary roads.

5) RESERVING SPACE FOR UTILITY SERVICE LINES

The Issue: In the absence of systematic planning approach, and lack of coordination, among different departments providing utility services in the city, the departments concerned start cutting city roads at different times to install their services. There are two types of issues involved here.

Firstly - there is no reserved space along the road, where utility services could have been installed for the city from the beginning. As a result the departments concerned install their utility services at different locations under the road surface, leading to frequent cutting of different portions of the road.

Secondly -there is no coordination among different departments; as a result they start digging the road at different times in a year, causing great inconvenience to traffic movement.

The Policy TR/5: It is necessary to reserve space for utility service lines along main (primary /secondary) roads from the very beginning.

Policy implementation:

- a) The road geometric standards proposed in the DAP, for different classes of roads such as primary, secondary and others should be officially approval by CDA, to be followed by issuance of a notification for their adoption by all agencies, building roads within CDA area.
- b) A separate notification needs to be issued by CDA for information of all utility service providing agencies to place their service lines in the space earmarked for that purpose in all new primary and secondary roads where the ROW is 80 feet and above.

6) NMTS' TO PROVIDE FEEDER SERVICES ONLY

The Issue: Presence of Non-Motorized Transport (NMT), mainly "Rickshaws" along main roads has

adverse impact on the efficiency of the motorized vehicles which need to move faster for the city's productivity. But at the same time, rickshaws play a significant role in the urban transport context providing transport services to the inner areas of the city. Rickshaws also represent an important source of employment and income for low-income people. Although rickshaws are environmentally sound, it must be recognized that they are inefficient, inhuman and unsafe as a means of transport in a mixed traffic situations.

The Policy TR/6: NMTs could continue providing a role of feeder transport between inner areas of the city and the main roads. All major roads should therefore, be free from NMTs, unless there is enough space to provide segregated lanes for NMTs.

Policy Implementation

1. CDA in consultation with the "Traffic Control Committee" (also see policy - II) need to identify major roads, which should be made rickshaw free. Separate consultation should also be held with the rickshaw owners association to motivate them and to gain their support for introduction of restriction on NMT movement along major roads.
2. In order to provide for the rickshaws as much circulation space as possible in the inner areas, which will have mostly residential and mixed land uses, many of the roads may have to be widened and some of the missing links completed to make a network. The DAP has already identified, as part the Development Planning zones (DPZ) those missing links and sections to be widened. CDA should take necessary measures to implement the DAP recommendations related to widening some of the roads, and construction of some missing links.

7) REORGANIZATION OF BUS TRANSPORT OPERATION IN THE CITY

The Issue: Bus transport, as an important and significant component of multi-modal public transport system in Chittagong city has many deficiencies and offers a poor quality of service. Too many owners are operating their buses in each route, because bus ownership is fragmented. As a result competition builds up to capture passengers sometimes at great risks of road safety. It is, therefore, necessary to re-organize the existing bus operation, and promote "bus industry consolidation"

by creating larger operating units, so that bus route franchising becomes possible to improve quality of services.

The Policy TR/7: Bus transport, as an important component of a multi-modal public transport system in the city, needs to be re-organized to promote "bus industry consolidation" to introduce "bus route franchising" to improve quality of services.

Policy Implementation:

CDA should consult the "Traffic Control Committee" to work out a modality as to how to go for "Bus Industry consolidation". "Bus bays" should also be provided in all major routes to facilitate smooth movement of other vehicles while buses are stopping to serve the passengers.

Along side this "Bus Industry Consolidation", initiative could be taken to introduce Bus Rapid Transit (BRT), along certain routes where ROW upto 100 feet and above is available. Once CDA takes a policy decision on this issue, separate feasibility study shall have to be undertaken for each route.

8) IMPROVEMENT OF MAJOR TRAFFIC INTERSECTIONS

The Issue: A survey of major city traffic intersections revealed that none of these are properly designed; as a result congestion is a regular feature in many of these intersections, especially during peak hours. Generally speaking, traffic management is also not up to the mark at these intersections. It is necessary to improve these intersections based on proper design, and strict enforcement of traffic management, not to allow any waiting of rickshaws near the intersections, except in the spaces earmarked as "Rickshaw Stands", "Taxi/Baby Taxi Stands".

The Policy TR/8: Major Traffic intersections are to be designed properly, and strict traffic management enforced.

Policy Implementation:

Chittagong being the second largest city in the country and a port of national and regional importance located there, it is expected to grow fast and generate more traffic. CDA should therefore, take the initiative to get all the major traffic intersections surveyed (O-D surveys and traffic counts taken), leading to proper designing, so that CDA could take initiatives to implement the designs. In

order to facilitate undertaking such designs, sufficient spaces need to be earmarked around all these intersection to provide for temporary parking spaces for Taxi/Baby Taxi and Rickshaws wherever applicable. In order to handle heavy traffic along some of these intersections, "Fly-over" may have to be built for which separate feasibility studies should be undertaken before investments are made.



Pic. 3-2 Flyover model.

9) IMPROVEMENT OF PEDESTRIAN FACILITIES IN CBD AREA

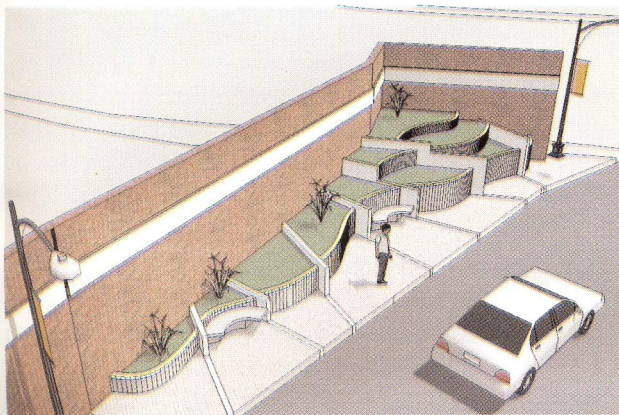
The Issue: A sizeable percentage of daily trips in Chittagong are made on foot, particularly in the Central Business District (CBD) area. But there is acute shortage of pedestrian facilities in the city. Most of the roads do not have, footpaths and some roads have footpath only on one side. Again, wherever footpaths exist, these are not in good condition, and often occupied by hawkers, creating problems for pedestrian movement. In the absence of proper footpaths, people use part of the road space for their trips on foot. Priority should, therefore, be accorded to development of pedestrian facilities in CBD and around all major intersections, to enhance safety of the people moving on foot.

The Policy-TR/9: Pedestrian facilities to be improved in the CBD area of Chittagong city

Policy Implementation:

CDA should take the initiative to motivate Chittagong City Corporation (CCC) to build six feet wide footpaths along major roads in CBD. Wider footpaths around major intersections and shopping areas would be desirable. Pedestrian over bridges should also be built at major intersections depending

on pedestrian traffic demand.



Pic. 3-3 Wider footpath around major intersection to be required for safe movement of the people.

10) EARMARKING PARKING AND WAITING PLACES FOR VEHICLES

The Issue: In the absence of organized “parking spaces” for different types of vehicles such as cars, jeeps etc., vehicles are parked all over the places in the city, creating acute congestion at certain periods of the day.

The Policy-TR/10: Both on-street and off-street parking spaces should be created for cars/Jeeps in different parts of the city.

Policy Implementation:

CDA, in consultation with the “Traffic Control Committee” mentioned below should take the initiative to earmark land (around 10 kathas) for “parking Cum-commercial use”, in different parts of the city. In order to create parking areas in the city, CDA could take some of the following measures in the future:

- a) While according “building permission” on all commercial plots along important corridors in the city, a provision could be made saying that all commercial plots will be required to provide an additional 20% parking for Public use, over and above their own requirements, for which vehicles could be changed for parking at market rate.
- b) For developing “earmarked parking spaces”, CDA could encourage real estate developers to build multi-storied parking spaces for rental parking, as a joint venture with land owner on such terms and conditions, which could be attractive to the

developers.

11) ENFORCING STRICT TRAFFIC MANAGEMENT

The Issue: Road spaces within the city of Chittagong are not fully available for traffic movement. Large parts of it are occupied by parked vehicles, stored building materials, wastes, hawkers, etc. Unless such uses can be controlled, there is no use of building more roads, as most of it would not be available for use by traffic. It is, therefore essential to enforce strict traffic management to keep the city road spaces free from temporary encroachment, and introduce penalties for violations.

The Policy-TR/11: Strict Traffic Management needs to be enforced in the city to facilitate smooth traffic movement and reduce congestion.

Policy Implementation: CDA should revive the former “Traffic Control Committee” established in August 2004 to address the traffic management and congestion problem in the city. An “Expert Committee” could also be established to guide the Chittagong City Corporation performed and the traffic police in adopting professionally should solutions to traffic problems. The “Traffic Control Committee” should meet periodically to review the progress of traffic management in the city.

3.2.2 Rail Transportation Policies

1) Development of commuter rail services to and from Chittagong to Hathazari and Dohazari.

The Issue: At present Bangladesh railway (BR) provides train services between Hathazari and Chittagong in the north and between Dohazari and Chittagong in the south. These are very poor quality services because both Hathazari and Dohazari have not developed as satellite towns, for which very good quality transportation services could be justified to and from the mother city Chittagong, where more and more people could find it convenient attractive to live but still continue to work in Chittagong.

