Bangladesh Transport Review

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Summary

Historical development

Road sector

- **Organisation Involved**
- **Standards and Design**
- **Vehicles and Users**

Railway sector

Waterway sector

Airway sector

Historical development

- Before British Colonial Period
- During Colonial Period
- During Pakistan era
- After Liberation in 1971
- Flow of aid fund after 1975
- Sporadic, Piecemeal and politically biased transport development

Transport sector problem

NATIONAL TRANSPORT INVESTMENT TREND

Year	Transportation Sector Investment as % of Annual Development Budget	Road Sector Investment as % of Transportation Investment	Rail Sector Investment as % of Transportation Investment	Water Sector Investment as % of Transportation Investment
1974-75	11.56	32.4	27.3	40.3
1979-80	13.79	42.0	30.6	27.4
1984-85	11.59	35.9	36.3	27.8
1989-90	12.01	49.6	29.9	20.5
1994-95	16.91	78.3	14.7	7.0
1999-00	18.81	88.0	9.0	3.0
2004-05	19.00	88.6	8.0	3.4

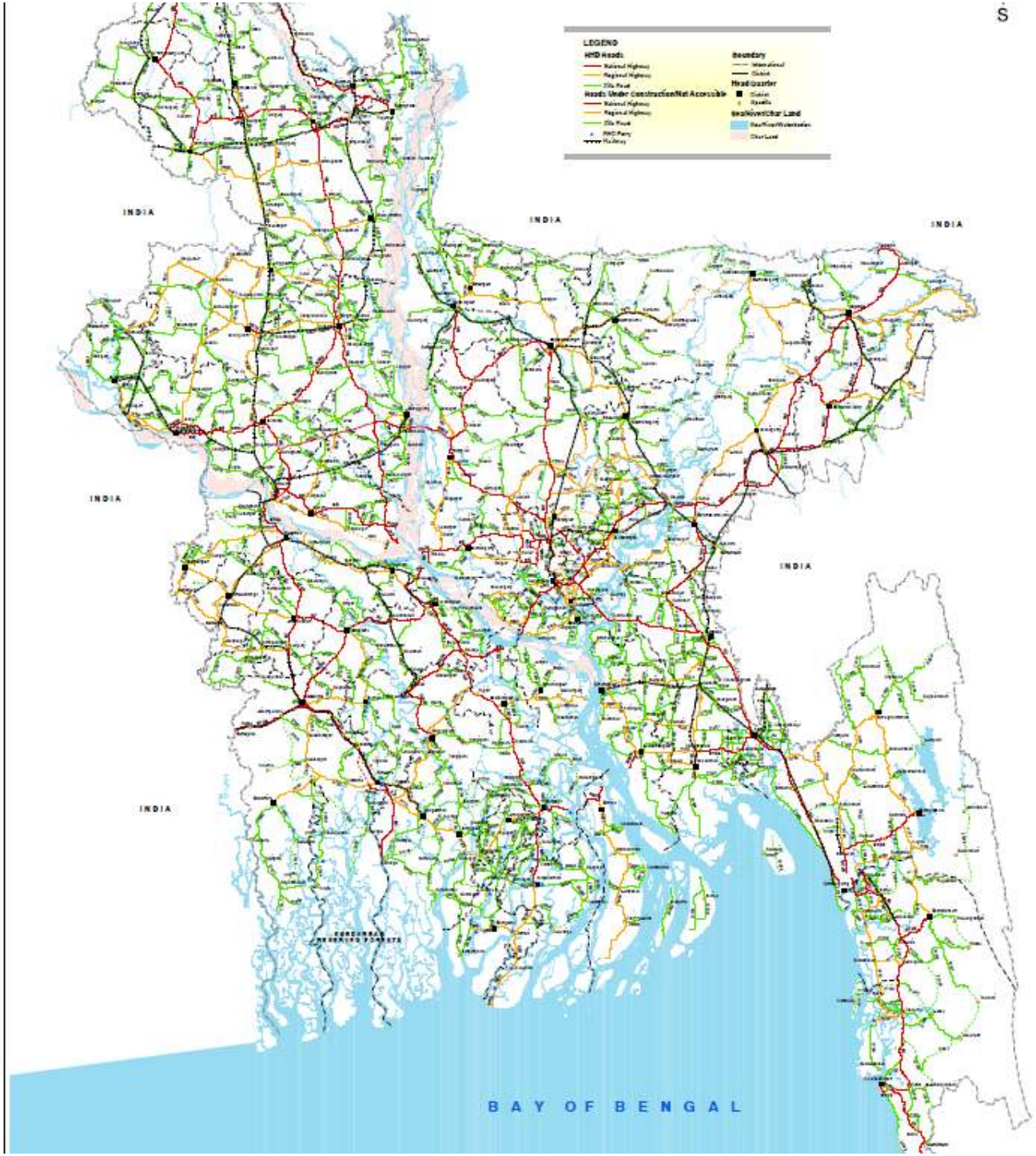
Source: Economic Review of Bangladesh 2005 (13)

