

Chapter I
**Introduction to transportation
Engineering**

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Definition

- Transportation is
 - All about moving goods and people from one place to another.
 - Safe, efficient, reliable, and sustainable movement of persons and goods over time and space.

Definition Cont...

- Transportation engineering
 - Focuses on the infrastructure of transportation
 - Design runways, build bridges, layout roads and plan docking facilities.
 - Look at traffic patterns, determine when new transport facilities are needed and come up with better ways
 - Application of technology and scientific principles to the planning, functional design, operation, and management of facilities

The characteristics of transportation system

- Multi-disciplinary
- Multi-sector
- Multi-problem
- Multi-objective
- Multi-modal

Elements of a transportation system

- ***Infrastructure***: which includes Road, canal, rail, air Transfer points Supporting elements (signs, signals, safety)
- ***Vehicles***: which includes Planes, trains, autos, buses, ships, trucks
- ***Operators/Content***: which includes Drivers, pilots, freight, passengers

History of transportation engineering

- Humans had migrated by their feet
- Use domesticated animals to carry goods
- Built machines and devices, like sleds and travois, to help them carry more.
- Establishing trading routes
- Well-used paths became more and more permanent.
- These paths became the first roads
- Maintain the roads and look at ways in which they could be made easier to travel
- The first transportation engineers.

History of transportation engineering

Cont...

- Four critical dimensions of change in transportation system
 - Change in values of the public
 - Changes in the technology
 - Change in operational policy
 - Change in the demand

Major disciplines of transportation

1. Transportation Planning:- Involves the development of a transport model
2. Geometric Design:- Deals with physical proportioning of other transportation facilities
 - Cross-sectional features,
 - Horizontal alignment,
 - Vertical alignment and
 - Intersections

Major disciplines of transportation

Cont...

3. **Pavement Design:-** Deals with the structural design of roads, both (bituminous and concrete)
 - Drainage design
 - Functional design
 - Structural design .
4. **Traffic Engineering:-** covers a broad range of engineering applications with a focus on
 - The safety of the public,
 - The efficient use of transportation resources, and
 - The mobility of people and goods.

Additional disciplines of transportation

1. *Public transportation*:- study of the transportation system that meets the travel need of several people by sharing a vehicle.
 - characteristics of various modes;
 - planning,
 - management and operations; and
 - policies for promoting public transportation.
2. *Financial and economic analysis*:- tries to quantify the economic benefit which includes saving in travel time, fuel consumption, etc.

Additional disciplines of transportation Cont...

- 3. Environmental impact assessment* :- attempts in quantifying the environmental impacts and tries to evolve strategies for the mitigation and reduction of the impact due to both construction and operation.
- 4. Accident analysis and reduction*:- looks at the causes of accidents, from the perspective of human, road, and vehicle and formulate plans for the reduction.
- 5. Intelligent transport system*:- offers better mobility, efficiency, and safety with the help of the state-of-the-art-technology.

Factors in Transportation Development

- *Economic Factors*
- *Geographical Factor*
- *Political Polices*
- *Military*
- *Technological Factor*
- *Urbanization*
- *Competition*



Role of transportation in society

➤ *Economic role of transportation:*

Transportation contributes two kinds of utilities: place and time utility

➤ *Social role of transportation*

- *Growth of Urban Centers*
- *Size and Pattern of Settlement*
- *Formation of settlements*

Role of transportation in society

Cont...

➤ *Environmental role of transportation*

- Safety
- Air Pollution
- Noise pollution
- Energy consumption

➤ *Other impacts*

- Aesthetics
- social life and social pattern

Modes of Transportation

- Means by which people and freight achieve mobility
 - *Road transportation*
 - *Intermodal transportation*
 - *Pipelines*
 - *Maritime transportation*
 - *Air transportation*
 - *Rail transportation*



Thank You!



AAiT

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Transport Engineering

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