The Policy-TR/1: BR should explore the prospects of developing commuter rail services between Chittagong-Hathazari and Chittagong-Dohazari, provided the government takes a decision to develop both Hathazari and Dohazari as planned towns with some economic and tourism activities to create employment opportunities. It is only under that

circumstance, the commuter rail services would be justifiable.

Policy Implementations: CDA to take lead together with BR, LGRD Ministry and Urban Development Directorate to explore possibilities of developing both Hathazari and Dohazari as modern and attractive satellite towns to live, having efficient commuter rail services to and from Chittagong.

2) Rail connectivity to Chittagong port needs to be more efficient

The Issue: Out of total container traffic that Chittagong Port handles per year, 70% are destined to Dhaka area. But out of that traffic, at present only 10% is carried by Bangladesh Railway (BR). The rest of the containers are destuffed and the contents are carried by road to Dhaka. In order to capture its own share of traffic, BR needs to improve its carrying capacity, increase and strengthen its line capacity, and the railway track in Chittagong Port needs to be realigned, to allow full-length train handling.

A number of proposals are being discussed to improve BR's capacity. These include double tracking Tongi-Bhiarab Bazar section and also Akhaura-Laksham section, to make the entire Dhaka-Chittagong double track. Another proposal is there to establish a "chord line" between Laksham-Fatullah to provide shorter rail link between Dhaka and Chittagong. Initiatives are already in hand to reform the operational side of the railway. Donor assistance of around US\$850 million is almost committed for a number of projects, which are expected to improve BR's performance considerably.

Policy-TR/2: Urgent action needed to improve rail connectivity to and from the port for efficient handling of containers destined for or originating from areas around Dhaka.

Policy Implementation:

BR to take urgent initiative for improving rail connectivity between Dhaka and Chittagong Port, with a view to handle at least 30-50% of the containers destined to Dhaka.

3.2.3 Inland Water Transportation

IWT Policies

1) Developing IWT container terminal in Chittagong Port Area

The Issue: Currently, container traffic between

Dhaka and Chittagong is handled only by BR and road transport. There is a great potential for Inland Water Transport (IWT) to handle a portion of the container traffic between Dhaka and Chittagong. BIWTA has already taken the initiative to develop IWT Container Terminal at Pangaon (near Dhaka). But supporting facilities are also required to be developed at Chittagong Port area to handle these IWT based container traffic.

The Policy-TR/1: IWT container handling facilities need to be developed in the port area, for handling containers to be carried by barges between Pangaon (Dhaka) and Chittagong.

Policy Implementation: BIWTA together with CPA should take the initiative to develop the required facilities to handle IWT based container traffic at Chittagong Port area.

3.2.4 Air Transportation

Chittagong airport is located at the southern tip of the Patenga Peninsula. The Chittagong airport facilities have been upgraded, and it has already been upgraded to an International Airport. The main access road to Chittagong airport currently passes through congested port area of the city. Another access road to the airport, on the western side along the coast has, therefore, been proposed in the Detailed Area Plan (DAP).

3.3 UTILITY SERVICES

Survey of the existing status of the urban utilities has carried out by collecting information from the concerned utility departments and field survey on utilities like Water supply, Gas supply, Electric supply, Sewerage & Drainage system, Telecommunication system, Fire services, Solid waste Management etc. The concern utility departments/ Organizations responsible for utility services are shown in Table-3.1.

3.3.1 Water Supply System

The Water supply in Chittagong City Area provided & maintained by Chittagong Water Supply and Sewerage Authority (CWASA) from Ground & Surface water source by Deep tube wells and water treatment plants. There are 67 Nos. of Deep tube wells in operation, 1 No. of surface water treatment plant and 1 No. of Ground Water Treatment plant supplying water. About 35%-40% of total water supply in CCC area are supplied by CWASA and rest

Table 3.1: The concerned utility departments/ Organization

Sl. No.	Utility Service	Department/Organization
1	Water Supply	Chittagong WASA/CCC/Private
2	Gas Supply	Bakhrabad Gas Systems Ltd.
3	Electricity Supply	Power Development Broad, Chittagong
4	Telecommunication System	BTTB /Mobile Co.
5	Sewerage System	Chittagong City Corporation/CWASA
6	Fire Service	Chittagong Fire Services & Civil Defense
7	Solid Waste Disposal	Chittagong City Corporation

Source: Consultant DDC, 2007

Table 3.2: Data of existing status of water supply facilities provided by CWASA up-to January 2007

Sl. No.	Item	Unit	Quantity
1	Length of water line	Km	602.06
2	Deep tube wells in Operation	No.	67
3	Surface Water Treatment plant	No.	1
4	Ground water treatment plant	No.	1
5	Capacity of Surface water treatment plant	MLD	90
6	Capacity of Ground Water Treatment plant	MLD	67.5
7	Reservoir & Elevated Tank	No.	14
8	Capacity of Reservoir & Elevated Tank	ML	142,000
9	High Lift & Buster Pumping Station	No.	6 & 3
10	Total Service connections	No.	43,062
11	Privately owned Deep tube well in operate	No.	5
12	Street Hydrant connections	No.	689
13	Religious institute connection	No.	371

Source: CWASA

Table 3.3: Status of Water Supply (Existing & future) in CCC area

Sl. No.	Total no of DTW (Existing)	Population of the area (in year)	Average consumption of water per person	Total consumption required according to population of area (MLD)	Production by existing (DTW)	Less production of water (MLD)	Percent (%) less production of water	More DTW required for the area over existing
1	67	25,62,711 (2007)	160 L/P	410 MLD	207 MLD	203 MLD	49%	116 DTW
2	67	35,11,671 (2015)	160 L/P	561 MLD	207 MLD	354 MLD	63%	202 DTW

Source: Consultant DDC - 2007

Figure 3.2: Location Map of Existing Water Treatment Plant and Deep Tube-well

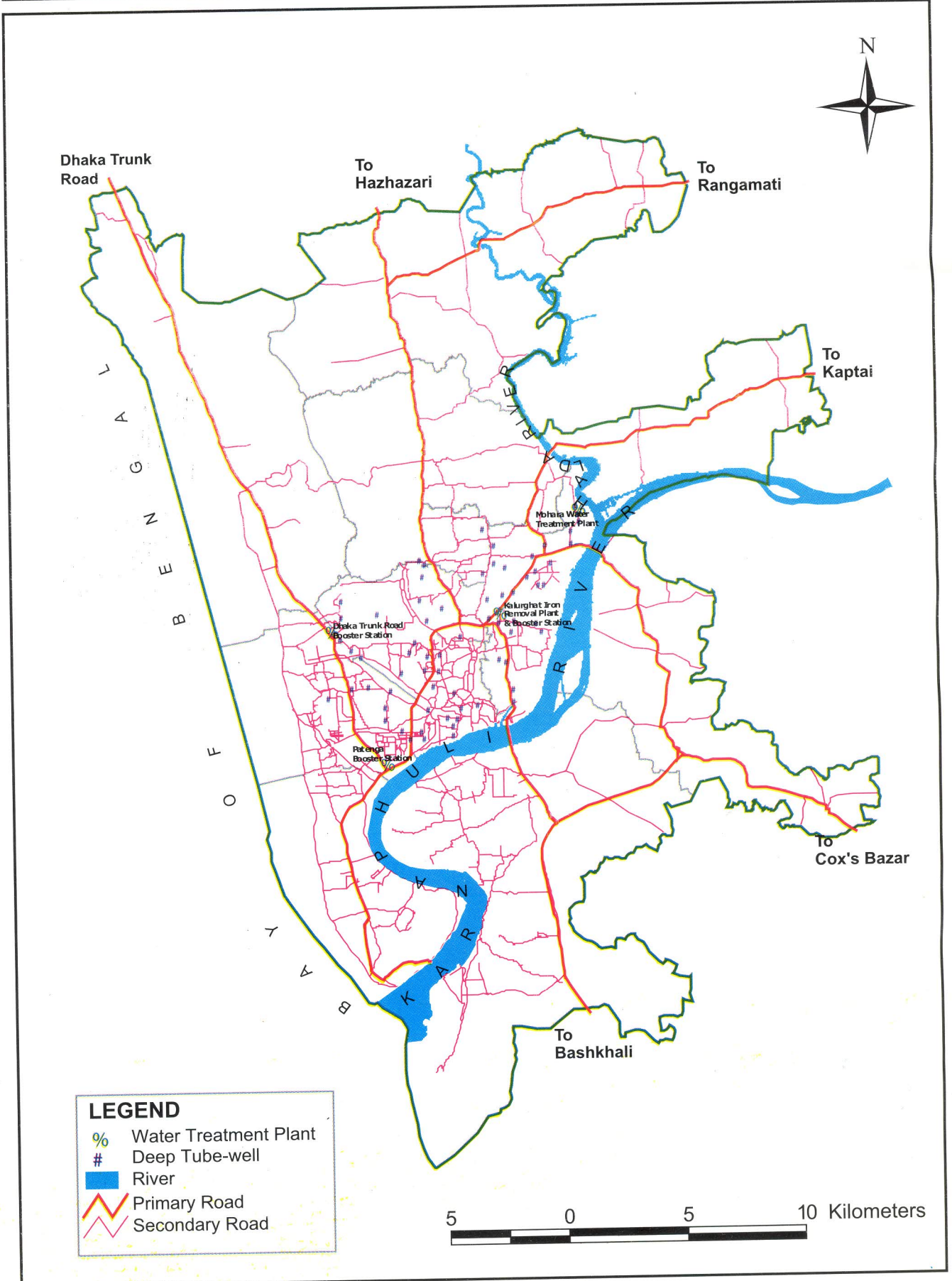


Table 3.4: Future Development Project of CWASA

Sl. No.	Project Name	Water Production Capacity/day (MLD)	Status
1	Mohara Water Supply Project	90 MLD	Re-tendering activities stop due to court cases
2	Madunaghat Water Supply Project	45 MLD	Agreement between CWASA and Contractor & Consultant Signed
3	Karnaphuli Water Supply Project	180 MLD	Short listing of Engineering Consultants done and invited proposal from short listed consultants.
4	3rd Interim Water Supply Project	—	68% of total work completed
5	Rehabilitation of Mohara & Kalurghat WTP	—	DPP Approved by ECNEC
6	Preparation of Master plan and feasibility study for priority work for water supply & waste water management for Chittagong city under Assistance of KOICA	—	Record of discussion between Implementation Survey team of Republic of Korea (KOICA) and CWASA on the preparation of Master plan for water supply & wastewater management for Chittagong city signed.

