Introduction to Urban Transportation Planning

Definitions

Planning: The process of working out, beforehand, scheme, program, or method for the accomplishment of an objective.

Urban Transportation Planning

1. Understand how decisions to build transportation facilities are made.
2. Understand basic elements of the transportation planning process.
3. Understand basic elements of travel forecasting

Common Types of Urban Land Uses

Urban land uses classified as:

1. Residential.
2. Commercial. → ex. Shopping centers
3. Industrial.
4. Institutional. → ex. Educational, governmental
5. Recreational.
6. Agricultural.

} *change with times*

A set of alternative transport plan is then generated for that horizon year . These plans incorporate varying nature and amount of transport facilities. The operating characteristics of each alternative in the horizon year are then estimated in the form of flows on each link of the horizon-year networks.

The usual criterion for choice among the alternatives is that the difference between the collective benefits to users (in the form of reduced travel impedance) and the money costs of constructing and maintaining these facilities should be a maximum.

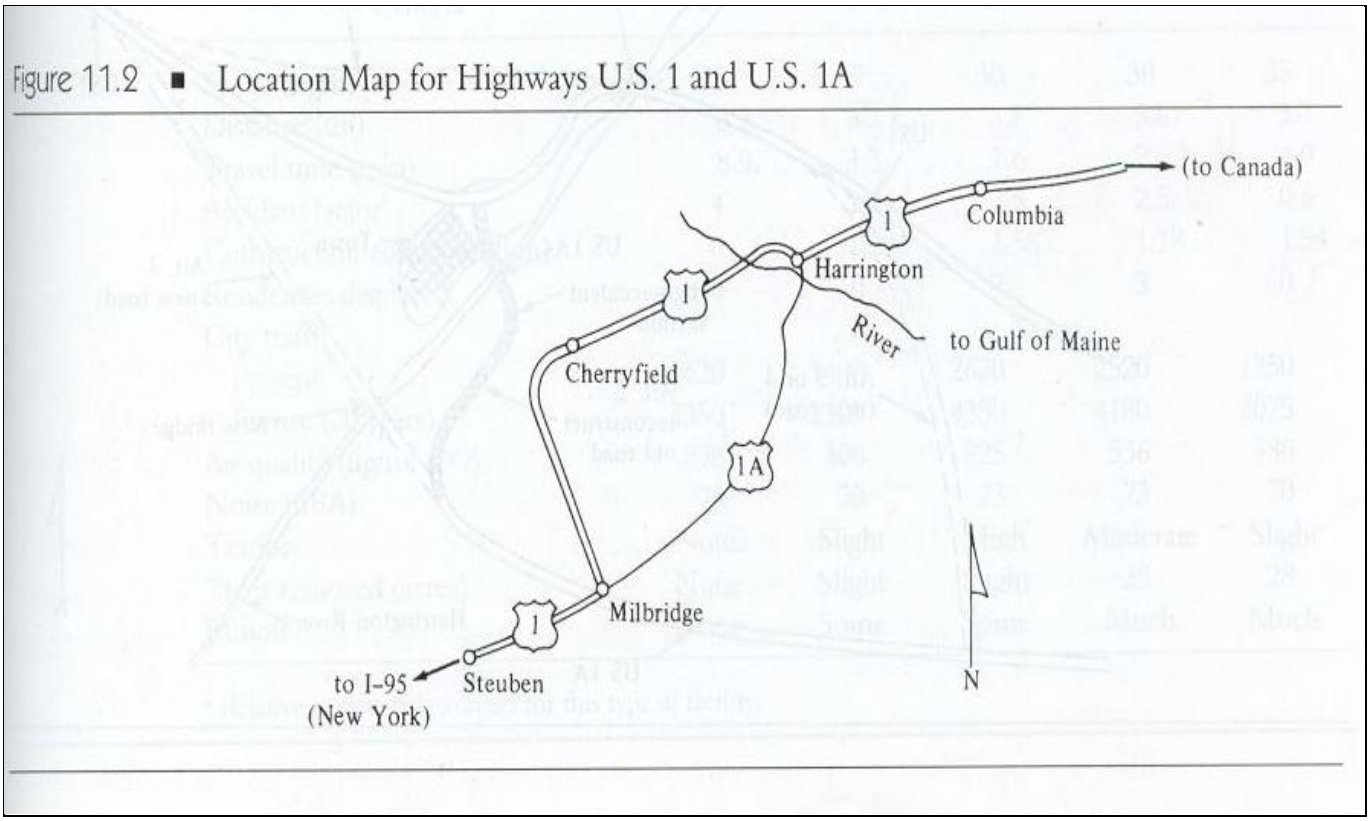
Basic Elements of Transportation Planning

