

CE474: Traffic Systems Design-Fall 2004

Class 01 – Introduction to Traffic Systems Design
August 23, 2004

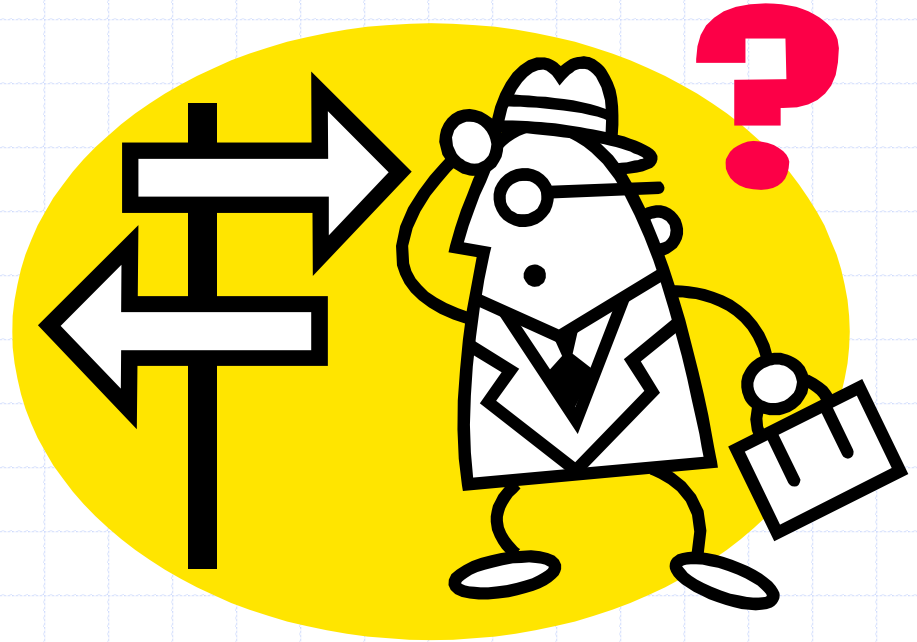
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Class Objectives

- ◆ Apply basic traffic flow theories at signalized and unsignalized intersections.
- ◆ Use standard simulation and optimization models, used by traffic engineering professionals, to develop and evaluate control plans for signalized intersections.
- ◆ Complete a signal timing design for an isolated intersection and an urban arterial system.
- ◆ Prepare and clearly and effectively present the findings of your design work.
- ◆ Use hardware-in-the-loop simulation to test a signal timing design.
- ◆ Apply the factors that make for successful design teams.

◆ Traffic Engineer vs. Civil Engineer

◆ The Elevator Problem



Traffic Systems Design – The Problem

- ◆ 250,000 traffic signals in U.S.
- ◆ 60% of the oil that we use in transportation is imported
- ◆ 2/3 of all miles traveled each year on streets controlled by traffic signals
- ◆ 25% of fuel consumed waiting at traffic signals
- ◆ 50% of all transportation professionals will retire in 5 years
- ◆ Some signalized intersections carry over 100,000 veh/day
- ◆ 1/4 of all agencies last retimed signals 4+ years ago

Traffic Systems design – The challenges

- ◆ Optimal Design...What's Optimal?
- ◆ The time-horizon
- ◆ Availability of data
- ◆ Stochasticness of traffic

WHY BUILD A TRAFFIC SIGNAL

- ◆ Traffic is congested!
- ◆ Serve new land uses
- ◆ Safety
- ◆ Level-of-Service
- ◆ New road connections
- ◆ Traffic pattern changes

BENEFITS OF SIGNALIZATION

- ◆ Reduce frequency of certain crash types, especially right-angle
- ◆ Create orderly traffic movement
- ◆ Increase traffic-handling capacity

BENEFITS OF SIGNALIZATION (CONT'D)

- ◆ Provide for continuous flow
- ◆ Function as part of signal system
- ◆ Allow vehicles, peds and bikes to cross traffic stream



DRAWBACKS

- ◆ Expensive- \$120,000 for equipment
- ◆ Ongoing maintenance - \$4,000 per year
- ◆ Motorists still have to stop
- ◆ Increase of certain crash types - rear-end type
- ◆ People may disregard
- ◆ Excessive delay

TRAFFIC SIGNAL STANDARDS

- ◆ Signal design standards come largely from:
 - Manual on Uniform Traffic Control Devices (MUTCD) - www.mutcd.fhwa.dot.gov
 - Institute of Transportation Engineers (ITE) - www.ite.org
 - State, Local standards - example - www.odot.state.or.us/traffic/design.htm