Unusually high share for road sector: Unsustainable trend

BUET

Road sector: Players

- Roads and Highways Department (RHD)
- Local Government Engineering Department (LGED):
- Bangladesh Road Transport Authority (BRTA)
- Jamuna Multipurpose Bridge Authority (JMBA)
- Dhaka Transport Co-ordination Authority (DTCA)
- Bangladesh Road Transport Corporation (BRTC)
- Bangladesh Land Port Authority (BLPA)


LEGEND
INDIA
INDIA
INDIA
INDIA
INDIA
BAY OF BENGAL

Road sector

Table 11.1: Various Categories of Roads under Roads and Highways Department

Year (up to the June, 30)	National Highway (km)	Regional Highway (km)	Feeder Road 'A' type (km)	Total (km)
1994	2920	1687	11063	15670
1995	2920	1700	11450	16070
1996	2920	1700	12934	17554
1997	2920	1700	15665	20238
1998	3144	1746	15964	20854
1999	3090	1752	16116	20958
2000	3086	1751	15962	20799
2001	3086	1751	15962	20799
2002	3086	1751	15962	20799
2003	3086	1751	15962	20799
2004	3723	4832	13823	22378
2005	3570	4323	13678	21571
2006	3570	4323	13678	21571
2007	3570	4323	13678	21571

Source: Department of Roads & Highways, The Ministry of Communication.

Road sector

Three types of RHD road are recognised:

National Highways:

National highways connect the capital with Divisional HQs or sea ports or land ports. National highways connect the capital with international borders. A National Highway must branch of from another National Highway, National Highways cannot connect between Regional Highways or Zilla Roads. N1 - N8 Major national routes. N101 - N809 National routes of lesser importance, where the first number is the major national route and the second digit (chronological order) designates a serial number.

Regional Highways:

Regional highways connect the National highway network with District HQs or main river and land ports not connected by National Highways. Regional highways connect District HQs. Regional Highways must branch of from National or Regional Highways, Regional Highways cannot connect between Zilla Roads. R101 - R899 Where the first number is the national road number from which is branches of and the second two digits (chronological order) designates a serial number.

Zilla Roads:

Zilla roads connect Upazilla HQs with the National/Regional road network (single shortest route). Zilla roads connect Upazilla HQs. Zilla roads branches of from National or Regional Highways or other Zilla roads. Z1001 - Z8999 Where the first number is the national/regional road number from which is branches of and the next three digits (chronological order) designates the feeder road (serial number).

Road sector

Link Number

A Link is the part of a road between two intersections on that road (of RHD roads).
Links are used exclusively for traffic purposes and not in connection with other types of data collection (except traffic counts) or in connection with locating maintenance works.

Link Numbering

Rule 1. The Number of Main Carriageway lanes is constant

Rule 2. The Link is either one way or two way traffic flow

Rule 3. Ramps and roundabouts are to be treated as single links unless the number of main carriageway lanes change, or the traffic flow change. In these cases the ramp or roundabout must be split and apportioned to more than one Link.

Rule 4. A link must start a Connecting LRP (Location Reference Point) but might end at a Connecting LRP or an End LRP, except in the special case of a roundabout where the Link starts and ends at the same Connecting LRP. The link must be either split or extended in accordance with Rules 1. to 3.

Rule 5. If the length of a Link (between two LRPs) is less than approximately 200 meters, then the Link is not to be considered a separate Link but to be included in the shorter of the Links either before or after. Each Link is given a serial number starting with 1, 2, 3 etc. from the beginning of the road and increasing in the direction (increasing chainage) of the road. A unique serial number is given to each Link within each Road.

