Transportation Engineering

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Transportation Engineering

- Role of Transportation in National Development.
- Transportation Ways.
- Surface Transportation and Aviation.
- BOT Projects for Highways.
- BOOT Projects for Highways.
- Elements of Traffic Engineering and Traffic Control.

What Is Transportation Engineering?

- Transportation engineering is the application of the principles of engineering, planning, analysis, and design to the disciplines comprising transportation: its vehicles, its physical infrastructure, safety in travel, environmental impacts, and energy usage.

- It involves “hard” physical sciences and “soft” sciences

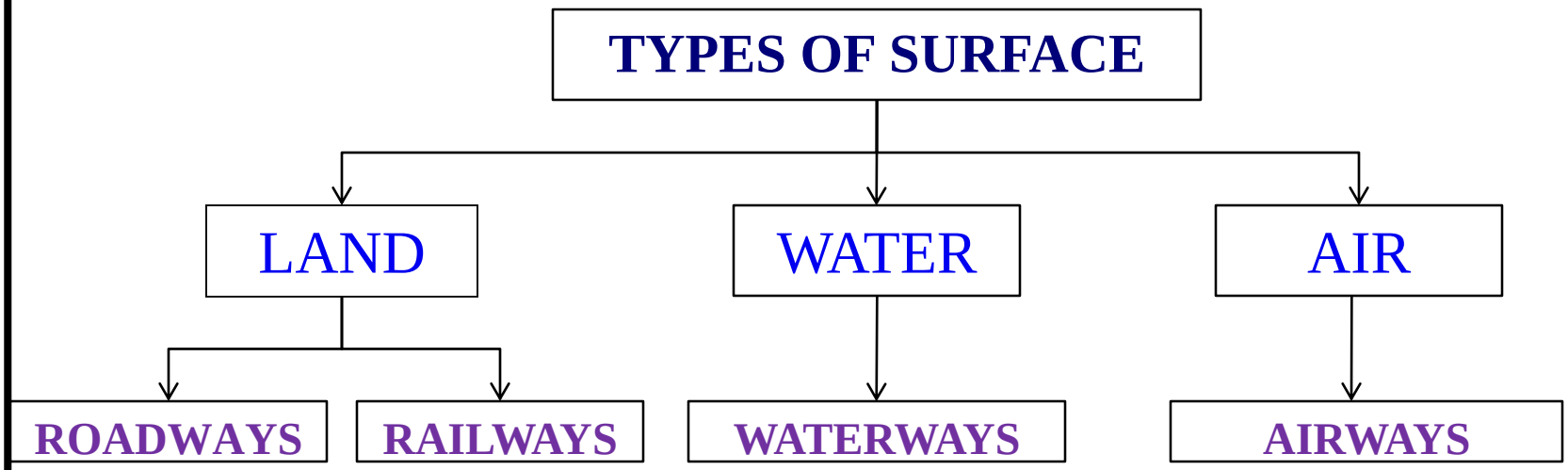
Role of Transportation in National Development

- Economic growth
- Place utility of goods
- Time utility of goods
- Preservation of quality of goods
- Mass production
- Exploitation of natural resources
- Urbanization
- Industrial development
- Agricultural development
- Costs of goods
- Defense and strategic needs
- Transport facilities and social activities

Transportation Ways

- Railways
  - Surface
  - Underground
  - Elevated
  - Light rail transit (LRT)
- Road Transport
- Air Transport
- Water Transport

Surface Transportation and Aviation



ROADWAYS

- **CLASSIFICATION OF ROADS**
  - NATIONAL HIGHWAY **(NH)**
  - STATE HIGHWAY **(SH)**
  - MAJOR DISTRICT ROAD **(MDR)**
  - OTHER DISTRICT ROAD **(ODR)**
  - VILLAGE ROAD **(VR)**