Situation definition	Inventory transportation facilities, Measure travel patterns, Review prior studies.
Problem definition	Define objectives (e.g., Reduce travel time), Establish criteria (e.g., Average delay time), Define constraints, Establish design standards.
Search for solutions	Consider options (e.g., locations and types, structure needs, environmental considerations).
Analysis of performance	For each option, determine cost, traffic flow, impacts.
Evaluation of alternatives	Determine values for the criteria set for evaluation. (e.g., benefits vs. cost, cost-effectiveness, etc)
Choice of project	Consider factors involved (e.g., goal attainability, political judgment, environmental impact, etc.).
Specification and construction	Once an alternative is chosen, design necessary elements of the facility and create construction plans.

Example 1: Planning the relocation of a rural road (simple, yet good enough to explain the steps…)

Step 1: Situation definition:

- to understand the situation that gave rise to the perceived need for a transportation improvement



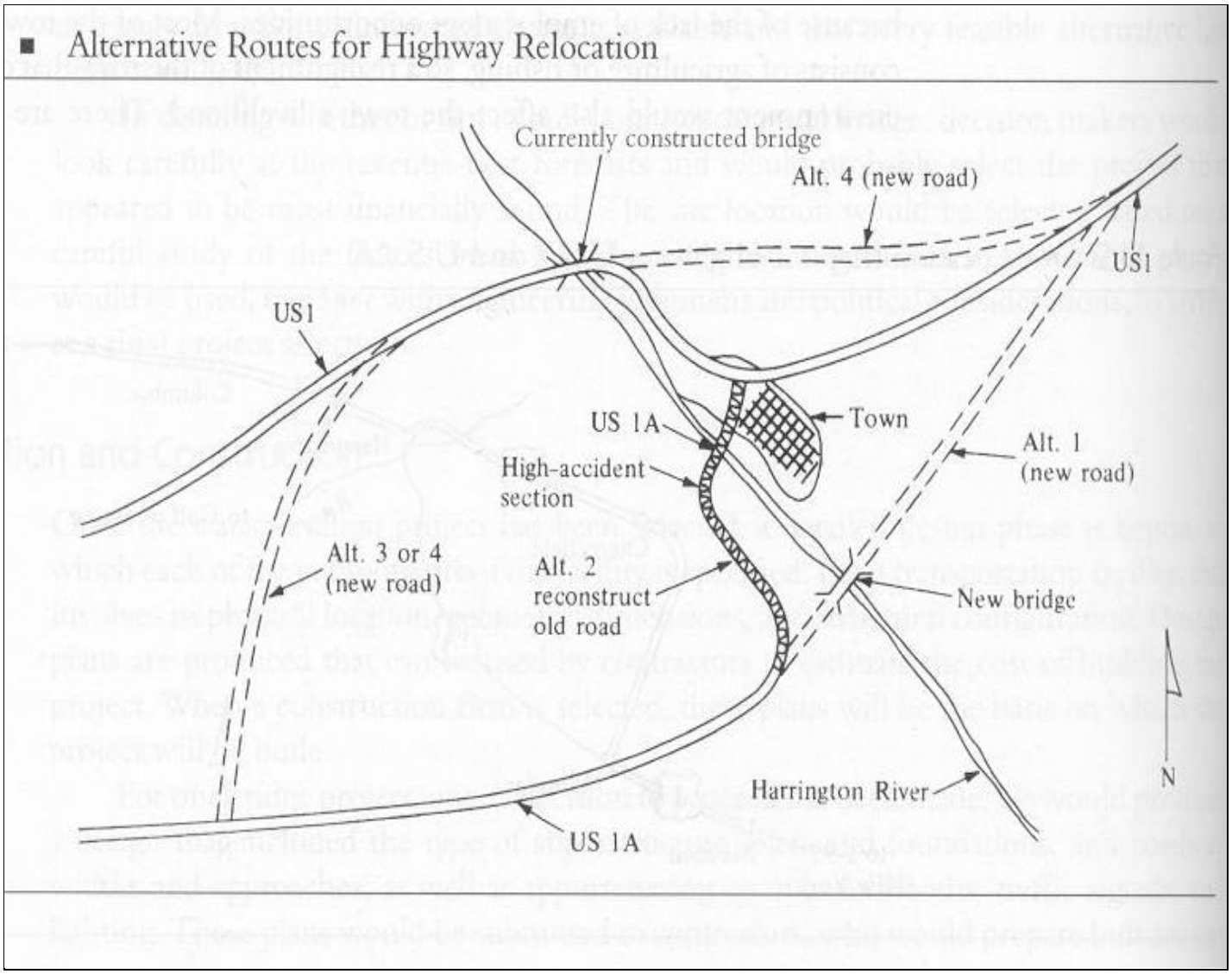
Step 2: Problem definition

