

# CE474: Traffic Systems Design-Fall 2004

Lab 1 – Introduction to Traffic Operation Analysis  
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# Introduction to Traffic Operations Analysis

## Module 1. Overview

- ◆ The City of Moscow is studying the intersection of Third St. and Jackson Ave. in downtown Moscow. The intersection is currently controlled by a fixed time signal. Traffic on Highway 95 (Jackson Ave.) continues to increase, particularly as commercial vehicle traffic from Canada becomes more important.
  
- ◆ The city is evaluating the “traffic operations” at the intersection to identify “problem areas” and “possible correction measures”
  
- ◆ Some of the questions that the city is considering include:
  - is there sufficient capacity to safely and efficiently accommodate the flow of traffic today? in the future?
  - is the delay motorists experience at the intersection tolerable?

# Introduction to Traffic Operations Analysis

Transportation engineers are concerned with both engineering and management of the transportation system, including design, construction, operation, maintenance, and optimization.

During this week's lab, you will learn about traffic operations analysis and how it can be applied to very common problems faced by transportation engineers using fundamental knowledge you learned in the introduction to transportation engineering course.

Your assignment this week is to use CE372 skills to assess the operating conditions that exist at the intersection today, to determine whether the intersection is functioning properly and to examine the effect of different parameters on the intersection's operation conditions

**Lab Deliverable:** A lab-report that summarizes the output of different tasks you carried out during the lab [Due by the beginning of tomorrow's class]

# Introduction to Traffic Operations Analysis

## Performance Measures and Level of Service

The traffic engineer can determine how well a given facility functions by making direct field measurements or by using a model [Simulation] to forecast the value of a parameter of interest. Let's consider several questions:

### Discussion Questions:

- Q1. What are the two perspectives that must be considered when evaluating the performance of a highway facility?
- Q2. What is a performance measure?

### Task 1-A [10 minutes]

List five different measures that could be used to evaluate the performance of a signalized intersection. Explain how you go about collecting these measures in the field.

# Introduction to Traffic Operations Analysis

## Module 2. Characterizing Traffic Flow at Intersections

### Traffic stream fundamentals: definition of terms

A traffic stream consists of vehicles traveling along a roadway in a given direction. A traffic stream can be described by several key variables:

### Discussion Questions [15 minutes]

Q3. What is flow rate?

Q4. What is the density of the traffic stream?

Q5. What is the average speed of vehicles in the traffic stream?

Q6. What is the headway between vehicles?

Q7. What is the maximum flow rate, or capacity, that can be achieved by the traffic stream?

Reference: See pages 2-1 through 2-6 of the Highway Capacity Manual for an overview of traffic flow variables.

# Introduction to Traffic Operations Analysis

## Module 2. Characterizing Traffic Flow at Intersections

Traffic stream fundamentals: definition of terms

Task 1-B Field Data Collection – [20 minutes]

For each cycle determine:

Number of stopped/nonstopped vehicles for each lane

Max queue length for each lane

Cycle	Lane 1		Lane 2		Lane 3	
	Stopped	Non stopped	Stopped	Non stopped	Stopped	Non stopped
1						
2						
3						
.						
.						

# Introduction to Traffic Operations Analysis

## Module 2. Characterizing Traffic Flow at Intersections

Traffic stream fundamentals: definition of terms

Task 1-C Field Data Collection – [20 minutes]

For each cycle determine:

Average Stoppage time

Cycle	Vehicle	Lane 1	
		Time in	Time out
1			
2			
3			
.			
.			

# Introduction to Traffic Operations Analysis

## Module 2. Characterizing Traffic Flow at Intersections

Traffic stream fundamentals: definition of terms

Task 1-D Field Data Collection – [20 minutes]

For lane 2 determine:

Average minimum headway between queued vehicles

# Introduction to Traffic Operations Analysis

## Module 2. Characterizing Traffic Flow at Intersections

### Discussion Questions [10 minutes]

Q8. What is the queue clearance time?

Q9. What is approach delay?

# Introduction to Traffic Operations Analysis

## Module 2. Characterizing Traffic Flow at Intersections

Traffic stream fundamentals: definition of terms

Task 1-F Intersection Delay and Speed Report – [45 minutes]

For each lane determine:

- Average stoppage time/vehicle

- Average approach delay/vehicle

- Average Speed

For the southbound determine:

- Average stoppage time/vehicle

- Average approach delay/vehicle

- Average Speed

- Total Travel Time

- Total intersection delay

Use intersection approach of 200 ft length and average free flow speed of 33 mph