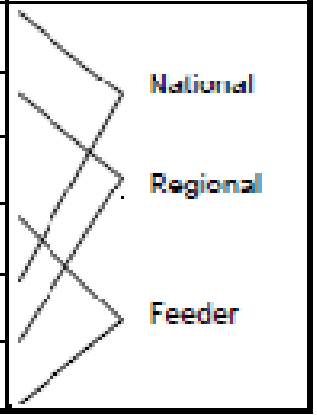
For example:

N1.1, N1.2, N1.3 etc

R101.1, R101.2, R101.3 etc

Category	Type	Description
1.	Heavy Truck	Three or more axles. Includes multi-axle tandem trubcks, container carriers and other articulated vehicles.
2.	Medium Truck	All 2-axle rigid trucks over three tonnes payload. Typical medium trucks are the Hindustan Bedford, "English" Bedford and Hino trucks of about 10 tonnes gross vehicle weight. Agricultural tractors and trailers are also included in this category.
3.	Light Truck	Small trucks up to 3 tonne payload. The most typical example is the Jeep based conversion.
4.	Large Bus	More than 40 seats on 36 foot or longer chassis. Includes double decker buses.
5.	Minibus	Between 16 and 39 seats. Typical minibuses are the TATA 909 and Hindustan Mascot.
6.	Microbus	Up to 16 seats. Typical microbuses are the 12/15 seat Toyota Hi-ace, and the Mitsubishi L300.
7.	Utility	Pick-ups, jeeps and four wheels drive vehicles, such as Pajero's and LandRover's.
8.	Car/Taxi	All types of car used either for personal or taxi services.
9.	Baby-taxi	Includes Babytaxi and Mishuks
10.	Tempo	Auto-Tempo and Auto-Vans.
11.	Motor Cycle	All two wheeled motorised vehicles.
12.	Bicycle	All pedal cycles.
13.	Rickshaw Standard	Three wheeled cycle rickshaws (not rickshaw vans)
14.	Rickshaw Van	Rickshaw vans
15.	Cart	All animal and manually drawn/pushed carts

	(typical MV AADT)	width	(no. of lanes)	shoulders	
1	4500 – 8500 (19,000–38,000)	36.2	2 x 11 (6)	1.8	
2	2100 - 4500 (7,000 – 19,000)	21.6	2 x 7.3 (4)	1.8	
3	1600 – 2100 (6,000 7,000)	16.3	7.3 (2)	1.5	
4	800 – 1600 (1,000 – 5,000)	12.1	6.2 (2)	1.5	
5	400 – 800 (500 – 1,000)	9.8	5.5 (2)	1.2	
6	<400 (<500)	9.8	3.7 (1)	1.2	



Notes
This is a summary table – refer to Section 4 before using these standards

Table 2.2 Typical Design Speeds

Design Type	Design Speed (km/h)		
	Plain	Rolling	Hilly
1 - 2	80 –100	80	-
3	00	65	50
4	65	50	40
5 - 6	50	40	30

Notes
Terrain: typical cross-slopes
Plain: 0 – 10%
Rolling: 11 – 25%
Hilly: >25%

Table 2.3 Speed Related Design Parameters

Design Speed (km/h)	Sight Distance (m)			Minimum Curvature Values	
	SSD	ISD	OSD	Horizontal curve (radius (m))	Vertical curve (K value)
Two lane roads					
30	30	60	120	35	2
40	45	90	180	65	4
50	60	120	250	120	9
65	90	180	360	250	18
80	120	250	500	500	35
100	180	360	720	1000	70
Singe lane roads					
30		60		120	4

SSD- stopping sight distance

ISD- Intersection sight distance

OSD- Overtaking sight distance

Road sector

Table 2.4
Passenger Car Unit (PCU) Values

Vehicle Type	PCU Value
Truck	3.0
Bus	3.0
Minibus	3.0
Utility	1.0
Car	1.0
Baby taxi	0.75
Motorcycle	0.75
Bicycle	0.5
Cycle Rickshaw	2.0
Bullock Cart	4.0

