Introduction

Mobility is a basic human need. Transportation plays a major role in the development of the human civilization.

Strong correlation between the evolution of human settlement and the proximity of transport facilities as well as between the **quality of transport facilities and standard of living**. **material.**

Transportation solution must be analytically based, economically sound, socially credible, environmentally sensitive, practically acceptable and sustainable.

Transportation solution should be safe, rapid, comfortable, convenient, economical, and ecofriendly for both men and material.

Disciplines of Transportation

1. **Transportation Planning**
2. **Geometric Design**
3. **Pavement Design**
4. **Traffic Engineering**
5. **Public transportation**
6. **Financial and economic analysis**
7. **Environmental impact assessment**
8. **Accident analysis and reduction**
9. **Intelligent transport system**

In addition, disciplines specific to various modes are railway engineering, port and harbor engineering, and airport engineering.

Factors affecting transportation

- Primary elements, namely the **vehicles, the roadways, and the road users.**
- **Their characteristics affect the performance of the transportation system** and the transportation engineer should have fairly good understanding about them.
- These factors greatly **influence the geometric design as well as design of control facilities.**
- Variant nature of the **driver, vehicle, and roadway** characteristics should be given importance **for the smooth, safe, and efficient performance of traffic in the road.**

Factors affecting transportation

Human Factors

- Variability
- Critical characteristics
- Reaction time
- Visual acuity and driving
- Walking
- Other Characteristics

Vehicle Factors

- Design vehicles
- Vehicle dimensions
- Weight, axle configuration etc.
- Turning radius and turning path
- Visibility
- Acceleration characteristics
- Braking performance

Road factors

- Road surface
- Lighting
- Roughness
- Pavement colors
- Night visibility
- Geometric aspects

TRANSPORTATION PLANNING

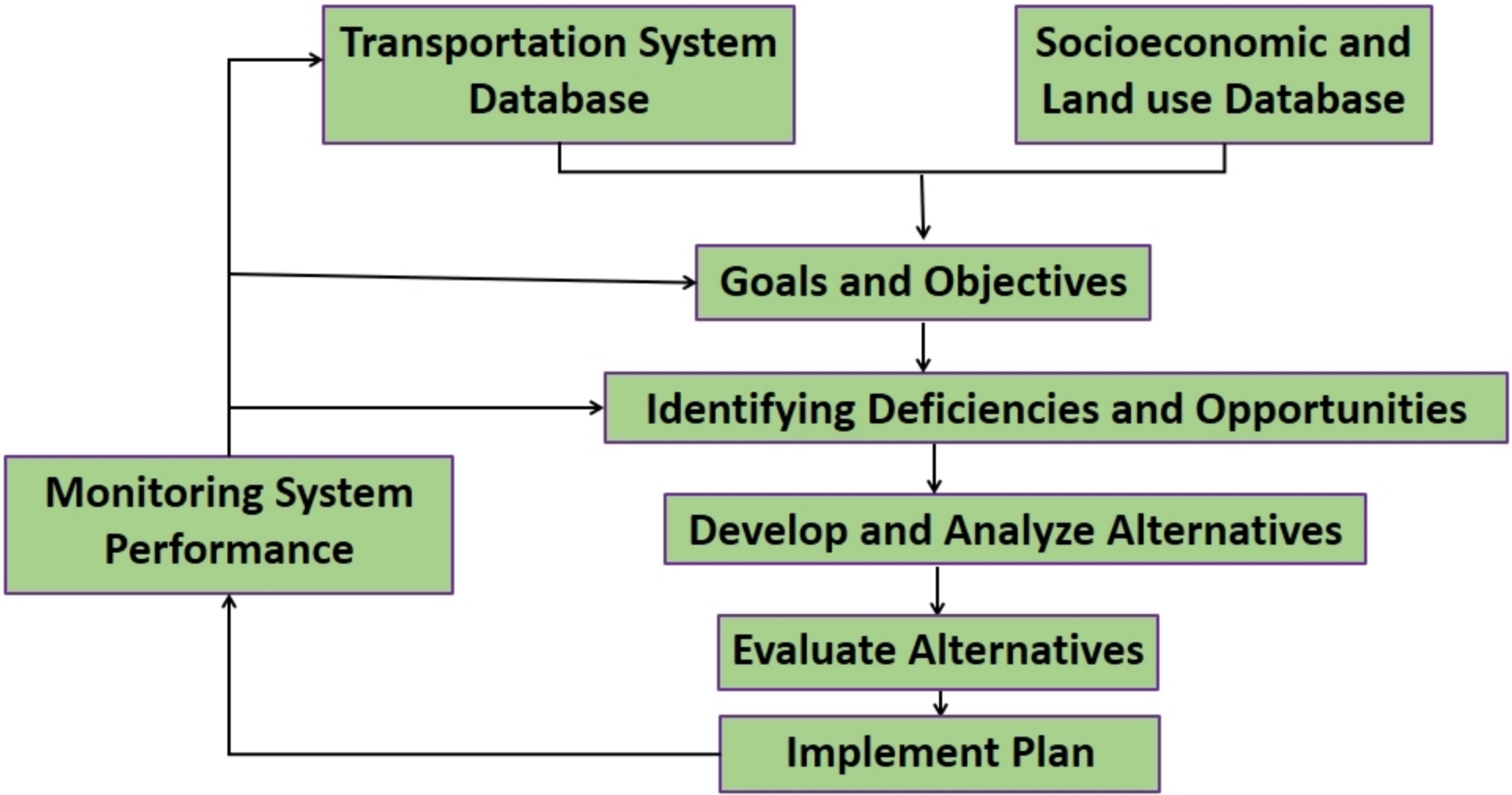
Transportation planning is a process.