Source: CWASA - 2007

water other than CWASA, Army, Navy, Air force, Railway, Chittagong Port Authority, Industries & some domestic consumer are producing water privately for their own consumption by DTWs, surface water treatment plant, Deep set hand Tube-well, ponds and wells. Detailed data of existing status of water supply by CWASA shown in Table-3.2 and the enclosed location map showing Deep Tube-well and water treatment plant of CWASA. Amongst the government organizations Bangladesh railway producing water from seven DTWs and surface water from the Foy's lake. Status of water supply (existing and future) in CCC area shown in Table-3.3 and future development project CWASA shown in Table-3.4.

A. ISSUES

1. About 60% to 65% of the total population are not covered with the water supply network of Chittagong WASA, only about 40% of the total demand of water in the city supplying by CWASA

2. Shortage of water line
3. Shortage of DTWs in operation
4. Shortage of Surface water production
5. Shortage of water service connection
6. The development projects of CWASA mentioned in Table-3.4 are not going in production due to some administrative and financial problems.
7. Though CWASA is not in a position to supply water to all the city dwellers, it charges an abnormal price for allowing them to sink deep tube-wells. So domestic user are discouraging legal sinking of deep tube-wells though unauthorized sinking of deep tube-well is continuing unabated.

B. POLICIES

1. All the projects mentioned in future development should complete immediately to produce more water.

2. About 354 MLD of more water will be required within year 2015. This can be met up by sinking 202 DTW, but these huge nos. of DTWs sinking are not recommended, about 200 MLD of water can be produce through Surface Water Treatment Plant from Halda & Karnaphuli river and completing the future development project of CWASA as shown in Table-3.4.

3.3.2 Gas Supply System

The gas supply in Chittagong is provided and maintained by Bakhrabad Gas System Ltd. The existing gas supply network distribution pipe line with ring main location shown in the map enclosed.

In Chittagong area total 2,58,035 Nos. of gas connection provided by Bakhrabad gas system limited in residential industrial and commercial sector. Gas connections in industrial and commercial sector are not sufficient in Chittagong. The existing Gas connection to the different consumer is shown in Table-3.5 and the existing length of pipeline in different diameter gas pipe in the Chittagong area shown in Table-3.6. The supply of gas in Chittagong comes from Bakhrabad Central Gate Station to ring main pipeline.

A. ISSUES

The entire area of Chittagong City Corporation

Table 3.5: Existing Gas Connection to the Consumers in Chittagong area

Sl. No.	Type of consumers	Nos. of Consumer
1	House holds/ connection	254,675
2	Commercial holds/ connection	2,398
3	Industrial holds/ connection	848
4	Power generating Plant	4
5	Fertilizer factories	3
6	GNG filling station	24
7	Tea Garden	1
8	Capacity. Power	82

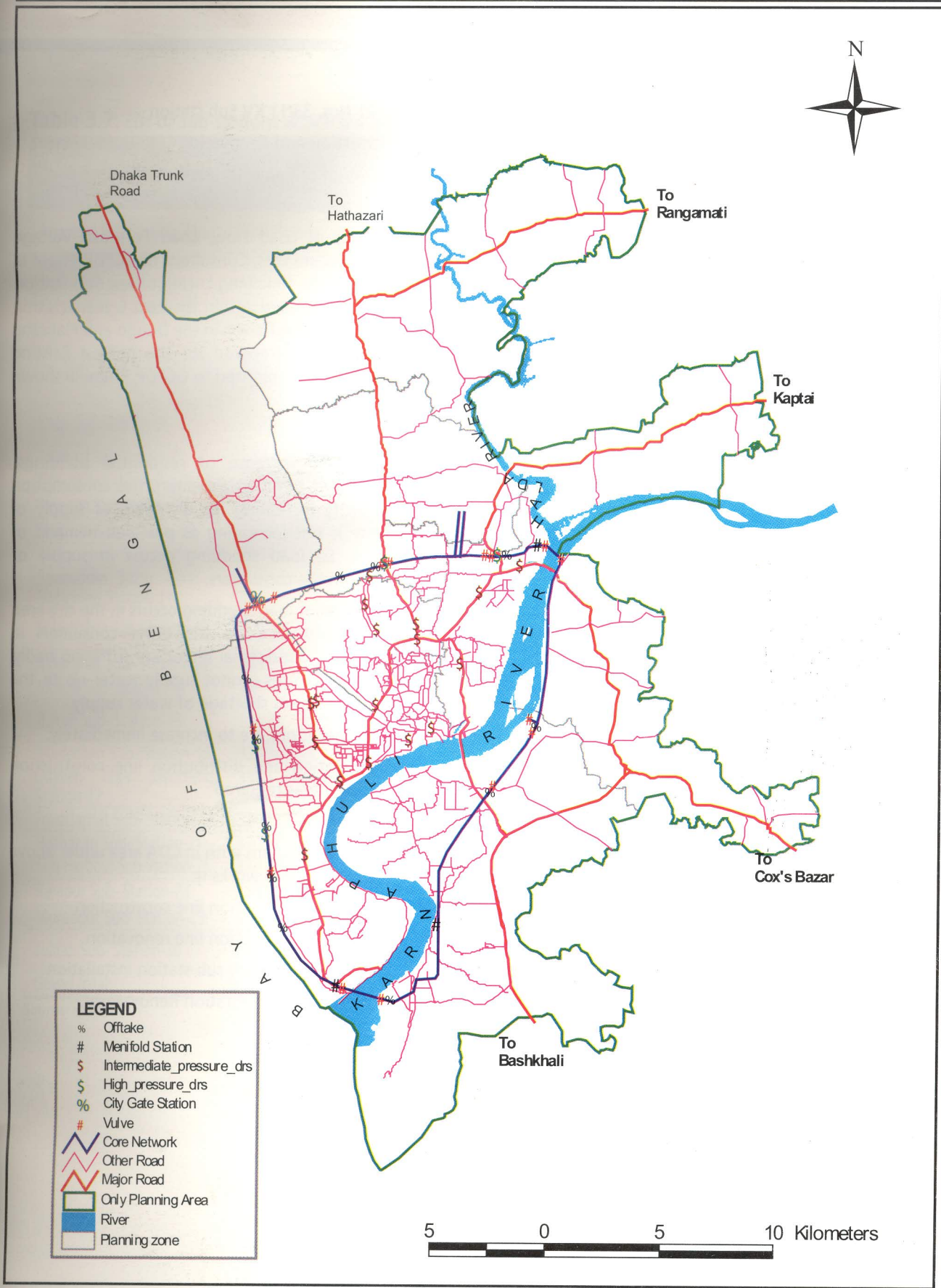
Source: Bakhrabad Gas System Limited-2007

Table 3.6: Length of Gas pipeline in the Chittagong area

Sl. No.	Diameter of Gas pipe line	Total km
1	24	33.28
2	20	35.03
3	16	9.72
4	12	4.17
5	10	34.8
6	8	67.39
7	6	69.21
8	4	164.41
9	3	177.33
10	2	725.15
11	1	876.8
12	3/4	453.23

Source: Bakhrabad Gas System Ltd. - 2007

Figure 3.3: Location Map of Existing Gas Supply Network



LEGEND

- % Offtake
- # Manifold Station
- \$ Intermediate_pressure_drs
- S High_pressure_drs
- % City Gate Station
- # Valve
- Core Network
- Other Road
- Major Road
- Only Planning Area
- River
- Planning zone

5 0 5 10 Kilometers

provided with gas supply. The gases also supplied out side CCC are provided gas connection to different consumers. Gas consumption in domestic, industrial and vehicular (CNG filling station) are increasing vary rapidly in comparison to the increase of gas supply. So gas supplies for different consumers are to increase by Bakhrabad gas supply limited.

B. POLICIES

The future work schedule to extend the gas facilities in the Chittagong are taken by Bakhrabad Gas System Ltd. as follows:

- a) Gas supply to Korean EPZ
- b) Gas supply to Karnaphuli EPZ
- c) Gas supply to Sikalbaha 150 & 225 MW Electric Generating Plant
- d) Construction of 33.00 km pipeline from Smutang Gas field to Bakhrabad -Chittagong Gas Transmission line for extension of gas supply to the Bakhrabad gas supply network.
- e) Construction 20-inch dia 24 bar 36 km pipeline to Chittagong Ring Main Pipe line to eastern leg.