Table 2.5 Generalised Traffic Flow Characteristics

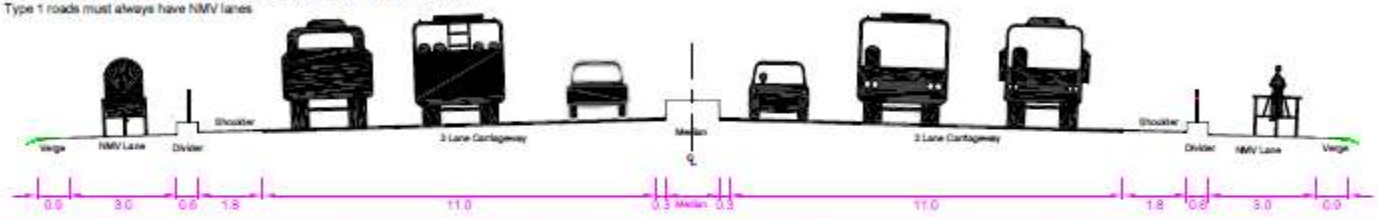
Road Classification	Peak hour flow as % of daily flow	No. of MVs as % of total PCU flow	NMV / MV ratio (PCU)
National	8	34	0.15
Regional	10	33	0.3
Feeder	10	13	2.5

Source: Tables 3.13 , 3.20, 3.22, derived from RMSS, Vol. V11A

ROADS AND HIGHWAYS DEPARTMENT
STANDARD CROSS SECTIONS FOR RHD ROADS

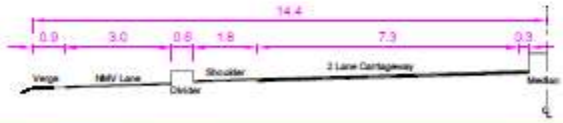
TYPE 1: DUAL 3 LANE CARRIAGEWAY WITH NMV LANES

Type 1 roads must always have NMV lanes

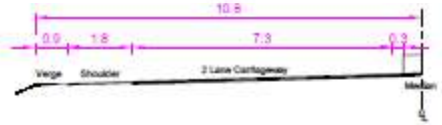


TYPE 2a: DUAL 2 LANE CARRIAGEWAY WITH NMV LANES

For use where there are many NMVs, such as through towns and villages

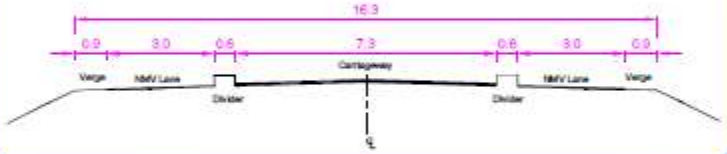


TYPE 2: DUAL 2 LANE CARRIAGEWAY



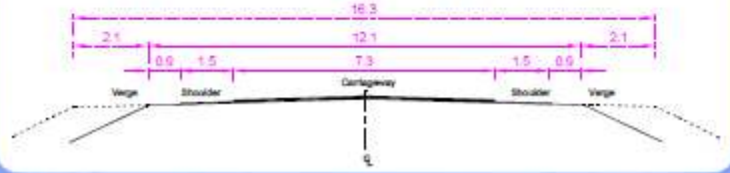
TYPE 3a: 7.3m CARRIAGEWAY WITH NMV LANES

For use where there are many NMVs, such as through towns and villages



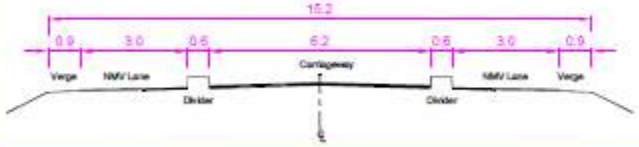
TYPE 3: 7.3m CARRIAGEWAY

If it is likely that NMV lanes will be needed in future the road should be built with a crest width of 16.3m.



TYPE 4a: 6.2m CARRIAGEWAY WITH NMV LANES

For use where there are many NMVs, such as through towns and villages



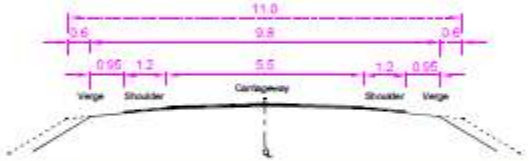
TYPE 4: 6.2m CARRIAGEWAY WITH 1.5m SHOULDERS

All new Type 4 roads to be provided with a crest width of 12.1m for later upgrading to Type 3

** When upgrading from Type 5 a verge of 0.9 meters width is permissible*

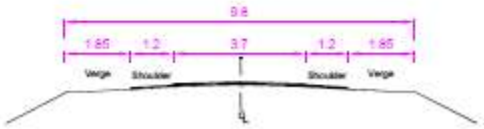
TYPE 5: 5.5m CARRIAGEWAY

If upgrading to Type 4 is likely to be needed in future the road should be built with a crest width of 11.0m



TYPE 6: 3.7m SINGLE LANE CARRIAGEWAY

All Type 6 roads to be provided with a crest width of 9.8m for later upgrading to Type 5



NOTES

General:

These RHD standard cross sections are to apply to all roads. Other cross-sections are only permissible in exceptional circumstances and with the written approval of the Chief Engineer.