- **BASED ON CARRIAGE WAY**
  - PAVED ROADS
  - UNPAVED ROADS

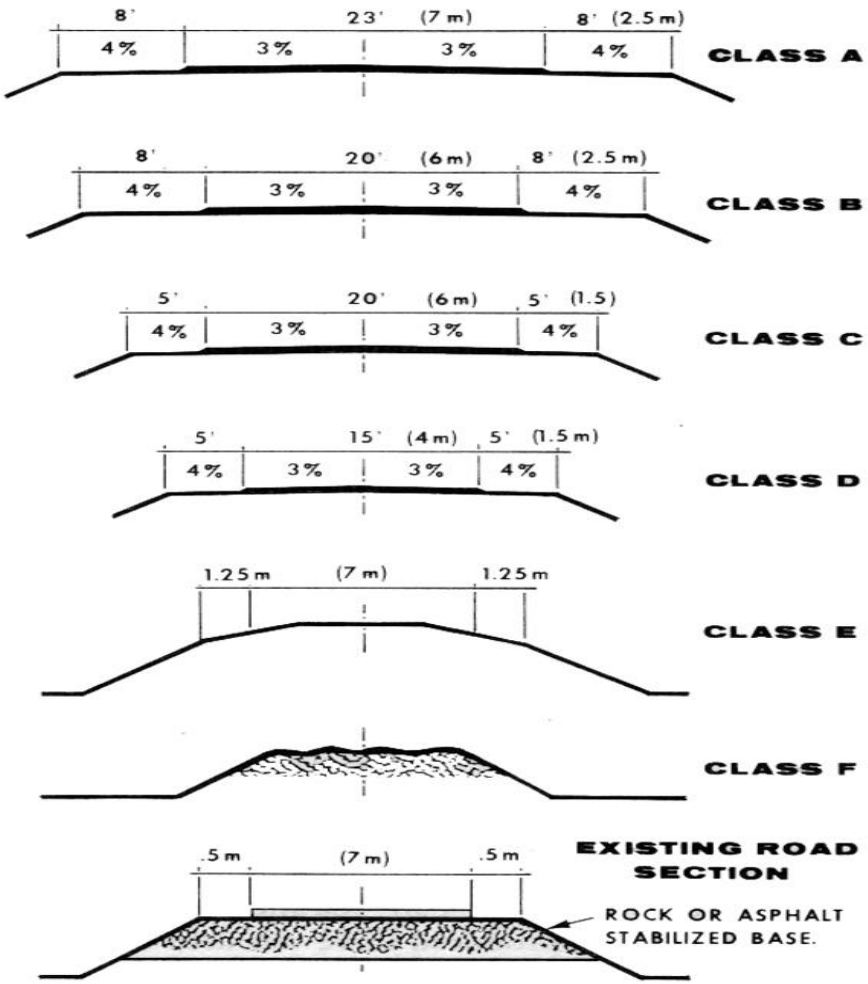
- **BASED ON PAVEMENT**
  - SURFACE ROADS
  - UNSURFACED ROADS

- **AS PER USABILITY**
  - ALL WEATHER ROADS
  - FAIR WEATHER ROADS

- **URBAN ROADS**
  - ARTERIAL ROADS
  - SUB-ARTERIAL ROADS
  - COLLECTOR STREETS
  - LOCAL STREETS

GEOMETRIC ELEMENTS OF A ROAD

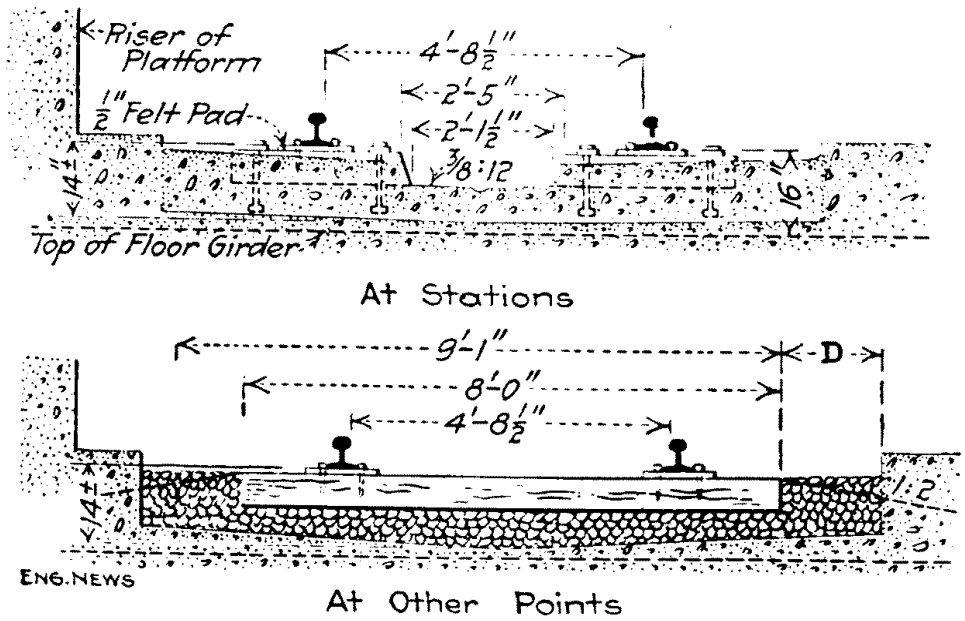
- CAMBER (CROSS SLOPE)
- CARRIAGEWAY WIDTH
- SHOULDER
- KERB
- WIDTH OF ROADWAY
- RIGHT OF WAY
- SLIGHT DISTANCE
- HORIZONTAL CURVE
- SUPERELEVATION
- GRADIENT
- VERTICAL CURVE
- ALIGNMENT



ADVANTAGES OF ROADWAYS	DISADVANTAGES OF ROADWAYS
✓ MAXIMUM FLEXIBILITY FOR TRAVEL	✓ GOODS CARRYING CAPACITY IS LOW
✓ IT PERMITS ANY MOAD OF ROAD VEHICAL	✓ SPEED IS LOW COMPARE TO AIR AND WATERWAY
✓ IT PROVIDES DOOR-TO-DOOR SERVICE	✓ LESS COMFORT AND SAFE
✓ IT SAVES TIME FOR SHORT DISTANCE	✓ UNECONOMICAL FOR LONG DISTANCE
✓ CONSTRUCTION AND MAINTAINANCE COST IS LOW	✓ NUMBER OF ROAD ACCIDENT IS HIGH