It consists of well defined tasks that must be accomplished before the final set of information is presented to those who must decide which course of action is best for an agency, region or community.

It may occur at different level of application

It is a process of producing information that can be used by decision makers to better understand the consequences of different course of action

Basic Elements of Transportation Planning



Tasks for Identifying and Assessing Consequence

- Collect and maintain transportation system data
- Collect and maintain socioeconomic and land use data
- Define goals and objectives
- Identify system deficiencies or Opportunities
- Develop and Analyze alternatives
- Evaluate alternatives
- Implement plan
- Monitor system performance

Basic Concepts in Transportation Systems Modeling

1. Trip making is a function of land use
2. Trips are made for different purposes
3. Trips are made at different times of the day
4. Travelers often have different options available to them
5. Trips are made to min the level of inconvenience associated with reaching a destination
6. Transportation networks and traffic analysis zones are the basis of system modeling

Transportation Systems Modeling

Reliable Forecast of Travel Demands

Transportation planning is concerned with future travel demand and putting in place the facilities and services that will accommodate these demands.

The challenge to transportation planners is to make reliable forecast of travel demands.

Ref: Highways, Volume 1: Traffic Planning and Engineering (3rd Ed), Page 143

Recognized components of future travel demands are:

1. Existing Traffic – to be improved
2. Normal traffic growth – anticipated growth of pop and land use
3. Diverted traffic – new shift from nearby facilities
4. Converted traffic-change of mode
5. Change of destination traffic – different destination
6. Development traffic – due ti improvement of adjacent land
7. Induced traffic – new trip due to improved transportation

Social and Environmental Consequences of Highways

Noise Attenuation

- By providing a Buffer Zone
- By modifying the horizontal or vertical alignment
- By providing a noise shield

General Principle of Noise Barrier Design

1. Should be high enough and long enough
2. Should be constructed so as to cast a big sound shadow
3. Should be constructed of a dense materials
4. Should have no air path through or under the barrier
5. Should be made as attractive as possible and blends into the forms of landscape

Air Pollution

- Vehicular emission are prime source
- CO, HC, NOx, SO_2, PM etc

Impacts on Wetlands

Highway Evaluation

Economic studies for highway purposes are done principally for one or more of the following reasons:

1. To determine feasibility of a project
2. To compare alternative locations
3. To evaluate various features of highway design
4. To determine priority of improvement
5. To allocate responsibility for the cost of highway improvement among various classes of highway users
6. To compare proposals for highway improvement with proposal for other public projects such as education

Costs of Highway Transportation

1. Highway investment costs
2. Highway maimtenance costs
3. Highway users costs: VOC, TTC, Accdt costs
4. Transit capital costs
5. Transit operating costs
6. Transit users costs

Benefits of Highway Transportation

1. Direct benefits-result from reduction in highway users cost.

   Decreased op cost, higher op speed, fewer delays, decreased accdt losses.