The cross-sections for Design Types 3 - 6 may be provided with extra-wide embankments in order to enable the road to be easily upgraded as traffic volumes grow.

Crossfall of paved carriageway and shoulder should normally be 3 %. Crossfall of unpaved shoulder and verges should be 5 %.

Design Capacities:

This diagram forms part of the RHD Geometric Design Standards document. This document should be referred to for further information on Cross Sections and Geometric Designs.

Type 1:
Maximum capacity: 8500 PCU/hr
(NMV lane to be provided in all cases)

Type 2:
Maximum capacity: 4500 PCU/hr
(assumed NMVs are either prohibited or are less than 50 PCU/hr. If NMV PCU/hr exceeds 50 adopt the type 2a cross section).

Type 3:
Maximum capacity: 2100 PCU/hr
(assumed NMV/MV ratio of 0.2)
(Consider providing separate NMV lanes as in cross section 3a if the NMV PCU/hr exceeds 400)

Type 4:
Maximum capacity: 1600 PCU/hr
(assumed NMV/MV ratio of 0.14)
(Consider providing separate NMV lanes as in cross section 4a if the PCU/hr exceeds 400)

Type 5:
Maximum capacity: 800 PCU/hr
(NMVs will use carriageways and the shoulder)

Type 6:
Maximum capacity: 400 PCU/hr
(assumed NMV/MV ratio of 2.5)
(NMVs will use carriageways and the shoulder)

PCU Equivalent

The wide variety of vehicle types in use on Bangladesh roads make it appropriate to define traffic flow in terms of passenger car units (PCU) rather than vehicles. The PCU values are given below:

Vehicle Type	PCU Equivalent
Truck/Bus/Minibus	3.00
Car/Utility	1.00
Baby taxi/Motorcycle	0.75
Bicycle	0.50
Cycle Rickshaw	2.00
Bullock Cart	4.00

Estimating Design Year PCU:

dy = design year
g = yearly growth of motor vehicle (in percentage)