RAILWAYS

- **CATAGORIES OF RAILWAY**
  1. TRUCK ROUTES
  2. MAIN LINE
  3. BRANCH LINE
- **TYPES OF RAILWAY**
  1. SURFACE
  2. UNDERGROUND
  3. ELEVATED
- **TYPES OF LOCOMOTIVES**
  1. DIESEL
  2. ELECTRIC



- **TYPES OF GAUGE**
  1. BROAD GAUGE : 1.676 m
  2. METRE GAUGE : 1.0 m
  3. NARROW GAUGE : 0.762 m
- **TYPES OF RAIL**
  1. DOUBLE HEADED RAIL
  2. BULL HEADED RAIL
  3. FLAT-FOOTED RAIL
- **TYPES OF SLEEPER**
  1. WOODEN
  2. METAL
     - (i) CAST IRON
     - (ii) STEEL
  3. CONCRETE
     - (i) RAINFORCED CONCRETE
     - (ii) PRESRESSED CONCRETE

ADVANTAGES OF RAILWAYS	DISADVANTAGES OF RAILWAYS
✓ GOODS CARRYING CAPACITY IS HIGH	✓ IT IS NOT FLEXIBLE.
✓ SPEED IS HIGH COMPARE TO ROADWAYS	✓ IT DEPENDENT ON ROADWAY
✓ CHEAPER THEN AIRWAYS	✓ TRAIN RUNS AS PER SCHEDULES
✓ COMFORTABLE FOR LONG DISTANCE TRAVEL	✓ MAINTAINANCE COST IS HIGH
✓ IT INCRESES TRADE, COMMERS AND BUSINESS	✓ IT PERMITS DEFINITE MODE OF TRANSPORT