2. Indirect benefits- benefits to adjacent property and to the general public

   Easier access to market, school, recreational and social facilities

   Efficient fire and police protection

   Rapid postal delivery

   Decreased cost of commodities

   Improved national defense

   Improved disaster management

- The classification of highway into different operational system, functional classes or geometric types is necessary among engineers, adminstrators and general public.
- Different classification may be applied for different purposes in different rural and urban areas.

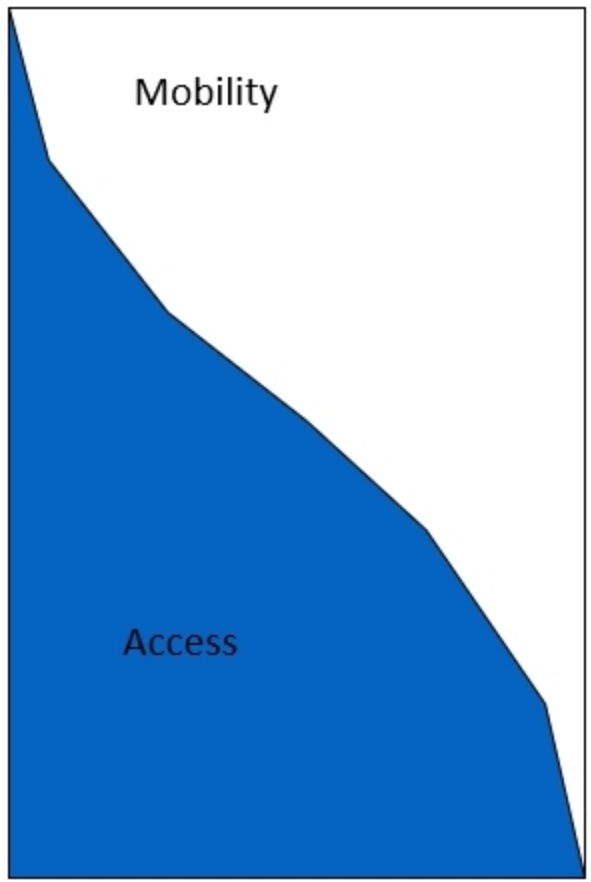
- **Design Types:** Freeways, highways, conventional streets
- **Route Numbering:** Interstate, US routes, State primary, State secondary, county, etc.
- **Administrative Classification:** State federal aid primary and secondary, state primary and secondary
- **Functional Classification:**
  - **Rural Roads**: Principal arterial, Minor arterial, Collector, Local road
  - **Urban Roads**: Principal arterial, Minor arterial street, Collector street, Local street

Main Highway Functions

Mobility = the ability to travel to many different destinations

Accessibility = the ability to gain entry to a particular site or area

The dominant function of arterial highways is mobility, while the principal function of local roads is to provide access to abutting property. Collector
roads provide more or less balanced service for both of these functions.