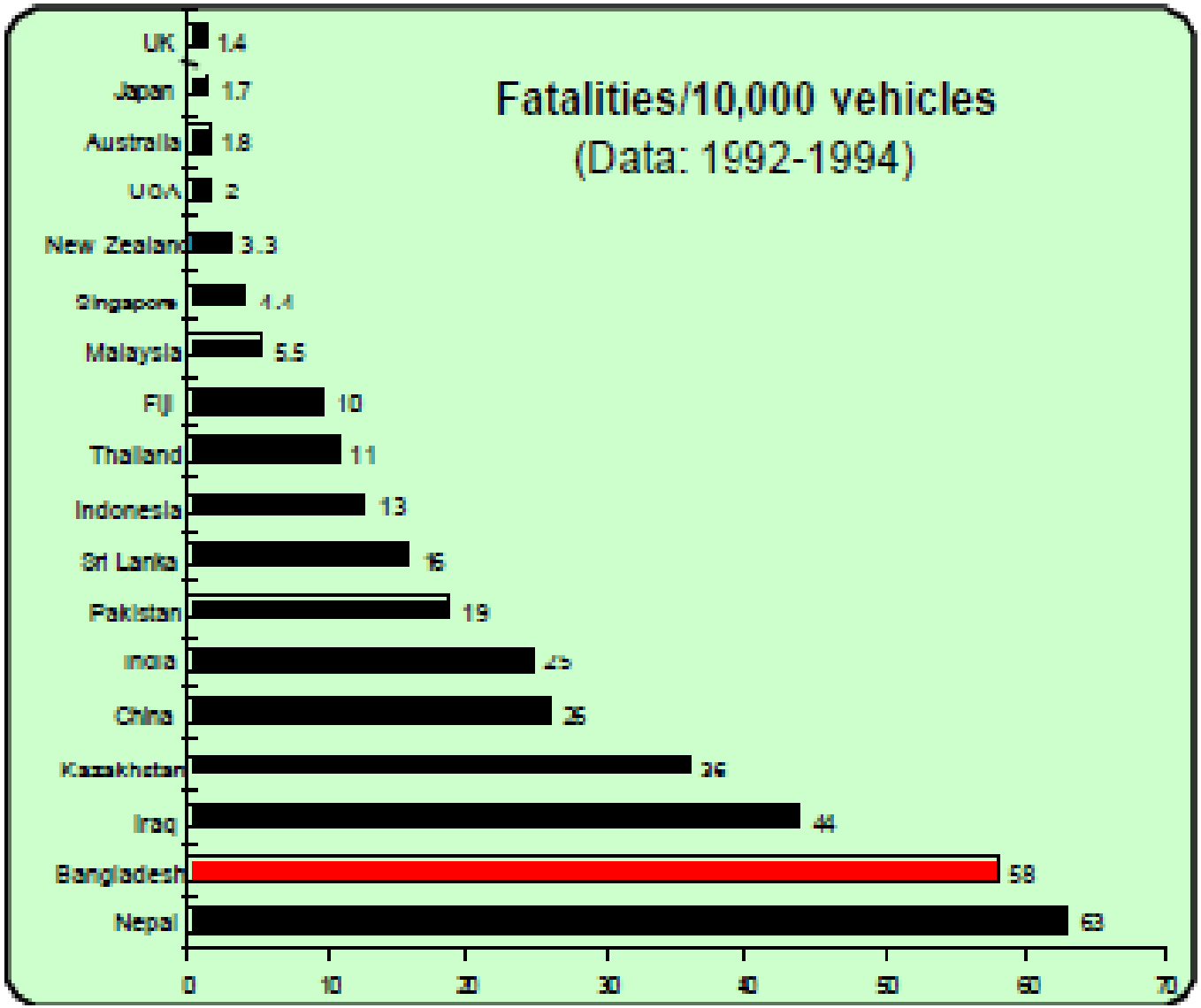
$PCU_{dy} = PCU_{present} \times (1+g/100)^{dy}$

For, dy= 10 years and g = 8 %

$PCU_{dy} = 2.16 \times PCU_{present}$

* PCU / hour is the peak hour PCU / hr (total of both directions) in the design year (dy)

Road sector


Fatalities/10,000 vehicles
(Data: 1992-1994)
UK 1.4
Japan 1.7
Australia 1.8
USA 2
New Zealand 3.3
Singapore 4.4
Malaysia 5.5
Fiji 10
Thailand 11
Indonesia 13
Sri Lanka 16
Pakistan 19
India 25
China 26
Kazakhstan 36
Iraq 44
Bangladesh 58
Nepal 63
0 10 20 30 40 50 60 70

Road sector: LGED

Table 11.2: Programmes of LGED for Infrastructure Development

Activities	Cumulative June-2001	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	Cumulative figure up to June '07
Dirt Road (km)	36459	4555	4770	6252	6040	6573	42	64691
Paved Road (km)	19855	3255	3829	4804	5237	5872	5086	47938
Bridge/Culvert (m)	288531	50882	42937	49405	60908	39728	40067	572458

Source: LGED.

