

## Development of Water Transport Network in the Northern Region of Dhaka City

Abu Sumaiya<sup>1, \*</sup>, Nazmul Alam Nahid<sup>2</sup>, Md. Mashiur Rahaman<sup>3</sup>, Khandaker Rasel Hasan<sup>4</sup>,  
ABM Mahbubar Rashid<sup>5</sup>

<sup>1, 2, 3</sup> Department of Naval Architecture and Marine Engineering, Bangladesh University of Engineering and Technology, Dhaka-1000, Bangladesh

<sup>4</sup> Department of Port and Shipping Management, Bangabandhu Sheikh Mujibur Rahman Maritime University, Dhaka, Bangladesh

<sup>5</sup> Metacenter Ltd., Dhaka-1000, Bangladesh

### ABSTRACT

All the megacities in the world suffer from traffic jam at certain hours of the day. But in Dhaka, traffic jam is the most severe and regular affliction in the daily life. People here have to kill hours simply sitting in the jam and that brings sufferings not only to themselves but also to the productivity. Northern region of the Dhaka city is one of the most important areas of Bangladesh with highly promising projects of the Government of the People's Republic of Bangladesh at Bashundhara Residential Area, Purbachal New Town etc. Therefore, with the existence of rivers and canals in and around that region, there is a possibility to develop a waterways network. At present, road transport is the only mode of transportation for accessing with other parts of the Dhaka City. The proposed waterways network will ensure the safety of the natural environment and bring a source of entertainment in the city life. Many cities around the world like London, Paris, New York, Shanghai, Venice etc. have already implemented successful waterways network inside the city.

**Keywords:** Water transport network, vacuum infusion process, modular concept, turning circle.

### 1. Introduction

Despite the construction of several flyovers, allowing people to park their vehicles in designated streets and bus stops and stern actions against wrong side driving, traffic congestion in Dhaka continues to aggravate, causing serious sufferings to city commuters. Traffic jam has turned daily trips into nightmares. Furthermore, it makes the existing public transport very inefficient and most importantly adds unbearable and unsafe level of both noise and hazardous air pollution.

This exasperating level of traffic congestion is already handicapping the economic growth and development. According to a World Bank report, in the last 10 years, the average traffic speed in Dhaka has dropped from 21 kmph to 7 kmph, and by 2035, the speed might drop to 4 kmph, slower than the walking speed. Another study, commissioned by Brac Institute of Government and Development, says traffic congestion in Dhaka eats up around 5 million working hours every day and costs the country USD 11.4 billion every year [1]. Many government and public transport agencies have drafted policies, undertook projects and implemented programs to solve the problem but yet, there is no improvement. An urban transport plan was commissioned with the US consulting group Louis Berger and Bangladesh

Consultant Ltd. A comprehensive transport plan was devised for Greater Dhaka City and its adjoining areas

(Tongi, Gazipur, Savar, Narayanganj, Keraniganj, Narshingdi and Manikganj) covering around 4000 km<sup>2</sup>. The plan looked at 15 key policy issues including safety, pedestrian preferences, management, mass transit systems etc. Almost 70 different policy recommendations were produced under these 15 issue areas. Ten comprehensive transportation strategies were then evaluated, using a base case of no BRT (Bus Rapid Transit) or metro service and a number of alternatives were explored. The adopted plan included roads, a three-line Mass Rapid Transit (MRT) and three-line BRT. It included provisions for 54 new roads in and around the city, three part elevated expressways and a circular waterway program [2].

But still, the citizens of Dhaka are suffering because our traffic system as well as the steps planned to reduce the traffic jam are failing us. It is high time we thought of alternative ways. In and around Dhaka City there are some rivers and canals those can be used for its internal passenger transport linking some of the busiest locations of Dhaka.

### 2. Locations and Particulars

The selected routes connect some of the busiest and most important areas of Dhaka City like- Sadarghat, Gabtoli, Ashulia, Uttara, Purbachal New Town, Gulshan etc.

In Table 1, detailed locations, proposed landing stations,

important areas adjacent to the routes, total distance by waterways, rivers or canals being used etc. are mentioned. In Fig.1, the whole concept is shown as a complete network in a map. Also in Fig. 1, the red lines indicate the routes whereas the black circles show all the proposed landing stations.

### PRESENT CONDITIONS OF THE RIVERS AND CANALS

Rampura Khal and some parts of the above mentioned rivers remain almost unused throughout the year. Balu and Shitalakshya rivers are presently being used for transporting local cargoes. There are housings on the both sides of these waterways. Their surroundings continue to be shrunked and polluted due to creep of construction and dumpage of massive quantities of garbage from the neighborhoods.