WATERWAYES

- **TYPES OF HARBOUR**
  - **1. NATURAL HARBOUR**
  - **2. SEMINATURAL HARBOUR**
  - **3. ARTIFICIAL HARBOUR**
- **TYPES OF PORTS**
  - **1. MAJOR**
  - **2. INTERMEDIATE**
  - **3. MINOR**
- **TYPES OF DOCKS**
  - **1. WET DOCK**
  - **2. DRY DOCK**

ADVANTAGES OF WATERWAYS	DISADVANTAGES OF WATERWAYS
✓ NO NEED OF CONSTRUTING TRACKS	✓ IT IS SLOW
✓ IT REQUIRES CHEAP MOTIVE POWER	✓ STROMS CAN CAUSE GREAT LOSS
✓ CHEAPEST MODE OF TRANSPORTATION	✓ IT IS USEFUL ALONG PARTICULAR ROUTES
✓ IT PROVIDES EFFICIENT MODE OF DEFENCE	✓ MAINTAINANCE COST IS HIGH
✓ IT HELPS IN GROWTH OF INDUSTRIES	✓ IT HAS LIMITED CONNECTIVITY

AIRWAYS

- **TYPES OF AIRPORTS**
  1. INTERNATIONAL AIRPORT
  2. DOMESTIC AIRPORT
  3. MILITARY AERODROMES
- **TYPES OF AIR FIELD**
  1. FLEXIBLE (BITUMINOUS)
  2. RIGID (CEMENT CONCRETE)

ADVANTAGES OF AIRWAYS	DISADVANTAGES OF AIRWAYS
✓ IT DOESNOT REQUIRE A TRACKS	✓ IT IS MOST EXPENSIVE
✓ IT IS USEFUL IN MILITARY ACTIVITIES	✓ CONSTRUCTION COST IS HIGH FOR AIRPORTS AND AIRCRAFTS
✓ FASTEST MODE OF TRANSPORTATION	✓ FUEL CONSUMPTION IS HIGH
✓ IT IS A POWERFUL MEAN OF ATTACK	✓ MAINTAINANCE COST IS HIGH FOR AIRCRAFTS
✓ IT HELPS IN AERIAL PHOTOGRAPHY	✓ ACCIDENT CAUSES HIGH LOSS