On completion of the above work program by the Bakhrabad Gas system Ltd. the gas facilities will extent to the consumer.

The gas consumers are increasing very rapidly; with in 2015 all types of consumer will increase, in spite of residential & industrial consumers, CNG conversion of vehicle is increasing rapidly, so CNG filling stations are to be increase immediately. There are only 24 Nos. of CNG filling stations in Chittagong. All Patrol pumping station are to provide with CNG filling facilities to avoid the sufferings of the consumers.

3.3.3 Electricity Supply System

The electricity facilities provided by Power Development Board (PDB) within CDA Area 216.37 sq. km. The list of existing substation, which are in operation under CMP Area shown in Table-3.7. Total length of Transmission line and their capacity in KV under CMMP area shown in Table-3.8. Unit charge of consumption of Electricity for the consumers according to their type such as residential, commercial, industrial etc. are shown in Table-3.9. Under Greater Chittagong power distribution project phase-III, the following schedules of work will be carried out in the fiscal year 2007-2008.

1. Extension and Rehabilitation of 7 Nos. 132/33 KV

and 21 Nos. 33/11 KV Sub-station

2. Construction and Renovation Distribution Line
3. Installation of Capacitor Bank
4. VHF Inter-linking

After Study of Load Flow, Load Forecast, Voltage Drop and System Loss, Consultant of GCPDP, Phase-III hope that in the following Location New Sub-Station needs to be installed within the next 5 years (within 2012). This proposal given in the Design and Planning Documents that prepared for the nearest Existing Sub-Station and submitted to GCPDP, Phase-III shown in Table-3.10

A ISSUES

Due to rapid increase of residential buildings, industries and commercials enterprises consumption of electricity increasing rapidly, were as supply of electricity is not increasing as per load demand of electricity. So load shedding occurs in supply of electricity to the consumers.

Due to frequent load shedding occurs in the city area the household dwellers and other consumers in commercial and industrial sector are suffering badly, DTWs pump houses cannot supply water up to the mark, which causes shortage of water supply.

Electric generations are to increase immediately.

New sub-station and distribution line construction are to increase as required

B. POLICIES

The list of future plans with in CDA area under above project the scope of works is:

1. 350 km new distribution line construction
2. 153 km new distribution line renovation
3. 10 Nos. 33/11 KV New sub-station installation
4. 4 Nos. 33/11 KV Sub-station Renovations.

Table 3.7: List of Sub-stations which are in operation under CMMP area

Name of Sub-Station and ID Number	Voltage Level	132/33kV Transformers Capacity	33/11kV Transformers Capacity	Location
Agrabad Sub-Station-01	33/11kv S/S.		2x16/20+1x10/13.3 3=53.33MVA	Near Karnafully Shisu Park
Bidyut Bhaban 11kV Switching Station-02	11kV Switching Station		-	Bidyut Bhaban Area-PDB
Pahartali Sub-Station-03	33/11kV S/S.		2x16/20=40 MVA	A.K.Khan Gate Moor
Halishahar Sub-Stiation-04	132/33/11kV S/S.	2x44.1/63MVA =126MVA 1x25/41.7KVA =41.7MVA	2x10=20MVA	Opposite of Karnafully EPZ
Kulsi Sub-Station-05	132/33/11kV S/S.	2x44.1/63MVA =126MVA	2x16/20=40MVA	Foyez Lake
Jalabad Sub-Station-06	33/11kV S/S.		2x16/20=40MVA	Near Poly Technical Institute
New mooring Sub-Station-07	33/11kV S/S.		2x10/12.5=25 MVA	Near Nayer Hat
Patenga Sub-Station-08	33/11kV S/S.		2x10/12.5=25 MVA	Near Air Force Base
Stadium Sub- Station-09	33/11kV S/S.		2x16/20=40 MVA	Near M.A. Aziz Stadium
Pathar ghata Sub- Station-10	33/11kV S/S.		2x16/20=40 MVA	Near C&B Colony
Reazuddin Bazar 11kV Switching Station-11	11kV Switching Station		-	Reazuddin Bazar
Solashahar Sub-Station-12	33/11kV S/S.		2x16+1x16/20 = 52 MVA	Near Bangladesh Oxyzen Moor
Kalurghat Sub- Station-13	33/11kV S/S.		2x16/2 = 40 MVA	Near B.A.D.C Road
Mohra Sub- Station-14	33/11kV S/S.		2x16/20=40 MVA	Near Kaptai Road Moor
Bakali Sub- Station-15	132/33/11kV S/S.	2x48/64 MVA =128 MVA	2x16/20=40 MVA	Naar Bakalia Thana
Madarbari Sub- Station-16	33/11kV S/S.		2x16/20=40 MVA	Near Kadamtoli (East Madarbari)
Oxyzen 11kV Switching Station-17	11Kv Switching Station			Oxyzen Moor
Fouzdarhat Sub- Station-18	33/11kV S/S.		2x10/13.33=26.66	North of Fouzdarhat
Hathazari Sub- Station-21	33/11kV S/S.		1x12.5=12.5MVA	Near Hathazari Bus Stand
Fish Harbour Sub-Station-25	33/11kV S/S.		2x10=20 MVA	Near Marine Fisheries Academe
Rampur Sub- Station-28	33/11kV S/S.		2x16/20=40 MVA	Near Halishahar K-Block Pole Factory
Muradpur Sub- Station-29	33/11kV S/S.		2x16/20=40 MVA	Near Muradpur Moor
Juldah Sub- Station-30	132/33kV S/S.	2x48/64 MVA=128MVA		North of Marine Academy
Grand total		498 MVA	687.196 MVA	