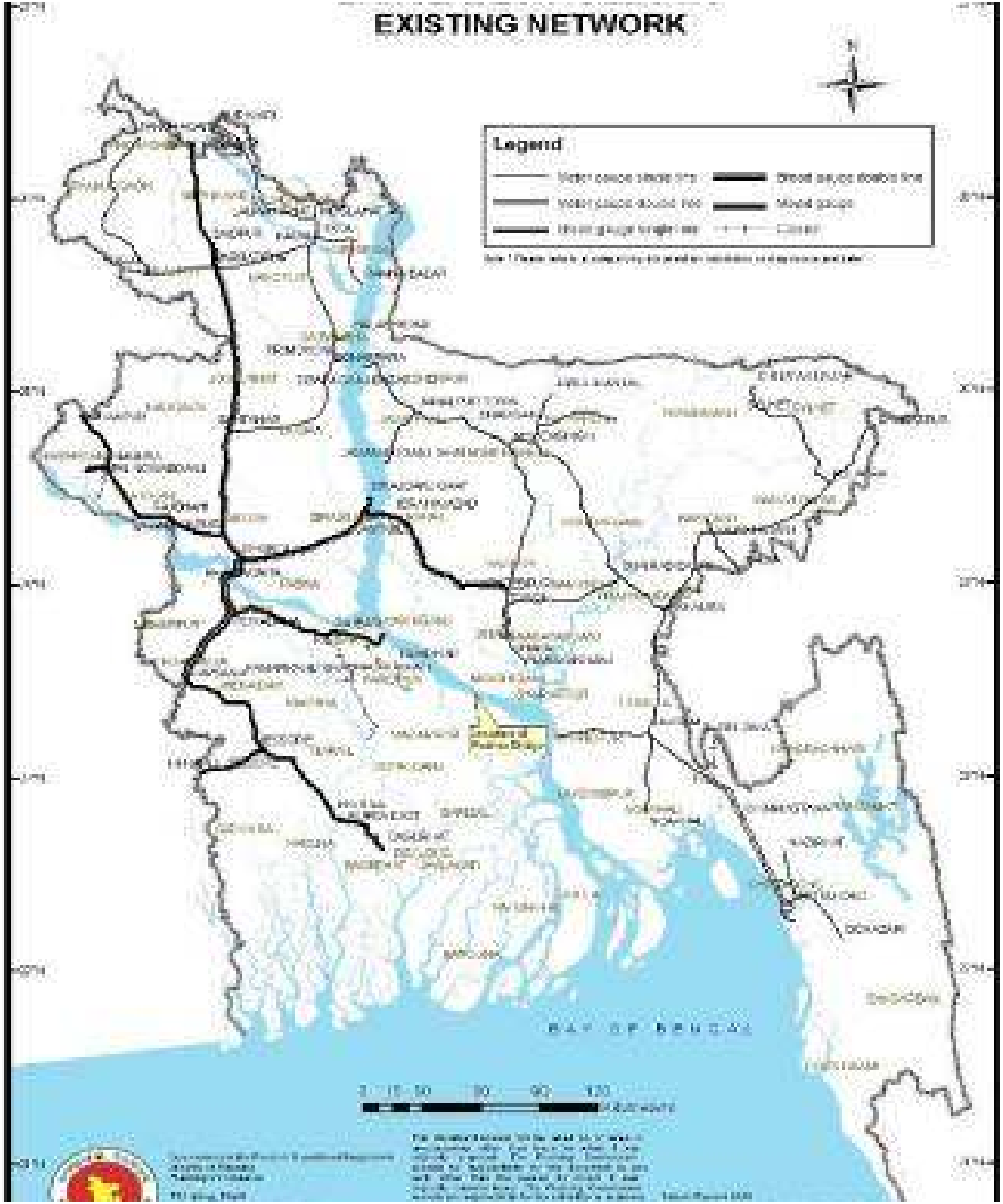
Bangladesh railway

Table 11.4: Overall Activities of Bangladesh Railway

Fiscal Year	Passenger traffic km (million)	Freight traffic km (million)	Revenue earnings (crore Tk)	Revenue expense (crore Tk)
1995-96	3333.25	689.02	284.09	401.59
1996-97	3753.61	782.43	330.64	414.17
1997-98	3855.50	803.85	350.91	433.36
1998-99	3678.00	896.40	374.27	461.15
1999-00	3940.69	777.10	341.49	469.86
2000-01	4209.00	907.88	366.39	523.87
2001-02	3972.00	951.82	388.40	535.48
2002-03	4024.20	951.99	420.10	586.71
2003-04	4341.50	895.50	394.17	639.41
2004-05	4164.13	816.80	445.62	695.09
2005-06	4387.45	728.57	444.27	814.73
2006-07	4597.68	761.47	444.94	754.91

Source: Bangladesh Railway, Ministry of Communication.

*PSO and welfare grants are included.