BOT Projects for Highways

- BOT = BUIL-OPERATE-TRANSFER
  - TOLL BASED
  - ANNUITY BASED

BOOT Projects for Highways

- BOOT = BUILD-OWN-OPRATE-TRANSFER

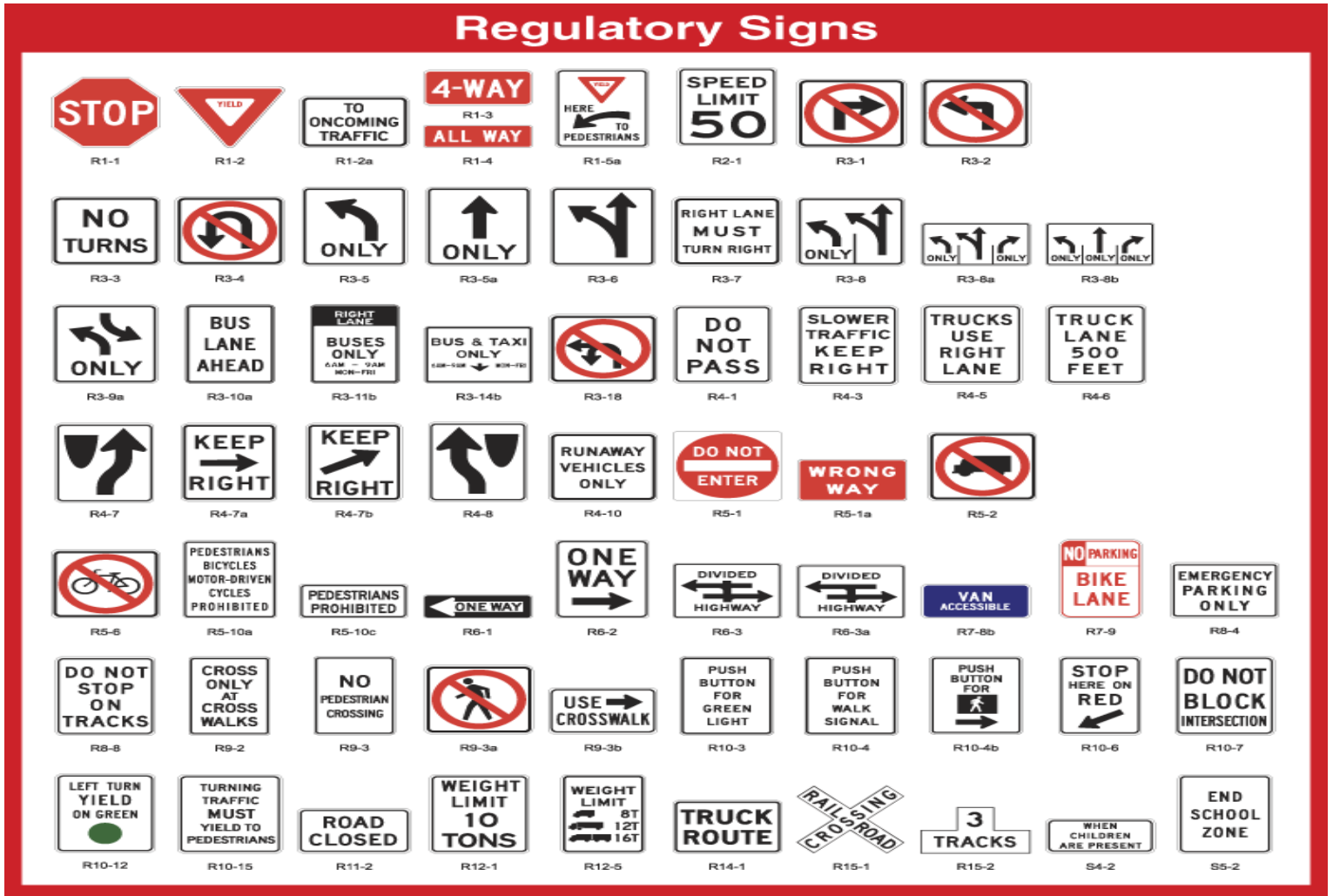
ADVANTAGES OF BOT	DISADVANTAGES OF BOT
✓ GOODS QUALITY OF ROAD IS MAINTAINED	✓ ROAD USERS HAVE TO PAY TOLL
✓ CONSTRUCTION PERIOD IS LESS	✓ PUMPS AND RESTPLACE ARE LOCATED AT FIX DISTINATION
✓ THERE IS NO CONGESTION	✓ NO PARKING AREA
✓ TRAVEL TIME IS LESS	✓ CONSTRUCTION COST IS HIGH
✓ COLLISION WITH OTHER TRAFFIC IS LESS	✓ PVT. COMPANY MAY NOT MAINTAIN ROAD IN FUTURE

ADVANTAGES OF BOOT	DISADVANTAGES OF BOOT
✓ RISK IS SHARED WITH PRIVATE SECTOR	✓ IT CAN BE TRANSFERRED TO PUBLIC SECTOR DURING CONST RUCTION
✓ IT MAXIMIZE CAPITAL COST ALLOWANCE	✓ PUBLIC SECTOR LOSES CONSTRYCTION OVER CAPITAL CONSTRUCTION
✓ COST SAVING AS PER THE COMPANY	✓ PRIVATE SECTOR CAN DETERMINE THE TOLL TAX
✓ IT ENSURES BEST FACILITY	✓ LESS PUBLIC CONTORL COMPARED TO **BOT** PROJECTS
✓ ALL "START-UP" PROBLEMS ARE ADDRESSED BY PVT. CO.	✓ THERE IS DIFFICULTY IN REPLACING PRIVATE SECTOR PARTNERS

