

Chapter 1-Introduction

1.1 Introduction

Travel time estimation in real time can be used to inform travelers as well as to optimize traffic management procedures. Statistical methods, AVI technology, and traffic flow theory have been used to estimate the travel time on freeways. However, few approaches exist to estimate travel times on an arterial street network especially using the real time data from point surveillance detectors.

This research focuses on developing the appropriate algorithms that can estimate the travel time based on real time detector data under different traffic conditions including incident conditions. The developed algorithms would address various issues such as queue build up at the intersection that would even reach the detector itself, queues that would back up from the downstream link, and lane closures due to incidents or construction. The algorithms should be versatile to handle various intersection control strategies and various time interval updates.

1.2 Objectives of the Thesis:

The objective of this thesis is to develop dynamic flow algorithms that estimates the travel time on an arterial street network by utilizing the traffic information obtained from detectors. A modified method to the one adopted in HCM2000 is developed and utilized to estimate the real-time travel time for a short-time interval update.

1.3 Thesis Organization

This thesis is organized into 8 chapters. They are:

Chapter 1: Introduction.

Chapter 2 presents the literature review. It provides a review of the available literature in the area of travel time estimation on freeway and arterial streets including incident conditions.

Chapter 3 describes the components of the travel time on a link as influenced by the incoming volume and the intersection traffic controls. It also shows how to mesh the detector time interval update with the intersection cycle length.

Chapter 4 focuses on the methods employed to compute the intersection control delay. A modified method to the one used in HCM2000 is developed and discussed in this chapter.

Chapter 5 describes the developed algorithms to estimate the real-time travel time on arterial network. Four algorithms are introduced in this chapter to cover all conditions such as intersection bottleneck and queue over loop detector.

Chapter 6 focuses on the application of the algorithms to a hypothetical network and its results. To validate the developed algorithms, a small arterial network with loop detectors is simulated in CORSIM. The algorithmic travel times are computed based on the data from the loop detector and are compared with the output of CORSIM.

Chapter 7 describes the real-time travel time estimation on arterial streets under incident situation.

Chapter 8 provides the conclusions and the recommendations for future research.