While visiting the respected areas it was found that in some areas extremely polluted water full of odor. The authors also noted the alarming rate of illegal encroachment and sewerage pipelines discharging sewerage.

### PRESENT SCENARIO OF PUBLIC TRANSPORT

Presently the main public transport in all of the routes are buses (both local and counter bus service). In 2010, Bangladesh Inland Water Transport Corporation launched two water buses in Sadarghat- Ashulia route to ease nagging traffic congestion of the capital city. Another circular water route stretching from Ashulia to Kanchpur Bridge (via Tongi) was introduced in the second phase. But the project could not be popular for various reasons [3].

**Table 1** Detailed locations and particulars of the waterways network.

No	Proposed routes	Proposed Landing Stations	Adjacent important spots	Total distance by waterway	River/ Canal used
1	Sadarghat→Gabtoli→Ashulia→Tongi	Sadarghat, Gabtoli, Ashulia, Tongi	Chandrima Model Town, Amin Bazar, Dia Bari, Tamanna World Family Park, Eastern Housing, Birulia Launch Terminal, Uttara (Sector 10, 11, 16, 18), Several universities.	37 km	Buriganga river, Turag river
2	Rampura→Purbachal	Rampura Khal, Purbachal New Town (Sector 10,18)	Banasree, Kayet Para, Kapotakkha Green City, Beraid Boat Ghat, Jalshiri Abason, Bashundhara Residential Area	17.5 km	Rampura Khal, Turag river, Balu river
3	Rampura→Chanpara→Kanchpur Bridge	Rampura Khal (near bus stand), Chanpara, Kanchpur Bridge	Banasree, Khilgaon (Trimohoni bazar), Demra	15.5 km	Rampura Khal, Balu river, Shitalakshya river
4	Kanchpur Bridge→Chanpara→Beraid Boat Ghat (Gulshan)→Bashundhara Residential Area	Kanchpur Bridge, Chanpara, Beraid Boat Ghat, Bashundhara	Demra, Kayet Para, Kapotakkha Green City, Gulshan	19 km	Shitalakshya river, Balu river
5	Kanchan Bridge→Kanchpur Bridge	Kanchan Bridge (Purbachal Sector 4,5,6), Kanchpur Bridge	Welcare Green City, Rupganj, Murapara	18.5 km	Shitalakshya river
6	Uttara (Abdullahpur)→Purbachal New Town→Beraid Boat Ghat (Gulshan)→Chanpara→Kanchpur Bridge	Uttara (Abdullahpur), Purbachal (Sector 1), Beraid Boat Ghat, Chanpara, Kanchpur Bridge	Tongi (opposite to Abdullahpur), Kapotakkha Green City, Jalshiri Abason, Gulshan, Kayet Para, Demra	33.5 km	Turag river, Balu river, Shitalakshya river

## PHYSICAL CONSTRAINTS ASSOCIATED WITH DEVELOPMENT OF WATER TRANSPORT NETWORK

Some physical constraints such as bridges, dams, bends, and rapid change of direction were noted by physical survey. Bridges constructed across the routes at some spots are presenting obstacles for required air draft for the water buses. But the most important factor here is the polluted water and surroundings that must be taken care of with priority.

## PROPOSALS TO CHECK THE CONSTRAINTS

Bridges in some areas have to be reconstructed providing necessary air draft. This criterion has to be

maintained for new bridges those are being planned to be constructed. Dredging in some spots of the routes is a must to maintain the required draft for shallow water boat, especially in winter. Severely polluted water is a major problem for the passengers to travel through waterways. Therefore, water purification plants have to be developed in highly polluted regions of the proposed routes for waterway network. Also social awareness has to be increased among the locals living in the adjacent areas of the water routes by proper initiatives.



Fig.1 Proposed waterways network (red line) and landing stations (black dots).

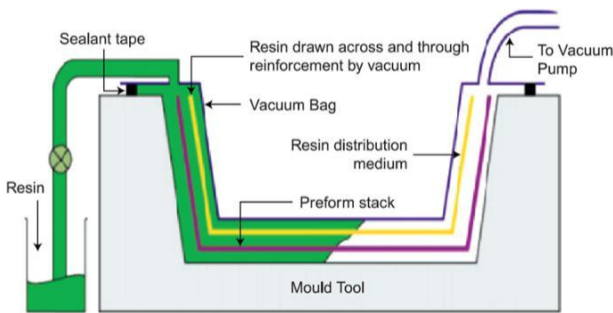
## PRIORITIES TO BE CONSIDERED BEFORE DESIGNING WATER BUSES FOR THIS NETWORK

The main objective of the present study is to design a waterway and to set priorities to design a water bus that will lead to a saving of time and money along with lessening affliction related to the traffic jam. Therefore, an optimum shallow water draft boat with moderate speed and size is necessary for the proposed waterways network. Special attention should be taken so that the operation of the boat will not be a reason for pollution

of the rivers and canals. Again, as there are residential buildings beside the water routes, the boat should not be a source of noise [4].