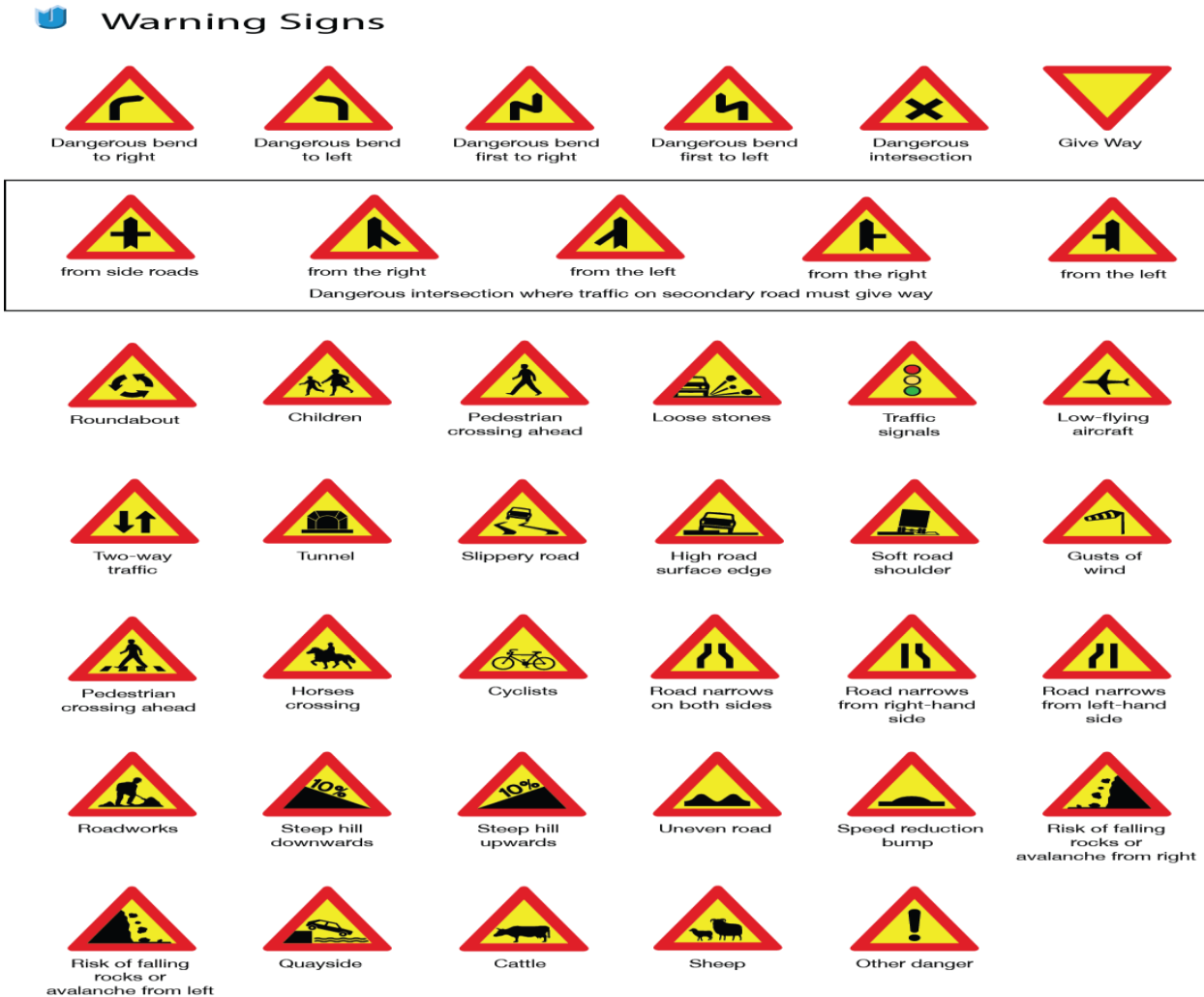
Elements of Traffic Engineering and Traffic Control