Source: PDB-2007

Figure 3.4: Location of Existing Electricity Supply Sub-Station

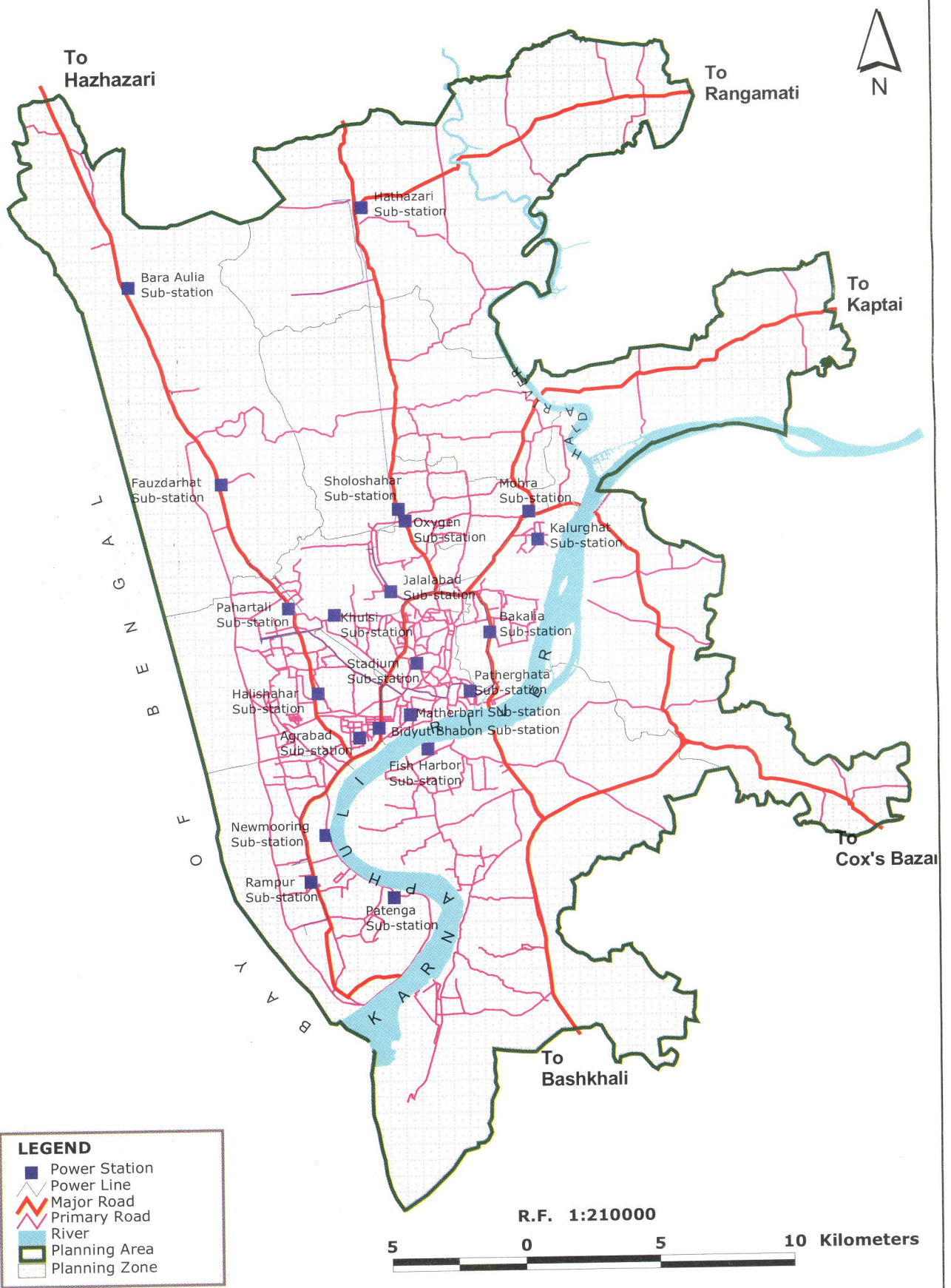


Table 3.8: List of Length of 132kV Transmission Lines under CMP Area

Sl. No.	Name of 132 kV Transmission Line	Length of Line Km	No. of Circuits	Nos. of Tower/ Pole	Construction
1	Madunaghat-Khulshi Line(runs through the Chittagong Metropolitan City area)	12.7	Single Ckt.	40 (T)	Before GCPDP Phase-I
2	Khulshi-Baraulia (runs through partly over city area and partly outside city area)	16(Part)	Double on double Ckt Tower	57(T)	1 st circuit in phase-I & 2 nd circuit
3	Khulshi-Halishahar Runs through Chittagong City area	17.5	Single Ckt.	53 (T)	Before Phase-I in 1966
4	Halishahar-Sikalbaha (including Karnafully river crossing)	12.9	Single Ckt.	47 (T)	Phase-I
5	Madunaghat-Sikalbaha (including Karnafully river crossing)	16.1	Double Ckt.	57 (T)	Phase-I
6	Sikalbaha-Shah Mirpur	9.077	Double Ckt.	34 (T)	Phase-III
7	Shah Mirpur-Juldah	5.703	Double Ckt.	22 (T)	Phase-III
8	Sikalbaha-Bakalia including River Crossing of 1.8 km	2.214 1.8	Double Ckt. Double Ckt.	10(T), 7(T), 1(P)	Phase-III
9	Bakalia-Khulshi	19	Double Ckt.	37 (T)/61 (P)	Phase-III
10	Khulshi-Halishahar including 2 km of 4 Ckt. in EPZ areas	14	Double Ckt. & 4 Ckt.	33(T), 27(P), 11(T)EPZ, 4 Ckt.	Phase-III
Total		126,994			

Source: PDB- 2007

Table 3.9: Types of Consumers and Unit Rates

SL.No.	Qualifications of consumers	Rate per unit
1	Class-A: Residential (household)	
	a) 1 st step 000 to 100 units	Tk. 2.50
	b) 2 nd step 101 to 400 units	Tk. 3.15
	c) 3 rd step 401 to upwards	Tk. 5.25
2	Class-C: Small industries	
	a) Flat rate	Tk. 4.02
	b) Off pick hours	Tk. 3.20
	c) Pick hours	Tk. 5.62
3	Class - D: Non-residential (light and power)	Tk. 3.35
4	Class - E: Commercial	
	a) Flat rate	Tk. 5.30
	b) Off pick hours	Tk. 3.80
	c) Pick hours	Tk. 8.20
5	Class-F: Industrial category	
	a) Flat rate	Tk. 3.80
	b) Off pick hours	Tk. 3.14
	c) Pick hours	Tk. 6.73
6	Class-H: High pressure, for general use (33KV)	
	a) Flat rate	Tk. 3.58
	b) Off pick hours	Tk. 3.03
	c) Pick hours	Tk. 6.15
7	Class-J: Street light and pump	Tk. 3.86

Source: PDB- 2007

Table 3.10: Summary of proposal for Implementation of New Sub-station within the next 5 years

Sl. No.	Location	Type of KV of S/S.	Remarks
1	Near Patenga Sea Beach Area	33/11KV	Under CMP Area
2	North Side of Ananda Bazar, Middle Haliashahar	123/33/11KV	Under CMP Area
3	Munsurabad CSD Godown Area	33/11KV	Under CMP Area
4	Near GEC Factory, Garibullah Shah Majar Dampara	33/11KV	Under CMP Area
5	Rahmatgonj Area	33/11KV	Under CMP Area
6	Near Proposed International Women University	33/11KV	Under CMP Area
7	Wazdia (West Side of Wazdia Madrasha)	132/33/11KV	Under CMP Area
8	Bakalia, Balirhat Area	33/11KV	Under CMP Area
9	Near Chowdhury Hat, Fateyabad (South Side of Chowdhury Hat)	33/11KV	Under CMP Area
10	Near S. Alam Steel Mill, Under the area of Karnaphuli Thana	33/11KV	Under CMP Area
11	Near Bhatiary, City Bus Stand Area	33/11KV	Out of CMP Area
12	Near Choto Kumira	33/11KV	Out of CMP Area
13	Kalatali Moor, Cox's Bazar	33/11KV	Out of CMP Area
14	Bidyut Bhaban Switching Station, Cox's Bazar	33/11KV	Out of CMP Area

Source: PDB-2007

For implementation and energizing the above sub-station and their 11kV out Going Feeding linking some 33kV line and 11kV line may be needs to construct beside the roads of the above area and its surroundings

3.3.4. Telecommunication System:

The telecommunication in the Chittagong city area is provided and maintained by BTTB, Chittagong through telephone exchanges located at different places in the projected area. The location of telephone exchanges, cabinet boxes, poles etc. are shown in the physical feature map. The projected area has been provided with telephone facilities. The

existing location map of Main switching unit (5 units). Remote switching unit (6 unit) and Remote line unit (1 unit) shown in location map and existing telephone line in Chittagong city area shown in Table-3.11 and Chittagong Multi-exchange Optical Fiber Cable Link shown in Table-312 and 3.13. Now a day's telecommunication system has been improved because of introduction of mobile phones in

Table 3.11: Capacity of Telephone lines in Chittagong City Area

Sl. No.	Name and Location of telephone exchange	No of lines
1	CENT (Nandan Kanan)	55448
2	AGBD (Agrabad)	45065
3	EPZ (EPZ)	3721
4	SGK (Sgarika)	9179
5	MRDP (Muradpur)	21498
6	KGT (Kalurghat)	8049
7	PHT (Pahartali)	2625
8	BZD (Baizid)	12795
9	CHP (Chilimpur)	2000
10	GKL (Guptakhal)	4000
11	HTHZ (Hathzari)	3000
12	VERSITY (CIG)	256
Total		167636

Source: BTTB- 2007

Figure 3.5: Location Map of Existing Telephone Exchange

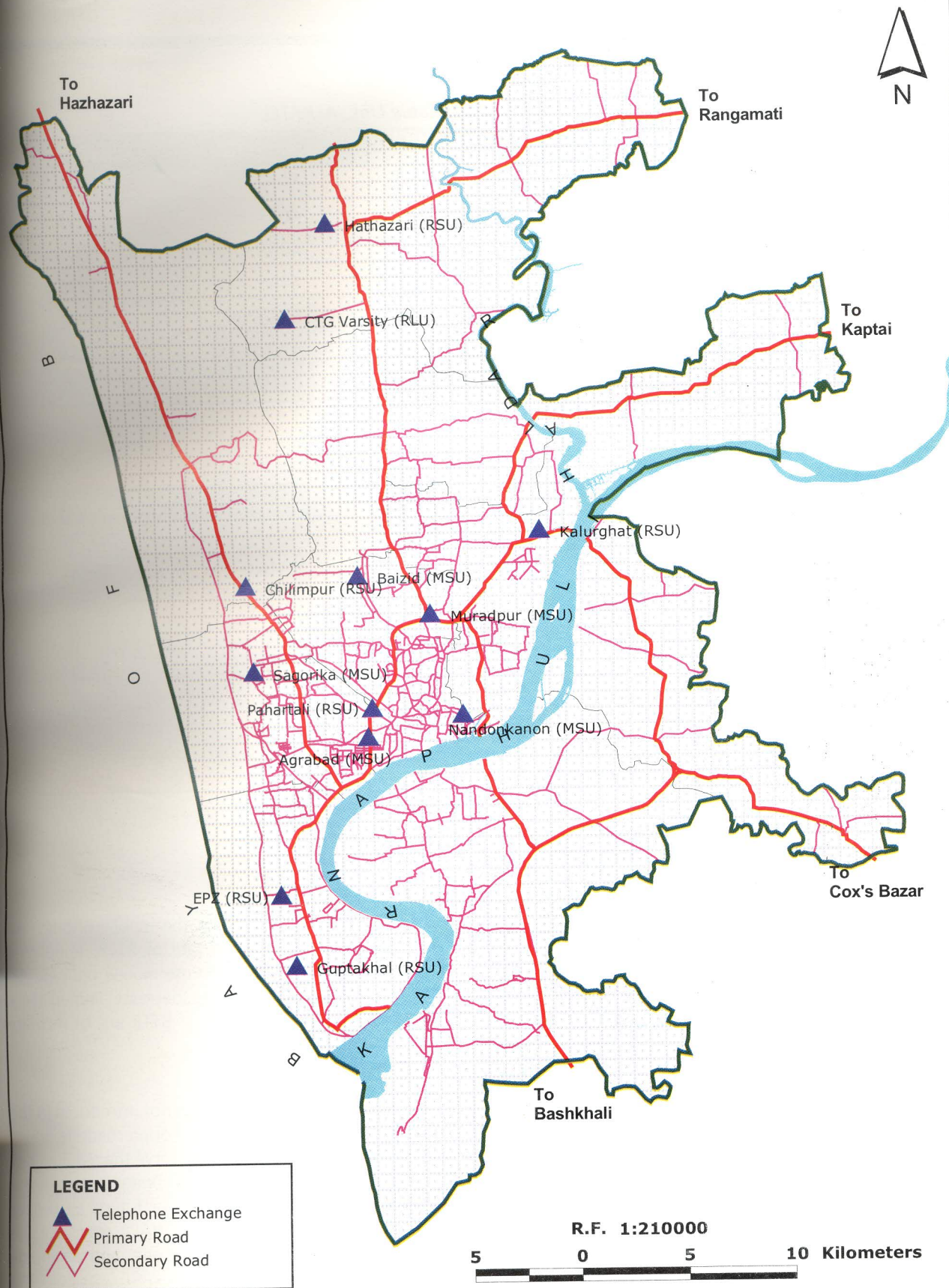


Table 3.12: Chittagong Multi-exchange optical Fiber Cable Link, ALKATEL

Sl. No.	Link name	F/ No.	C. Length (M)	D. Length (M)
1	Agrabad-Central	12	5177	4905
2	Central-Muradpur	12	4033	3894
3	Muradpur-Baizid	12	4802	4601
4	Agrabad-Sagarika	8	6786	6485
5	Agrabad-EPZ (RSU)	8	5540	5380
6	M.pur-K.ghat (RSU)	8	4243	4141
7	M.pur-P.Tali (RSU)	8	4375	4312