Arterials

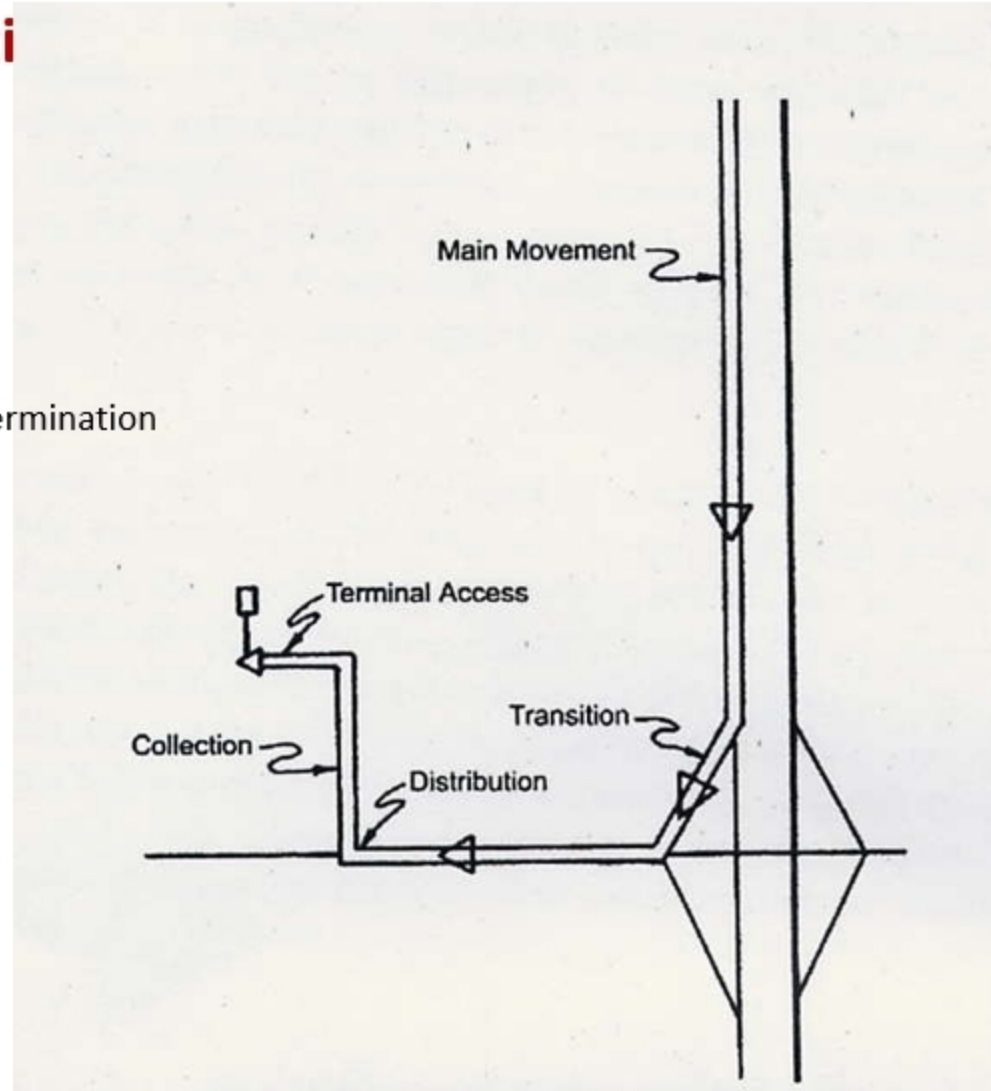
Collectors

Locals

The Concept of Functi

Hierarchies of Movements and Components: 6 stages

- Main movement,
- Transition,
- Distribution,
- Collection,
- Access, and
- Termination



Classification or Types of Roads

The roads are classified based on many factors as follows.

- Materials
- Location & function
- Traffic volume
- Width
- Economy
- Traffic type
- Rigidity
- Topography

Classification or Types of Roads: Based on Materials

1. Earthen roads
2. Gravel roads
3. Murrum roads
4. Kankar roads
5. WBM roads
6. Bituminous roads
7. Concrete roads

Classification Roads: Based on Location and Function

1. National highways
2. State highways
3. District roads
4. Rural roads or village roads

Based on Traffic Volume

1.Light traffic roads
2.Medium traffic roads
3.High traffic roads

Based on Economy

1.Low-cost roads
2.Medium cost roads
3.High-cost roads

Based on Traffic Type

1.Pedestrian ways
2.Cycle tracks
3.Motorways

Based on Rigidity

1.Flexible roads
2.Rigid roads

Road and Highway in Bagladesh

Roads and Highways Department

1. National highways (designated by a number preceded by "N"), Regional highways (R numbers) and
2. Zilla or district roads (Z numbers)

Local Government Engineering Department

1. Upazila Roads,
2. Union Roads, and
3. Village Roads

National Highway: major highways connecting the capital with different parts of the country and the port city

Regional and Zilla Highways: connecting smaller cities and towns, and rural areas.

