

LECTURE NOTE
ON
TRANSPORTATION ENGINEERING (TH.2)
3RD SEMESTER IN CIVIL ENGG.



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UNIT-1

Role of Transportation in the development of nation:

- 1- Economic Role → Increased productivity of agriculture and industrial products and their distribution through efficient transportation system can lower the cost of products. It also increase the employment opportunities.
- 2- Social Role → Transportation system facilitates social interaction, movement for education/health/recreation/other social activities.
- 3- Spatial Development Role:- It facilitates area and infrastructure development for housing (industrial/educational and other activities).
- 4- Cultural Role → It enhances civilization, urbanization, education and enlightenment.
- 5- Political Role → It promotes national integration, supports defence of the country and helps to maintain law and order.
- 6- Environmental Role → It leads to environmental pollution (air, water and noise pollution, vibrations), fuel consumption, lack of safety to life, increased consumption of land, etc.
- 7- Others:- Transportation planning contributes to the aesthetics of the region. It also affects social life and pattern of a community. Planning and constructing new transport infrastructure requires relocation of residents.

Different Modes of Transportation:-

- 1- Land - Highways, railways, pipelines, conveyors, aerial ropeways.
- 2- Air - Airways
- 3- Water - Waterways like river ways, canal ways, ocean ways.

Merits and Demerits of Roadways and Railways :-

Roadways

- Merits →
- 1- Provides greater flexibility of travel
 - 2- Accommodates different classes of vehicles as well as pedestrians
 - 3- Provides door to door service for both passenger and freight movement.
 - 4- Acts as feeder system for other modes of transport.

- Demerits →
- 1- Consumes greater energy per passenger
 - 2- Rate of emissions of pollutants is higher than that of other modes of transport.
 - 3- Road transport is more prone to accidents compared to other modes.

Railways :-

- Merits →
- 1- Bulk movement on long hauls through railways is more economical, compared to road transport.
 - 2- It acts as a high-speed public transportation system for suburban-to-urban travel and intra-urban travel.
 - 3- Lesser amount of emissions per unit weight of goods to be transported in case of electrified track.

- Demerits →
- 1- To access intermediate parts and localities between stations, a feeder system is required.
 - 2- Less flexible as compared to roadways in terms of fixed time tables and routes.
 - 3- Construction and maintenance cost is more than roadways.

* Therefore, an integrated rail-cum-road network is essential for a developing country like India, to conserve energy and money.

Scope and Importance of Roads in India :-

1. Rural connectivity :- Since India is an agriculturally predominant country, connectivity to villages is essential for the economic and social uplift of the rural community, which can be accomplished only through a good system of road network.
2. Transportation in Hilly Areas :- A considerable portion of area covered in our country belongs to hilly or steep terrain, where the best feasible mode of transportation is roads for effective connectivity.
3. Strategic Importance :- The defense of the country at borders depends greatly on road system available.
4. Freight and Passenger traffic share :- Short & medium distance passenger/freight traffic is taken care of by road network.
5. Forestry & Marine Products Trade :- Trade & commerce related with forestry & marine products is facilitated through proper link roads penetrating the forests and also along the coast line.
6. Tourism Development :- Tourist centres can be well connected by proper road system.
7. Employment Potential :- Employment opportunities can be enhanced with the development road sector.
8. Famine and flood relief :- To relieve the hardships due to flood and famine, road system is highly beneficial.
9. Administrative convenience :- For administrative convenience and maintenance of law and order, a good road system is essential.

Characteristics of Road Transport :-

- 1- Wide geographical coverage provided by Roads.
- 2- Usage by wide variety of vehicles.
- 3- Low capital investment.
- 4- Quick and assured deliveries of articles are possible through road transport.
- 5- It offers flexibility of service, flexibility in timing of travel, flexibility of routes of travel.
- 6- Road transport offers door to door service from origin to destination.
- 7- It permits simpler packaging of goods,
- 8- It offers high employment opportunities.

Classification of Roads :-

1. Based on weather condition :-
 - a) All-weather roads -
 - b) Fair-weather roads
2. Based on Surfacing provided :-
 - a) Paved road (surfaced road)
 - b) Unpaved road (unsurfaced road)
3. Based on traffic volume :- Heavy / medium / Low volume roads
4. Based on tonnage : class I or II, or class A, B.
5. Based on location and function : (Generally used criterion)
As per Nagpur Road plan (1st Road Development Plan 1943-63)
 - a) National Highway (NH) (by MORT&H)
 - b) State Highway (SH)
 - c) Major District Roads (MDR)
 - d) Other District Roads (ODR)
 - e) Village Roads (VR)

Classification of Urban Roads :-

- (a) Expressways
- (b) Arterial Roads
- (c) Sub-arterial Roads
- (d) Collector streets
- (e) Local streets

Selection of Best Alignment of the Highway :-

- 1- Map study
- 2- Reconnaissance
- 3- Preliminary survey
- 4- Final location & Detailed survey

Factors affecting road alignment :-

- 1- Obligatory or control Points → The point through which the road should or should not pass
- 2- Traffic factors
- 3- Geometric Design Elements
- 4- Economic Factors
- 5- Other considerations - (Drainage, hydrological, Environmental, social and political, Monotony in driving)