Source: BTTB- 2007

Table 3.13: KTI

Sl. No.	Link name	F/ No.	C. Length (M)	D. Length (M)
1	Central- M.pur	12	4134	4044
2	M.pur-Baizid	12	5116	4848
3	Baizid-Sagarika	12	10232	9789
4	Agrabad-Sagarika	12	6717	6706
5	Agrabad-Central	24	5402	5229
6	EPZ-G.Khal (RSU)-(RSU)	12	3878	3640
7	Sagarika-Ch.Pur (RSU)	12	6446	6220
8	Baizid-HTHZ (RSU)	24	12933	12720

Source: BTTB Chittagong -2007

Bangladesh by some private organizations like GrameenPhone, Citycell, Aktel, Banglalink, etc. BTTB also provided mobile telephone named Teletalk. With the rapid increase of population in the Chittagong city at the same time permanent household dwellers, demand of telephone services are increasing rapidly. So telephone facilities are to be increased for the projected area. Now a days demand of fixed land telephone connections to domestic household and commercial purposes has comparatively decreased due to wider use of mobile phones among the people.

A. ISSUE

The telephone lines in the Chittagong city are not sufficient with the demand. About 88000 line are working in the area and total capacity of telephone lines created very recently by BTTB, Chittagong are about 168000 as shown in Table 3.11. But by introducing mobile phones demand of land phones

connection are decreasing.

B. POLICIES

As the consumption rate of the mobile phones are less than the land phone rate of BTTB, telephone consumers are interested to use mobile phones. So BTTB telephone rate are to decrease immediately. The telephone connections of BTTB are to increase immediately

3.3.5 Sewerage System

The Sewerage system so far has not introduced in the Chittagong City. There are few open roadside drains provided by CCC, which cannot serve the requirement of wastewater discharge. The drainage system in the study area is to be improved in future by proper drainage network. Chittagong WASA may take the whole responsibility of Sewerage and Drainage system in Chittagong city area.

3.3.6 Fire Services

Fire services within Chittagong City area are maintained by Chittagong Fire services and civil Defense Services stations. 10 Nos. of fire station located at different area in Chittagong City area. Table-3.14 lists the existing Fire Services and their locations.

services. The CCC does not engage sweepers for clearing of cantonment and railway properties rather CCC only collect solid wastes from the pits of these two organizations. Port Authority has own arrangement for collection and disposal of solid wastes. Besides, the industries also maintain their own arrangement of collection and disposal of solid waste. Solid waste from point the generation to the

Table 3.14: Location of existing fire services within CMMP area and fire fighting equipments

Sl. No.	Name of the Fire Station	Class	Manpower	Water carrying vehicle	Pulling vehicle	Pump
1	Agrabad	A	35	1	1	3
2	Chandanpura	A	35	1	1	3
3	Nandan Canon	A	35	1	1	3
4	Lamar Bazar	A	35	1	1	3
5	Kalurghat	A	35	1	1	3
6	Bayezid	A	35	1	1	3
7	Dock	A	35	1	1	3
8	EPZ	B	27	1	1	3
9	Newmuring	B	27	1	1	3
10	Samudragamj	B	27	1	1	3
Total			326	10 Nos.	10 Nos	30 Nos

Source: Chittagong Fire services & Civil Defense

A ISSUES

Besides these fire stations shown in Table-3.14 every multi-storied high-rise building using commercial and industrial sectors is to provide fire-fighting equipments of their own arrangement as per rule of the fire services department.

B POLICIES

With the increase of population & household, industries in the study area in future at 2015 recommend one Fire Station to be provided for each DPZ area, so for 12 DPZ areas 12 Nos. and 3 Nos. for special area, total 15 Nos. of Fire Station are to establish in future with modern fire fighting equipment and water carrying vehicles.

3.3.7 Solid Waste Disposal

Solid waste collection and disposal in Chittagong city is the responsibility of Chittagong City Corporation (CCC). In addition to CCC, the three largest land owners namely Army Cantonment, Port Authority and Railway Department have their own clearing

final disposal can be grouped into four functioned elements

1. Waste generation & storage
2. Collection
3. Processing & recovery
4. Final disposal.

1. Waste Generation & storage: With respect to the population taking 0.5 kg/day/person total wastes 1208 to 1510 ton of wasted per day are generated in Chittagong (on the basis of population 30, 21, 345). The conservancy Section of CCC claims that they clear up almost all wastes daily. Due to difficult location or narrow road if any dustbin left, they able to mange it next day.

2. Collection: The waste collection is done in the following three stages:

- i. The residents themselves take domestic refuses from households to the intermediate dumping points;

- ii. Street and drain wastes are collected and dumped at intermediate disposal points by the municipal sweepers and cleaners;
- iii. Final collection from the intermediate points and its disposal to the dumping yard by the conservancy worker;

3. Processing & recovery: The main purposes of processing of solid wastes are to improve the efficiency of solid waste management system, to recover useable materials and to recover conversion products and energy. There are processing techniques that are employed in solid waste management systems to achieve the above three purposes. Several techniques are compaction, incineration, shredding, drying and dewatering, manual and mechanical. In Chittagong there is no formal system of processing and recovery.

4. Final disposal: At present Chittagong City Corporation have only two disposal sites at Hali Shahar Ananda Bazaar (Ward 37) and Raufabad (Opposite of Amin Jute Mills within Ward 7).

A POLICIES

Recycling Plant: There is no prominent use of solid waste in our country. In developed countries, this is also a resource and uses these resources for many purposes. In Chittagong the use is limited up to:

1. Charcoal Preparation and
2. Compressed Fertilizer preparation.

Recently CCC has started to produce "Burning Wood" from the organic garbage particles with the help of locally developed technology. This helps them sorting of valuable inorganic particles from the household garbage and on the other hand helps generating working income opportunity for the poor and less privileged groups. The "Burning Wood" plant is in operation and located in Hali Shahar at Ward-37. The composted fertilizer plant is almost ready there and will start its operation shortly.

Recommendation: In order to improve the solid waste problem and to improve the environmental condition of Chittagong the following Macro and Micro level policy measures should be undertaken.

Role of National Government at Macro Level: Policies related to solid waste management improvement for implementation by the National

Government at Macro level are as under:

1. Formation of legislation regarding solid waste management
2. Formation of standards for collection and disposal of waste
3. Incentives for introduction of environmentally clean and efficient technology for waste disposal which would help to reduce the volume of waste and facilities more recycling
4. Construction of waste as an unutilized resource and assisting in recycling of waste for conservation of resources and protection of environment
5. Introduction of environmental education especially sanitary habits in school curriculum.

Role of CCC at Micro Level: CCC should implement micro level policy because it is directly involved in the management of solid waste. The aspects, which should be improved at micro level, are:

1. Developments of awareness and motivation through dissemination of information and education
2. Research and development for low cost option for waste management
3. Coordination with other agencies regarding waste management
4. Optimum utilization of manpower and equipment
5. Development of separate collection and disposal system of different types of waste such as domestic, industrial and clinical
6. Maintenance of adequate data regarding waste generation, composition and characteristics
7. Regular monitor of land fill sites and maintenance of record of such sites
8. Promotion of separation and minimization of waste at household level
9. Regular maintenance of solid waste infrastructure
10. Increase the number of new dustbins and periodic maintenance of the brick dustbins should be done to ensure that damaged portions are rebuilt and broken plasters are repaired. Metallic dustbins should be cleaned

and painted periodically so that they will last longer

11. Restriction of building or close structure on or near landfill sites.

3.4 ENVIRONMENTAL PROTECTION AND ENHANCEMENT

In the Structural plan particular attention has been given for the protection and improvement of urban environmental quality. It has been guided to taking into consideration the environmental impact assessment related to all development activities of Chittagong. There might be a conflict between the level of development and the need for conservation of natural environmental system. It is thus the recommended policy to accept a sustainable level of development and try to avoid all possible environmental conflicts. Once the environmental problem is occurred due to unplanned development activities it becomes very expensive to restore and in many cases irreplaceable.