Road network lengths		
Network	Length (km)	Length (mi)
National highways	3,790.861	2,355.532
Regional highways	4,206.121	2,613.562
Zilla roads	13,121.757	8,153.482
Upazila roads	37,800	23,500
Union roads	44,750	27,810
Village roads	215,750	134,060
Total	375,000	233,000

Expressways (operational)

Dhaka–Bhanga Expressway	55 km
Dhaka Elevated Expressway	19.84 km
Purbachal Expressway	13 km
Chittagong Elevated Expressway	16 km
Dhaka Bypass Expressway	48 km

Expressways (under construction

Dhaka–Ashulia Elevated Expressway	24 km
Bhanga–Benapole Expressway	129 km
Dhaka East-West Elevated Expressway	23 km
Hatirjheel–Demra Expressway	10 km

National Highway

Highway No.	Route	Length (km)	Length (mi)
N1	Dhaka (N8) - Katchpur (N2) - Madanpur (N105) - Mainamati (N102) - Cumilla (R140) - Feni (N104) - Chittagong (N106) - Manashertek (N107) - Satkania (N108) - Ramu (N109) - Cox's Bazar (N110) - Teknaf	455	283
N2	Katchpur (N1) - Bhulta (N105) - Sarail (N102) - Jagadishpur (N204) - Shaistaganj (N204) - Mirpur (N207) - Sherpur (N207) - Sylhet (N205, *N208) - Jaintiapur - Jaflong	286	178
N3	Dhaka — Progoti Sarani (N301) - Tongi (N302) - Joydebpur (N105, N4) - Mymensingh	112	70

National Highway

N4	Joydebpur (N3, R310) - Kadda (N105) - Tangail (N404) - Elenga (N405) - Madhupur (N401) - Jamalpur	146	91
N5	Dhaka - Mirpur Bridge (N501) - Nabinagar (R505) - Manikganj (R504) -Muljan - Uthali (N503) - (ferry) - Natakhola — Baderhat (N505, N513) - Kashinathpur (N6, N504) - Shahjanpur (N515) - Banani (N514) - Bogra western bypass: Jahangirabad (N502) - Tinmatha (N510) - Matidali (N514, N515) - Mordern More (N506) - Rangpur bypass (N517) - Saidpur bypass (N518) - Beldanga (N508) - Thakurgaon - Panchagarh - Tentulia — IND (Banglabandha)	507	315

National Highway

N6	Kashinathpur (N5, N504) - Pabna bypass (N604) - Gaspara (N604) - Dasuria (N704, N705) - Banpara (N507) - Harispur (N602) - Chawk Bidaynath (N602) - Belpukur (N603) - Rajshahi (R680)	150	93
N7	Daulatdia Ferryghat — Goalchamot (N803) - Magura (N704) - Arappur (N704) - Jhenaidah - Hamdah (N703) - Palbari (N707, N708) - Chanchra (N706) - Murail (N707) - Phultala (N709) - Khulna - (ferry) - Kudir Battala (N709) - Digraj	252	157
N8	Dhaka - Mawa Ferryghat (R812) - (ferry) - Bhanga (N804, N805) - Barisal (N809) - Patuakhali		

Regional Highway

R110	Jatrabari-Demra-Shimrail-Narayanganj (Chasara) Road
R111	Signboard at 6th km of N1Road-Narayanganj Road
R112	Narayanganj (Signboard)-Demra-Amulia-Rampura Road
R113	Madanpur-Madanganj-Sayedpur Road
R114	Nayapur-Araihazar-Narsingdi-Raipura Road
R120	Akhaura Town By-Pass Road
R140	Cumilla-Lalmai-Chandpur-Lakhmipur-Begumganj Road

Zilla Road

Z3002	Dhaka Cantonment V.V.I.P Terminal Road
Z5069	Turag-Ruhitpur-Baorvita Road
Z3003	Abdullahpur-Tairmukh-Ulukhola Road
Z3012	Uttara-Tairmukh Road
Z1090	Majerchar-Mahajampur-Barapa-Rupashi-Majina-Kayetpara Road
Z3004	Mirpur-Pallabi-Dhaur-Kadda Road