Purpose of the step: Describe the problem in terms of the objectives to be accomplished and translate those objectives into criteria.

Example:

- Objective = Statements of purpose: Reduce traffic congestion, Improve safety, Maximize net highway-user benefits, etc.
- Criteria = Measures of effectiveness: Travel time, accident rate, delays (interested in reductions in these MOEs).

Step 3: Search for solutions



Step 4: Analysis of performance

Estimate how each of the proposed alternatives would perform under present and future conditions.

Table 11.1
Measures of Effectiveness for Rural Road Alternatives

Criteria	Alternatives 0	1	2	3	4
Speed (mph)	25	55	30	30	55
Distance (mi)	3.7	3.2	3.8	3.8	3.7
Travel time (min)	8.9	3.5	7.6	7.6	4.0
Accident factor[a]	4	1.2	3.5	2.5	0.6
Construction cost ($ million)	0	1.50	1.58	1.18	1.54
Residences displaced	0	0	7	3	0
City traffic					
Present	2620	1400	2620	2520	1250
Future (20 years)	4350	2325	4350	4180	2075
Air quality ($\mu g/m^3$ CO)	825	306	825	536	386
Noise (dBA)	73	70	73	73	70
Tax loss	None	Slight	High	Moderate	Slight
Trees removed (acres)	None	Slight	Slight	25	28
Runoff	None	Some	Some	Much	Much

[a] Relative to statewide average for this type of facility.

Step 4: Ranking of alternatives (in terms of MOE)