In the Structural plan to enhance the environmental quality of the city six guidelines have been stated considering the issues of environmental degradation related to manufacturing activities, solid waste disposal, noise and air born pollution, hill cutting and loss of vegetation coverage. However, the trend of current environmental degradation of Chittagong is even much acute and multiple than has been projected in the Structural plan. The city has already been and in future would be more accurately suffering from the environmental issues related to hill cutting and land slides, water logging, fillings of ponds and water bodies, development activities in Foy's lake area, solid waste disposal, illegal extraction of ground water, pollution and encroachments of the Karnaphuli and khals, unplanned ship breaking activities near Bhatiary, and overall unplanned urban development, particular the current contraction of high-rise buildings, unless these issues are not properly addressed, assessed and take into consideration into the planning processes.

3.4.1 Guiding Principles

1. Hill Cutting and Vegetation Cover: Chittagong has its unique and distinctive undulating hilly landscape. In recent years hills are being cut at individual or institutional level either for housing plots or for other development activities. Hill cutting has been identified as a great

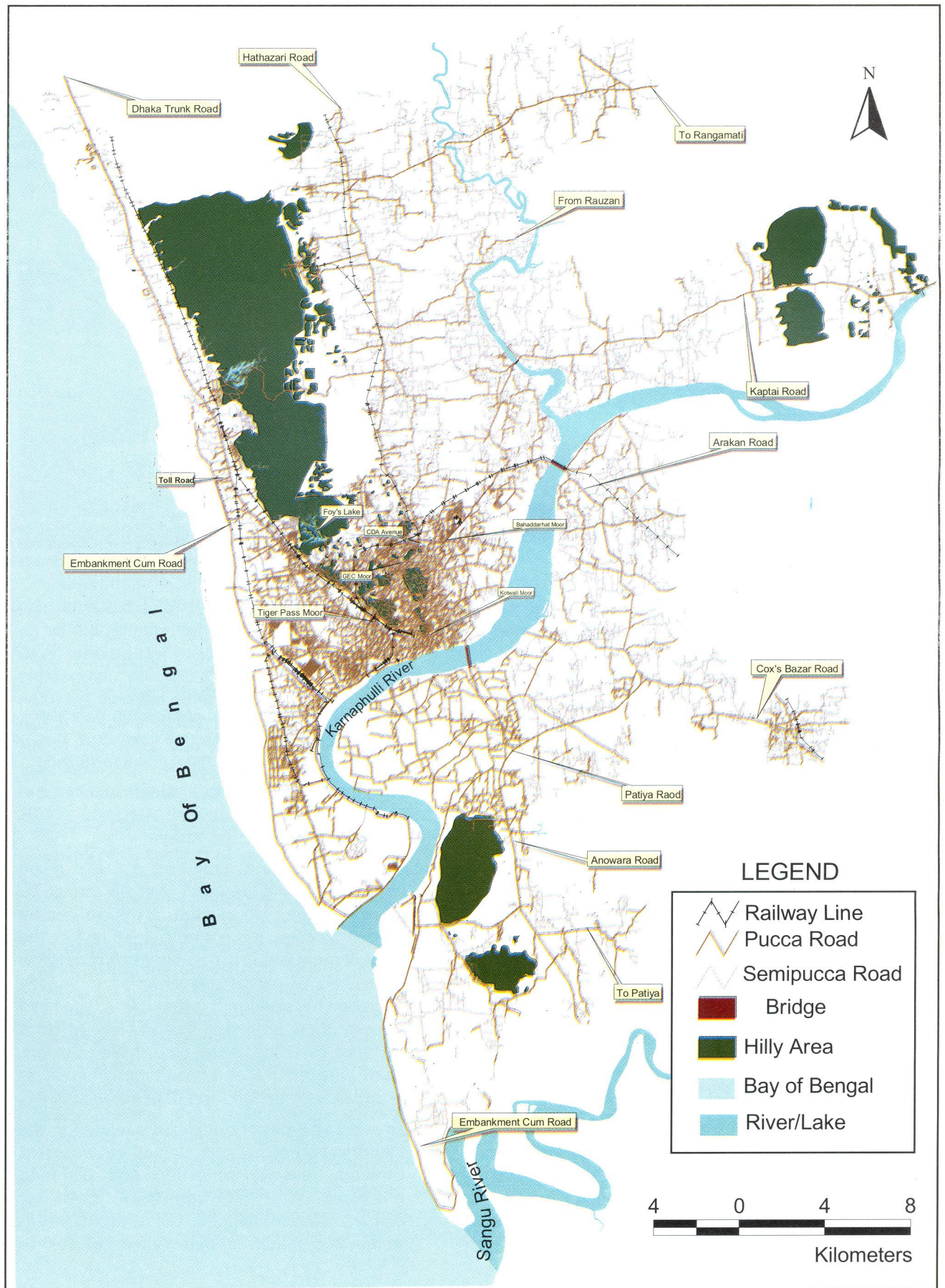
environmental concern, which had lead to a series of environmental and human catastrophic, including human deaths, tolls due to massive land sliding. However, some of the guiding principles related to hill areas and hill cuttings are:



Pic. 3-4 Hill cutting takes place for housing plots or development activities.

- a) Stop all types of hill cuttings, either in a new area or in locations currently being cut by an individual, group, society or institutional level. However, if it becomes absolutely unavoidable but to cut or dress or trim a hill only for some government project of public interest, it can only be allowed after proper EIA, open public hearing, expert (environmentalist) opinion, ensuring appropriate mitigating measures and law clearance related to such alteration of hills and proper engineering design.
- b) Hills, which have already been cut and made level for housing purposes, can no longer be allowed to develop as high or middle density residential areas. It is not possible to restore the lost hill areas but it is possible to turn those to green belt, as partial compensation to already degraded hill ecology. It is thus immediate need to cover these leveled or partially leveled lands to forest coverage at the cost of their owners. Phase wise removal or rehabilitation of all slums or squatters from hill tops, slopes or valleys
- c) To avoid all types of complexities related to the identification of hill sites, and to development controls, revenue collection and planning processes, the hill has been classified, demarcated and mapped. The authority needs to develop either its own cell or to link to

Figure 3.6 Existing Hilly Areas Need Protection and Enhancement



Universities/research centers to conduct regular survey to update the information on hill landscape and environment.

- d) For a sustainable, livable and environmentally suitable city, it is not wise to remove the existing green coverage of the city to solid structures/buildings and turn the future city landscape into a jungle of bricks and concretes. Keeping pace with the forest policy and environmental policy of the Government, it is necessary to keep at least 15% of the city landscape under vegetation/ forest coverage. It can be achieved through the development of green belt along the sea shore, along the river front line, on the existing and altered hill areas, along the khal bank lines, remaining vacant areas for further development and also in the planning process for individual plot development. Even the underground development measures overlaid by surface vegetation coverage, and roof side green coverage can be encouraged. The existing plantation along major roadsides needs to strengthen and effectively managed. Existing green coverage, such as CRB, DC hill, FRI, Batali hill, Fairy hill, Joypahar, Prabattak, Golpahar and Foy's lake areas need to make more green through further plantation.

2. Water Pollution: Chittagong city is surrounded by water bodies on its three sides; the Bay of Bengal on its west and south, and the Karnaphuli River on its east. Both the marine and river water are seriously being polluted due influx of untreated solid waste and liquid effluences from individual houses and industrial units. Manufacturing and processing industries are primarily located at Nasirabad/Sholashahar/Kattoli/Kalurghat/Fouzderh at and Patenga industrial areas, which are directly connected either to the sea or Karnaphuli River for discharging their effluences. The location of ship breaking industries at Bhatiary, where near about 60 ships/oil tanker/cargoes are dismantled annually become a threat to marine ecology, due to dumping of crude oil, pollutants like heavy metals and toxic elements, directly into the sea. However, some guiding principles related to the river and sea front industrial activities and water pollutions are as follows:

- a) Considering the economic and social

contribution of ship breaking activities at Bhatiary, and due to its wonderful location in a muddy beach area, it is wise to allow and continue such entrepreneurs but off course not in its present form. It can only be allowed only subject to complete stoppage of all sources of marine and coastal pollution, and recognition of this sector as formal industrial activities and ensuring the healthy and safety working environment of the workers.

- b) No industrial activities would be allowed to continue on the sea/river bank side unless toxic and hazardous effluences are treated at an acceptable level at their own cost before discharging into the sea/river water. Considering the cost of treatment plan, a group of industries of similar nature can establish their common treatment plant for common use
- c) To avoid massive pollution of marine and river water due to oil spill or spread of toxic pollutions from an accidental cause, the related industries or authorities, such as oil refineries, port authorities, ship breaking association, cement and chemical factories, must have their adequate preparation in advance to mitigate the potential threat.

3. Water logging: Despite a good gravitational drainage system, only after a rainfall of 20-30 mm in an hour, most parts of the city become inundated due to severe water logging. Such water logging is the consequences of removal of vegetation coverage from hill slopes, massive hill cutting and fillings of streams/gullies in the hilly upper reach; unplanned urban growth and encroachment of drainage network in the developed middle reach; and illegal encroachment and occupancy of khals in the lower reach of the drainage catchments. Unless the present trends of unplanned development activities, particularly along the khals and drains are stopped, the city would be no longer be comfortable to live and even during the planning period would be a non-livable city. However, some guiding principles related to water logging issues are as follows:

- a) Hill area management as per guideline principles for the hills {3.4.1(1)} Widening of all drainage passage by immediate removal of all illegal occupancies, and if it is not sufficient to water drainage it should be through land

acquisition. Immediate stop of all types of further unplanned development in the city, and strict control of urban land development process, including the control of FAR for all types/level of buildings and permission for high-rise buildings.

