Overview

Travel time and travel speed data are needed to identify and assess operational problems along selected sections of highways. Travel time data are also necessary in traffic signal control coordination, as input to traffic assignment algorithms, and in "before and after" studies.

Traditional travel time study techniques include license plate studies and a variety of test vehicles studies. The most direct way of obtaining the travel time for several vehicles between two points in the highway system is by recording the time of entry and the time of exit for individual vehicles traversing the study section. Individual vehicles are "tagged" during entry and exit by recording license plate numbers. The numbers are then matched, and the elapsed travel times are calculated assuming that there were no intermediate stops. Large sample sizes are required to provide the number of matches necessary to obtain a reasonably confident travel time. This study technique has several inherent disadvantages including (1) stopped time is not available, (2) individual route choices are not specifically known, and (3) speed variation on different segments/links are not known.

A second travel time study technique involves the use of a test vehicle. The test vehicle is driven along the desired travel route, and the driver is instructed to "float" in the traffic stream. The driver would attempt to maintain an average speed, passing the same number of vehicles that pass the test vehicles. Primary advantages of this study technique are as follows: (1) stopped delay is available by segment and location, and (2) a small number of sample test runs are required to obtain reasonable reliable travel times. Travel time contours, speed contours, flow-travel time relationships and other vehicle performance factors can be developed from these studies.

Traditional techniques are conceptually very simple, but their implementations tend to be quite labor intensive. Nowadays, distance measuring instruments (DMIs) can be used to automatically record distance, time, and speed. However, these units have several disadvantages including a need for frequent calibrations and verification of factors which have nothing to do with the units (for example, tire pressure), and difficulty in using the resulting data in a GIS environment. Global positioning system (GPS) receivers have the ability to overcome these difficulties and, as a result, they are increasingly being used to conduct travel time studies.

The GPS data collection software (GPS2LT in this lab) allows you to easily collect data for travel time analysis and processes this data to provide time, speed, latitude, longitude, and a variety of other statistics. This data can then be further used by Travel time Study Software, such as PC-Travel for Windows, for comprehensive travel time and delay analysis.
The objectives of this lab are as follows:

- Acquaint students with GPS-based travel time and delay study equipment and software,
- Acquaint students with the “average car” driving technique,
- Acquaint students with the travel time study software, such as PC-Travel,
- Acquaint students with the concept of travel time characteristics and intersection delay on arterials, and
- Acquaint students with the procedure of arterial LOS analysis.

The software programs can be downloaded from:

https://www.pc-travel.net/Downloads/downloads.html (I will put the files on my website)

Software keys will be emailed to you. They should work with Version of both PC-Travel and GPS2LT.

Procedures

- Conduct a study of traffic operations of the existing speed, travel time, and delay being experienced along both directions of University Drive, from Ireland St. to Highway 6 frontage road (East side).
- Make at least 4 runs in each direction during the PM Peak on a Monday, Tuesday, Wednesday, or a Thursday. If you wish you may do additional runs.
- Use the “average car” driving technique.
- Use the GPS-based JAMAR travel time and delay system to collect the data. There are two of these systems available for use. See Dr. Lord for details.
- It is encouraged that whenever possible each member of the group should operate the GPS2LT software on at least one of the runs (driver may be excluded if he/she is the only licensed driver in the group).

Requirements

- Prepare a literature review detailing previous research in at least the following subjects:
  - Recent developments in travel time and delay study.
  - Travel time characteristics on arterials.
  - Freeway travel time characteristics.
  - Arterial operations and level of service.
- Provide printouts from one run, all-run tabulation for one direction, and summary tables of the average values for both directions.
- Provide speed profiles and travel time-space profiles by direction.
• Provide a written summary of your study, including experiences with the GPS-based system.
  • Report the average delay (sec/veh) at each signal’s thru phase on University Drive.
  • Report any causes for the delays experienced.
  • Report operating speed and running speed.
  • Compare results informally with other groups. Discuss any variations in the analysis that exist between the other groups and determine why these variations occurred.
  • Using the combined data set that includes runs by all group, provide basic statistics of travel time on each link and on the arterial.
  • Investigate the relationship between speed limit and average link speed.
  • Compare travel times in two directions.
  • Estimate arterial LOS with the combined dataset (disregard the fact that the runs may have been from different days).
  • Discuss any relevant topics important to the results of this laboratory investigation not described above.

• Each group is to submit a lab report and a separate signed sheet of participation must be submitted at the same time. Each group is also required to e-mail their raw data, statistical analyses, and an electronic report to Dr. Lord. For this lab, the page limit (including cover page and any appendices) is 15 pages.

• Each group will give a 15 minute presentation summarizing their findings. This presentation will take place during the lab period at 3:55 p.m., on November 8.

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