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A TRAFFIC ENGINEERING; AN INITIAL WAY TOWARD'S SMART TRAFFIC MANAGEMENT

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ABSTRACT

The transportation system is often referred to as the nation's "lifeblood circulation system." Our complex system of roads and highways, railroads, airports and airlines, waterways, and urban transit systems provides for the movement of people and goods within and between our densest urban cities and the most remote outposts of the nation. Without the ability to travel and to transport goods, society must be structured around small self-sufficient communities, each of which produces food and material for all of its needs locally and disposes of its wastes in a similar manner. The benefits of economic specialization exists to move needed materials of production to centralized locations, and finished products to widely dispersed consumers.

INTRODUCTION

Traffic engineering deals with one critical element of the transportation system: streets and highways, and their use by vehicles. This vast national system provides mobility and access for individuals in private autos and for goods in trucks of various sizes and forms, and facilitates public transport by supporting buses, bicycles, and pedestrians.

Because the transportation system is such a critical part of our public infrastructure, the traffic engineer is involved in a wide range of issues, often in a wide range of issues, often in a very public setting, and must bring a wide range of skills to the table to be effective. Traffic engineers must have an appreciation for and understanding of planning, design, management, construction, operation, control, and system optimization. All of theses functions involve traffic engineers at some level.

The institute of transportation Engineers defines traffic engineering as a subset of transportation engineering as follows (1):

Transportation engineering is the application of technology and scientific principles to the planning, functional design, operation, and management of facilities for any mode of transportation in order to provide for the safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods.
and :

Traffic engineering is that phase of transportation engineering which deals with the planning, geometric design and traffic operations of roads, streets, and highways, their networks, terminals, abutting lands, and relationships with other modes of transportation.

These definitions represent a broadening of the profession to include multimodal transportation systems and options, and to include a variety of objectives in addition to the traditional goals of safety and efficiency.

Elements of traffic Engineering

There are a number of key elements of traffic engineering:

1. Traffic studies and characteristics
2. Performance evaluation
3. Facility design
4. Traffic control
5. Traffic operations
6. Transportation systems management
7. Integration of intelligent transportation system technologies.

Traffic studies and characteristics involve measuring and quantifying various aspect of highway traffic. Studies focus on data collection and analysis that is used to characterize traffic, including (but not limited to) traffic volumes and demands, speed and travel time, delay, accidents, origins and destinations, modal use, and other variables.

Performance evaluation is a means b which traffic engineers can rate the operating characteristics of individual sections of facilities and facilities as a whole in relative terms. Such evaluation relies on measures of performance quality and is often stated in terms of "levels of service." Levels of service are letter grades, from a to F, describing how well a facility is operating using specified performance criteria. Like grades in a course, A is very good, whereas f connotes failure (on some level). As part of performance evaluation, the capacity of highway facilities must be determined.

Facility design involves traffic engineers in the functional and geometric design of highways and other traffic facilities. Traffic engineers, per se, are not involved in the structural design of highway facilities but should have some appreciation for structural characteristics of their facilities.

Traffic control is a central function of traffic engineers and involves the establishment of traffic regulations and their communication to the driver through the use of traffic control devices, such as signs, markings, and signals.

Traffic operations involves measures that influence overall operation of traffic facilities, such as one-way street system, transit operations, curb management, and surveillance and network control systems.

Transportation systems management (TSM) involves virtually all aspects of traffic engineering in a focus on optimizing system capacity and operations. Specific aspects of TSM include high-occupancy vehicle priority systems, car-pooling programs, pricing strategies to manage demand, and similar functions.

Intelligent transportation systems (ITS) refers to the application of modern telecommunications technology to the operation and control of transportation systems. Such systems include automated highways, automated toll collection systems, vehicle-tracking systems, in-vehicle global positioning system (GPS) and mapping systems, automated enforcement of traffic lights and speed laws, smart control devices, and others. This is a rapidly emerging family of technologies with the potential to radically alter the way we travel as well as the way in which transportation professionals gather information and control facilities. While the technology continues to expand, society will grapple with the substantial "big brother" issues that such systems invariably create.

This text contains material related to all of these components of the broad and complex profession of traffic engineering.

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