- b) Excavation of the major khals and turn those to natural tidal creeks. The bank lines of those khals need to be fixed up-to the reach of the tidal limit. A green buffer zone along the bank line up to 50-100 ft each side, suitable for walkway and/ or for cycling can be built. However, under no circumstances the floors of these khals should be fixed by any concrete structure, so that these khals can operate their own natural hydro-geological readjustments.
- c) Along with the permanent structures, all types of temporary obstacles, such as floating bamboos and timber logs at the khals mouths, unplanned anchoring of boats / ships, and dumping of solid wastages straight to the drainage/khals must be removed and stopped.
- d) Stop the fillings of all existing ponds/tanks and water bodies of the city, and their conservation as per the guideline for open space and water bodies {3.4.1(d)}.

4. Open Space and Water Bodies: Chittagong city is gifted with many large water bodies, and open spaces, although many of those are now rapidly being encroached filled and brought under concrete development. Many of these water bodies and open spaces, such as Ashkher dighi, Ranir dighi, Parade ground, Laldighi maidan are historically important. An accelerated rate of reducing the number and areal coverage of water bodies and open spaces in the city has already led to a series of environmental crises. Foy's Lake is areas where both water-mass and hilly landmass has collectively lead Chittagong to its unique attraction to visitors and tourists, both home and abroad. However, this unique symbolic identity of the city has now been severely affected due to very unwise and unplanned development activities by Concord, a private commercial firm, under a so called agreement with the Government, and has lead to a great concern to the hill environment and social protest from environmental activities. However, some guiding principles related to water bodies and open spaces

of the city are as follows:

- a) Foy's Lake is the cultural, social, and environmental symbol of the city. Its area coverage, water quality, hill topography, and plant and animal ecology must be conserved. It is immediate necessary to identify and demarcate the hill and lake area of the lake as a separate ecologically sensitive zone and stop all types of development and alteration of its soil, vegetation and water-mass. Ensure the protection of lake water and the surrounding ecology from all types of legal and illegal developments, sound pollution, air pollution and water pollution both physically and chemically. Immediate cancellation of the agreement with Concord, and take special measure to make the lake area as a specially control zone, only open for peace full site seeing and research interest
- b) Many of the historical ponds and dighis of the city have already been filled and remaining is under stress toward degradation. The city has a lot of ponds and dighis, with a very uneven distribution. For example many wards in the city centers, such as Jamal khan or Firingee bazaar has less than 5 ponds, where as wards at the periphery of the city has more than 150 such ponds. To protect and promote urban ecology no ponds/ dighis of size ≥ 0.5 acre can no way be encroached or filled and must be preserved as water bodies. Water bodies between 0.25-0.5 acres in the developed part of the city can only be filled subject to proper EIA clearance, open public hearing, clearance from local communities and expert committee. Water bodies and wetlands under private ownership can be promoted with financial and technical assistances to commercial uses as fishing ground, aquatic culture, swimming centers, tourism, and other water based sports.
- c) The number and total coverage of open spaces, such as play grounds, parks and gardens in the city are reducing as an alarming stage due to rapid unplanned growth of the city. At present there are about 25 playing grounds, which are above 0.5 acres in size. More than 70% of educational institution, particularly schools do not have their playing ground, which is alarming considering the health and mind of

their students. No school/educational institutes should get government approval or MPO consideration unless it has own play ground for its students, either in campus or out campus. Considering the land scarcity, 3-4 such schools can collectively own their play ground for common use. Such mandatory effort not only develops the physical and mental health of the students but also keep the city's physical environment to a sustainable level. It is immediate need to earmark and list all the playing ground of each wards, and such play ground, whatever is the size, can no way be considered for any kind of structural development, other than out door sports.

5. Solid Waste Disposal: A total of 1000 tons of solid wastes at household level is being produced daily in the city, and CCC collects and dumps more than 95% of such wastage. Moreover, untreated disposal of clinical wastage from the hospitals/clinics have been polluting the food cycle and lead to great health concern, particularly the lower income group of the city. It is not necessary to remove polythine from the market, rather it is more important to the effective management of waste. Solid waste management mode of the UK, or Japan based on the principle of household level accumulation and separation, and community/ward level collection, dumping and recycling methods need to be adapted. Considering their wind speed and direction, it is recommended to relocate the present two dumping grounds from southern part of the city to the north.

6. Noise and Air Born Pollution: The issues of noise and air pollution from motor vehicles, industrial emission, and brickfields now becoming greater concern to sustainable environmental quality of the city area. More than 30 brick filed are located vicinity to the city center, which lead to accelerate air pollution of the city. All these brick flied need to be relocated to far north from the city boundary, following the guidelines of brick filed ordinance 2001.

3.5 GENERAL POLICY

Considering existing situation, future demand and planning techniques the following general policies

will be applied in different parts of the study area.

Gp-01) CDA approved existing building as well as its use will be retained in the newly proposed land use plan but no further expansion of existing use will be allowed rather land use to be controlled and developed as per proposed land use plan. Considering the importance of proposed land use plan, in some cases the authority (CDA) can remove existing structure and land use with proper compensation and rehabilitation program. In this regard, the final decision will come through required assessment by the CDA Planning Committee.

Gp-02) In unplanned residential areas, supporting shops for community need may be permitted at the ground floor of buildings located along with at least 20' width road. But in planned residential areas approved lay out plan, guidelines and conditions will be followed.

Gp-03) CDA will highly appreciate and encourage land owners for coming together in order to planned housing and commercial development of existing unplanned areas. The authority can take initiative to motivate the community people for such planned development as well as take necessary steps.

Gp-04) People will get permission for building construction in existing homestead of

Agricultural areas based on existing feature survey and proper inspection by the CDA Planning Committee. In addition to this provision, suitable lands for agricultural use will be preserved. Agro related installation might be permitted to increase agricultural production.

Gp-05) land reclamation from the Bay of Bengal to the west side of Chittagong City may be considered for seafront development through detail study.

Gp-06) Generally centre line of the existing roads is to be followed to wide roads equally on the both sides. In some exceptional cases, considering existing obstacles along the road side it may be relaxed, as for example in order to road widening more space may be taken from one side than that of opposite side. In this case, a committee may be formed that will consist of a few members. The members may be director of DoE, highest level officer of Traffic Police, Ward Commissioner, prominent persons of local area and others.

Gp-07) The air port located at Charia of Hathazari

area which was left abandoned for long time, may be renovated to run again.

Gp-08) Mixed Use: This type of land use will mainly allow residential and commercial use. Commercial establishment will get approval subject to proper parking, circulation system and fulfilling other requirements as per Building construction rules. Commercial activities in the lower floors and residential use in the upper floors of the same apartment building will get permission by provision of parking facilities and good accessibility. In addition, other supporting uses will be allowed in mixed-use areas through proper evaluation of planning committee. With the aim of planned development in mixed-use areas, Chittagong Development Authority can motivate community people for the development of planned residential area through Land Development Techniques. CDA



Pic. 3-5 Mixed Use- Katcha bazaar and apartment complex.

will follow the whole process through private and local people participation. Light industry may be permitted at a small scale in mixed-use areas through

planning committee evaluation process including sufficient road width, traffic circulation & parking facilities as well as proper safety. Any kind of hazardous industrial development will be strongly prohibited in mixed-use areas.

Gp-09) In general community people can establish various community facilities, which will support them and will not make any contradictory with the proposed land use plan. In some cases if it makes any difficulties, decision to establish community facilities will come through proper evaluation process by Planning Committee. The community FOCUS will be highly encouraged in different parts of the city by responsible authority that will be the centre for community facilities, local government, and other government functions. The facility will be of high aesthetic, functional and architectural standard.

Gp-10) Any kind of development on hilly areas will be allowed or not as well as development scale in terms of hilly areas, will depend on the decision of Nagor Unnayan Committee by proper evaluation process. In addition to that, structural development on hilly areas will get approval as per Building Construction Rules. In the evaluation process for any kind of structural development in hilly areas, the committee will consider the following conditions.

- Structural development will be permitted on 10% of the total plot size in build able land of hilly areas.
- Slope stabilization is to be done following proper engineering method.
- Load bearing capacity is to be strongly considered to avoid any hazard.
- Minimum cutting, leveling and filling will be allowed in build able land of hilly areas.
- Detail plan of any structure or development has to be submitted with contour. If possible a three D rendering has to be submitted which will mention the situation before construction and after construction.
- Low density and high cost residential use will be highly appreciate.
- Building height should be restricted in such way that it does not hide the existing hill. Preferably high-rise building will be avoided to prevent hill slide.

- Land development techniques will be highly appreciated to use hill at optimum level as well as protect environment.

Gp-11) In view of the existing land use and future need, individual cases will be considered through different mechanism in order to implementation of redevelopment program, development control and promotion.

Gp-12) In order to enhance industrial activities, a certain scale of industrial supporting commercial use may be permitted as per requirement in proposed industrial sites under Detailed Area Plan.

Gp-13) Surveyed areas which are out of Planning Area will be considered as Agricultural Use.

Gp-14) For easy movement of handicapped or disable people, proper design has to be followed during construction of road, footpath and other establishments. From social point of view their accessibilities need to be considered in public and private projects.