For the construction purpose, environment friendly Fiberglass Reinforced Plastic (FRP) and Vacuum Infusion Process (VIP) can be prioritized. Fig.2 shows a schematic diagram of VIP method. The Vacuum Infusion Process utilizes vacuum to infuse resin into the laminate. The first step is to load the fabric fibers and core materials into the mold. Also ribs, inserts and any other components can be added, and this is done without

resin. Next the dry material is seal closed using a vacuum bag or a counter mold. High vacuum pump (25 in Hg or more) is used to remove all of the air in the cavity and

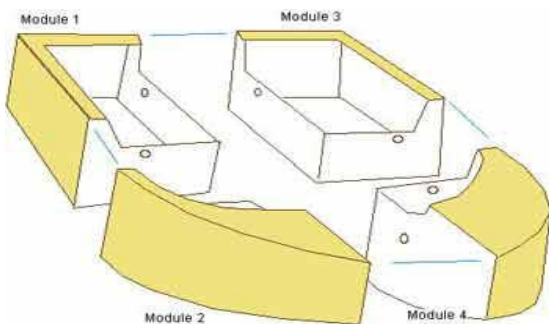


**Fig.2** Vacuum Infusion Process.

consolidate the fiber and core materials. Still under vacuum, resin is infused into the mold cavity to wet out the fabric fibers and core [5][6].

In the construction sector, “modular concept” has become a buzz-word for boat building industries. Hull parts are constructed as units (as modules) that can be delivered to anywhere and can easily be assembled. It ensures that resources can be applied at multiple work places in fabrication yards or even at different yards [7]. This concept is already being used in some design firms in Bangladesh i.e. Metacenter Design and Marine for their design and construction purpose. In Fig.3, boat parts constructed following modular concept are shown.

As pollution control is one of our prime concerns, implementation of eco-friendly power source (solar or electric) is proposed to avoid fossil fuels. Also the turning circle (the smallest circle in which the boat can turn without reversing) will be such that the water bus will not face any difficulty in the narrower zones.



**Fig.3** Modular concept.

Capacity of the boat will be such that the project will lead to a profit within a specified time. All measures of safety of passengers must be present in the water bus. A mentionable percentage of young generation uses bicycles for their daily movement. So a space has to be allocated in each water bus with a facility of carrying bicycles also. For that reason and for the ease of the

passengers, the landing stations and the deck of the water bus have to be of same height. Aesthetics of the water buses is important also so that those can add not only ease but also beauty and versatility to the city area [8].

#### REQUIRED OPERATIONAL SPEED

The speed of the water buses has to ensure faster and safer movement than that of road. As there is no jam condition in waterways, 15 kmph speed level (taking almost double of the average road speed, which is 7 kmph) for travelling is proposed, then the speed stands

$$= \frac{15 \times 1000}{60 \times 60}$$

$$= 4.17 \text{ m/s}$$

$$= \frac{4.17}{0.5144}$$

$$= 8.11 \text{ knot}$$

Therefore, the speed can be fixed at 8 knot.

#### 4. Landing Stations

Landing stations must be in such areas where passengers, after leaving the water bus will have an easy access to rickshaws, cars, bus stations etc. Already there exist several landing stations (Beraid boat ghat, Ashulia landing station etc.). A landing station has to be economic, light, with the same height as the deck of water bus, easily maintainable and movable. Usage of HDPE (high density poly ethylene) is proposed as the main material for construction of landing stations as it will fulfill most of the criteria.

#### 5. Conclusion

Northern region of the Dhaka city is one of the most important areas of Bangladesh with highly promising projects. There is existence of rivers and canals in that region which is almost unused at present. Therefore, there is a possibility to develop a waterways network for passengers and cargos transport. In present study, waterways transport network is proposed with landing stations for handling passengers and cargos. If the proposed waterways network can be implemented practically, it can not only be a reliable and effective alternative of the road transport but also be a suitable usage of the unused or less used rivers, canals etc.

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