EXISTING NETWORK
Legend
BAY OF BENGAL

Bangladesh railway

Table 2-1 : Bangladesh Railway Routes Network in kilometre

Item	East Zone			West Zone			
	Metre Gauge	Dual Gauge	Total	Metre Gauge	Broad Gauge	Dual Gauge	Total
Route under operation	1283.04	83.60	1366.64	501.64	507.10	280.55	1289.29
Closure of route	24.14	-	24.14	29.51	175.09	-	204.60
Total route	1307.18	83.60	1390.78	531.15	682.19	280.55	1493.89

Item	Metre Gauge	Broad Gauge	Dual Gauge	Total
Route under operation	1,784.68	507.10	364.15	2,655.93
Closure of route	53.65	175.09	0	228.74
Total route	1,838.33	682.19	364.15	2,884.67

Bangladesh railway

Sector/Business	Potential	Constraints	Opportunities
Containers	• Massive growth through Chittagong • Ideal for rail transport • Rail only carrying 10% of market, but potential exists to carry higher share	• Capacity of Dhaka ICD almost reached • Line capacity on Dhaka-Bhairab, and Lakhsam-Chinkiastan limits container trains to 2 per day each way • Distance relatively short compared to international standards • No rail connection to Mongla port	• New ICD at Dhirasram could increase capacity • Tongi-Bhairab dual track by 2010; and • Lakhsam-Chinkiastan dual track by 2011 will open up opportunities • Railway can take up to 25% of market • Could remove 500 trucks (carrying container goods) per day from roads • New ICD in North-West Bangladesh could be set up
Other Freight	• Petroleum products • Stone/sand non-perishables • Food grain • Fertiliser	• Relatively short haul distances • Lack of infrastructure facilities at transfer points • Poor marketing initiative to capture traffic	• Improved handling • Competitive tariffs • Removal of trucks from road
Commuter Services	• Massive public transport market in Dhaka and other large cities	• Lack of network and track capacity • No institutional experience in railway mass movement	• Very little opportunity for BR to capture this traffic, better coped by new institution
Inter-city services	• Longer-distance travel suited to railway (average trip length on main corridors 173 km)	• Relatively low value of time, so may not pay much more for faster service • Poor quality	• Long trip lengths provide opportunities to capture high end of market • Current low use of AC and 1st class

Bangladesh railway

An analysis of railway traffic, the commodity carried, their volume and origin-destination revealed that most passenger and freight movement takes place on a limited number of key corridors. In order to enable BR to carry the anticipated traffic in the future, the Railway Master Plan focussed its attention on the major corridors where almost 90% of all traffic movement takes place. These eight major corridors are:

Corridor 1: Dhaka – Chittagong –- Cox's Bazar
Corridor 2: Chilahati – Khulna – Mongla
Corridor 3: Dhaka – Darsana/Benapole
Corridor 4: Dhaka – JMB – Rajshahi – Rohanpur
Corridor 5: Dhaka – Sylhet/Shahbazpur
Corridor 6A: Dhaka – JMB – Ishwardi – Chilahati
6B: Dhaka – JMB – Sirajganj/Roypur – Burimari
Corridor 7A: Dhaka – Mawa – Khulna – Mongla
7B: Dhaka – Mawa – Jesore – Benapole
Corridor 8: Dhaka – Mymensingh – Jamalpur – Tarakandi- JMB

water sector: Players

Chittagong Port Authority (CPA)

Mongla Port Authority (MPA)

Bangladesh Shipping Corporation (BSC)

Bangladesh Inland Water Transport Corporation (BIWTC)

Department of Shipping

Bangladesh Inland Water Transport Corporation (BIWTC)

Historically, Bangladesh was used to utilizing its vast network of rivers for communication purpose. A number of river ports had been evolved over the years. Important ones are Dhaka, Narayanganj, Barisal, Chandpur, Akhaura, etc. In past, navigable river route was about 9000km which has been dried out to about 3500km in recent times mainly due to various river water diversion measures undertaken by India in recent time.

Major cities like Dhaka, Chittagong, Khulna, Narayanganj and Barisal are connected by water transport network. Due to inadequate investment over the years this mode lost its image through poorer service design and lack of proper infrastructure. Modernization of infrastructure such as inland freight and passenger terminals and use of IT can improve the image and efficiency of the sector. Integration of road and rail with this mode can be very useful in improving overall transport sector efficiency.

Air Sector

Air Transport

Civil Aviation Authority of Bangladesh(CAAB)

It is now maintaining 3 international airports and 5 domestic airports. Apart from this, 1 domestic airport and 5 STOL ports have been built for the convenience of airlines. Out of the 14 operative and 13 non-operative airports and STOL ports

Biman Bangladesh Airlines Limited

Other Private Airlines