- **TRAFIC SURVEY**
  1. TRAFFIC VOLUME STUDY
  2. SPOT SPEED SURVEY
  3. SPEED AND DELAY STUDY
  4. ORIGIN AND DESTINATION (O-D) SURVEY
  5. TRAFFIC FLOW STUDY
  6. TRAFFIC VAPACITY STUDY
  7. PARKING SURVEY
  8. ACCIDENT SURVEY

TRAFFIC REGULATORY SIGNS

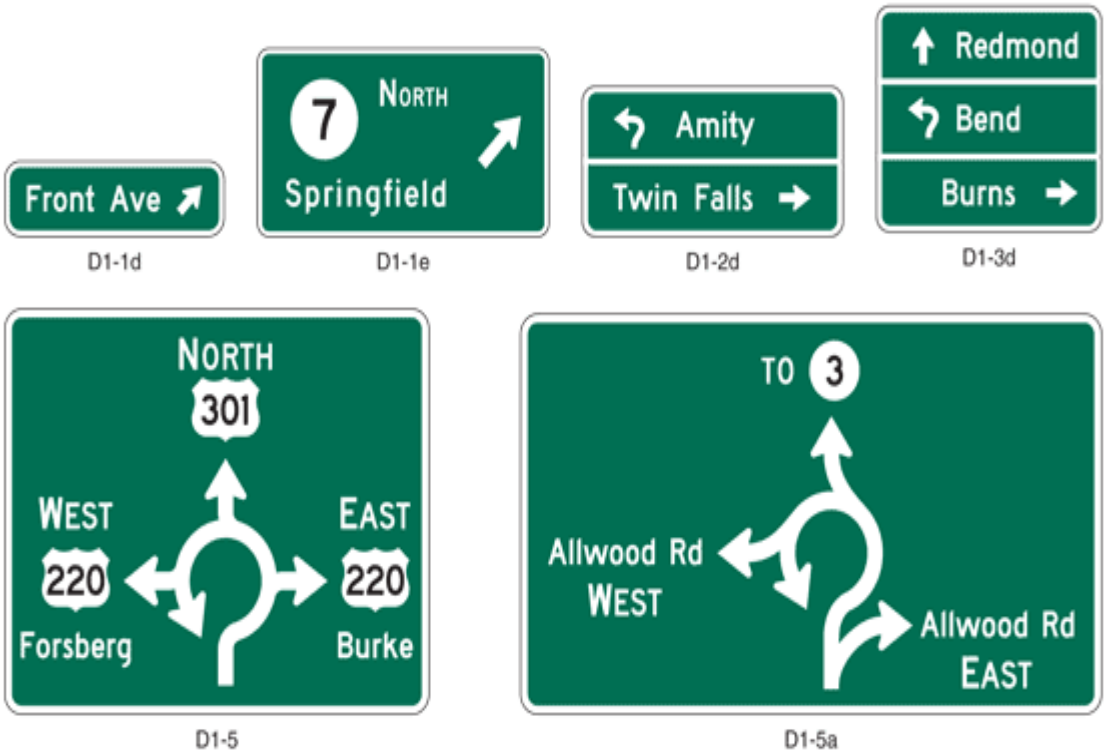


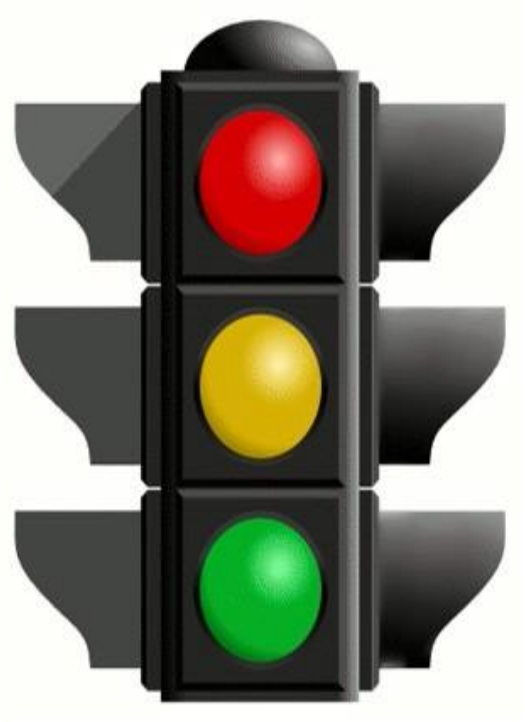
TRAFFIC WARNING SIGNS



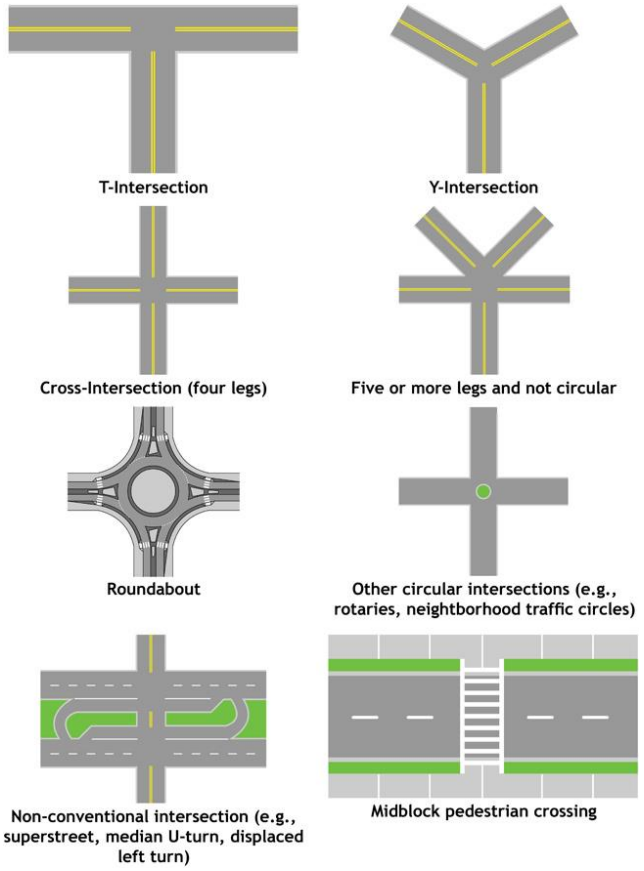
DESTINATION SIGNS AND SIGNAL