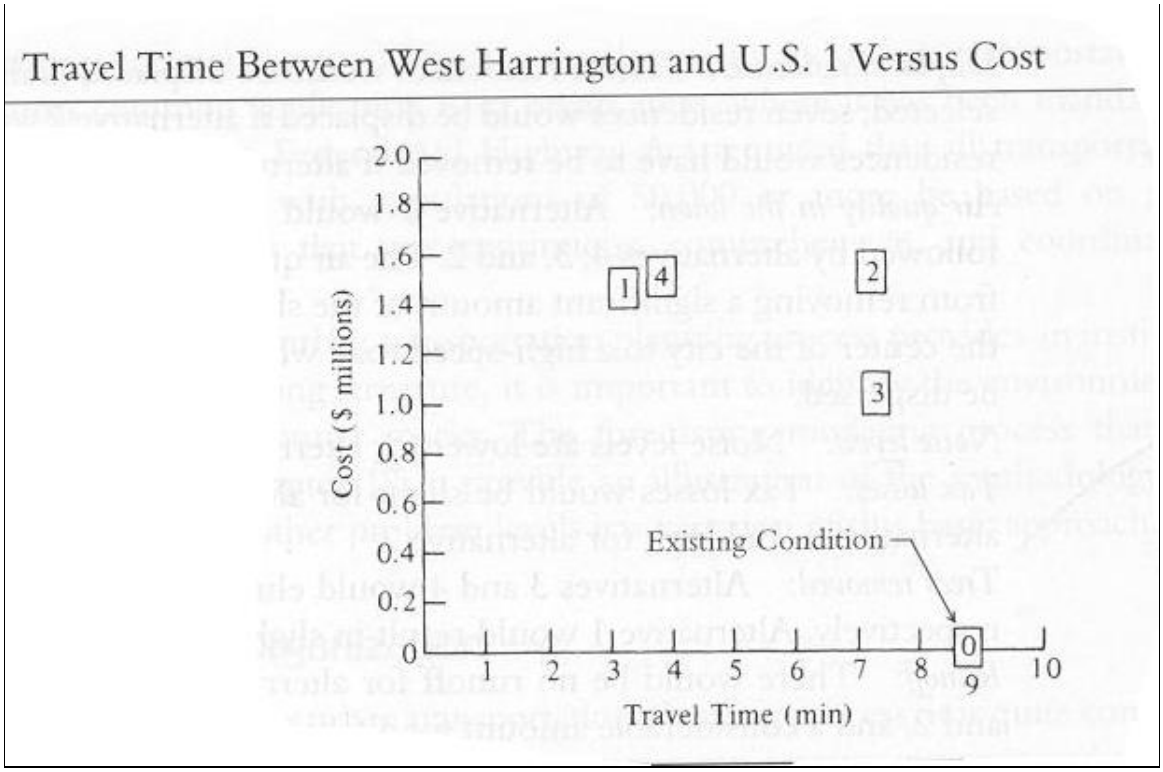
Table 11.2
Ranking of Alternatives

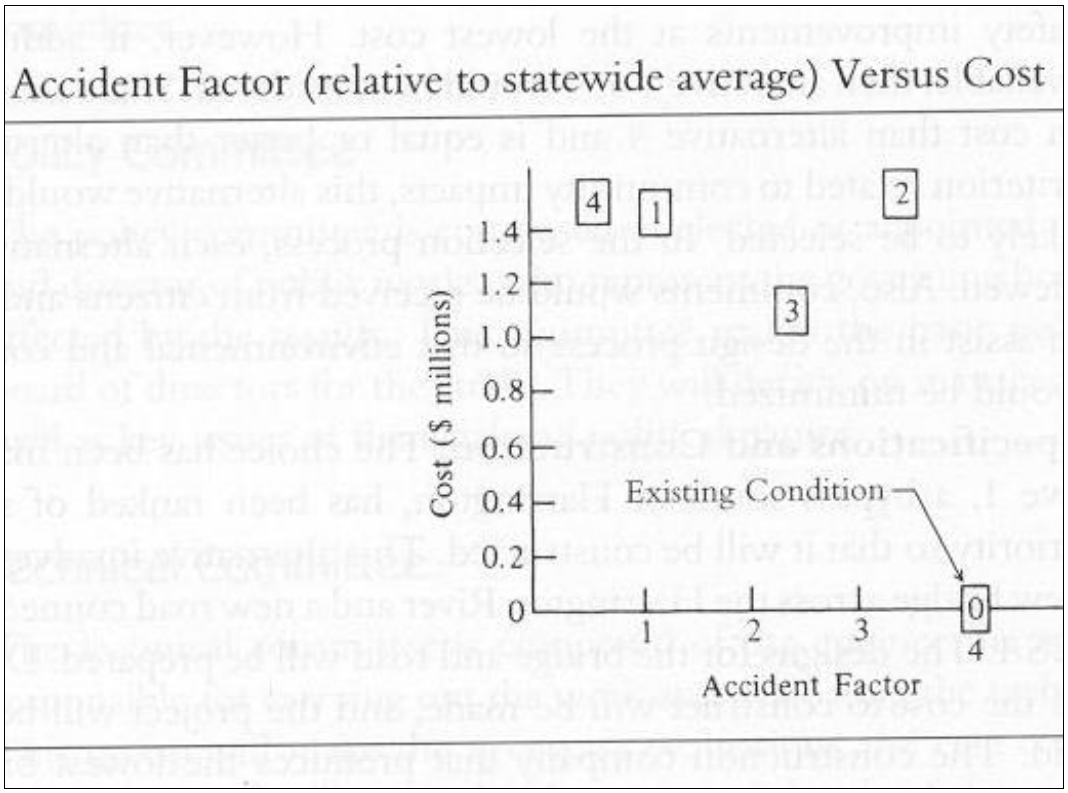
Criterion/Alternative	Alternatives 0	1	2	3	4
Travel time	4	1	3	3	2
Accident factor[a]	5	2	4	3	1
Cost ($ millions)	1	3	5	2	4
Residences displaced	1	1	3	2	1
Air quality	4	1	4	3	2
Noise	2	1	2	2	1
Tax loss	1	2	4	3	2
Trees removed (acres)	1	2	2	3	4
Increased runoff	1	2	2	3	3

Note: 1 = highest; 5 = lowest.
[a] Relative to statewide average for this type of facility.

Step 5: Evaluation of alternatives

Determine how well each alternative will achieve the objectives of the project as defined by Criteria.





Step 6: Choice of project

- Based on the alternative evaluation in Step 5, we will choose the best alternative for design and eventual construction. The best choice may not be built because of opposition by the people of the community that is affected.

Step 7: Specification and construction

- Once the project has been chosen, a detailed design phase is begun, in which each of the components of the facility is specified.

System and environment

A system may be defined as a set of components that is organized in such a manner as to direct the action of the system under inputs toward specific goals and objectives.

An environment may be defined as to set of all components outside a system, which both influences the behavior of the system and which intern is influenced by the behavior of the system.

System ⟶ all modes for urban transportation

- Bus
- Transit
- Taxi
- Passenger car.
- Etc.

We can classified them as follows:

1. Urban passenger transportation system.
2. Urban public transportation system.
3. Urban goods transport system.
4. Urban intermediate public transport system.
5. Urban personal transport system.

The urban transportation system may be thought as responding to the social and economic forces that exit in urban areas. This urban socioeconomic environment is in turn influenced by the characteristics of the transport system.

The role of the system planner may be conceived, in general way, as the direction of her efforts to design a system that achieves maximum integration, or degree of fit between the system and its environment.

Example (1)

Goal : Maximize mobility of people and goods

Related objectives:

1. Minimize travel time.
2. Minimize travel cost.
3. Provide adequate frequency of service.
4. Provide adequate system capacity.
5. Provide adequate system safety.

6. Provide adequate system reliability.

Related Standards:

1. The travel time by public transport between major activity centers not exceed 30 minutes.
2. The travel time cost by public transport not to exceed 15% of travel cost of private transport.
3. The frequency of public transport service on any route to be not less than 3 per hour.
4. The peak hour occupancy of public transport vehicles not exceed the permissible limits.
5. Fatal accidents involving public transport vehicles to be less than 1% of the total.
6. At least 95% of public transport operation to be as per the published time schedule.