Figure 2D-8. Destination Signs for Roundabouts



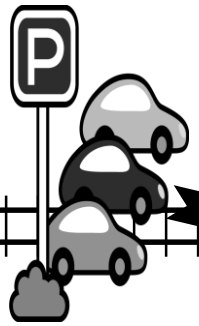


TRAFFIC INTERSECTION SIGNS

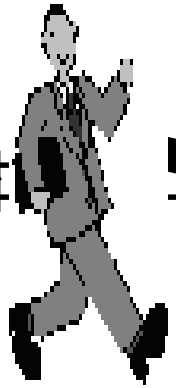


Questions…

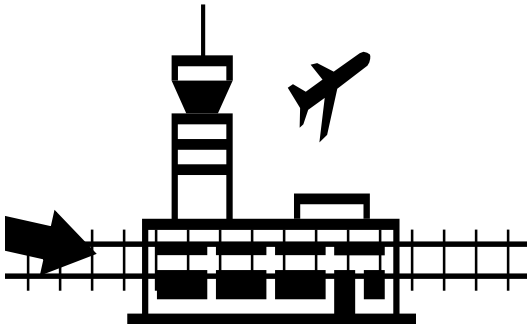
Transit or Taxi



Stop

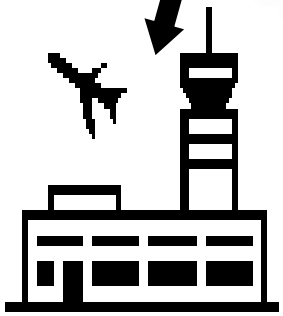


Walking



Airport Departure

Airplane



Airport Arrival

Walking

Bus Stop

Bus to Hotel

Hotel

Home Origin

Destination

Automobile


Thank You