

# PROPOSED METHODOLOGIES FOR CONDUCTING TRAVEL TIME SURVEYS FOR VARIOUS MODES OF TRANSPORTATION

It is desired to complement current methodologies of collecting travel time data by using innovative new technological developments to gather additional and more accurate data. The use of high-speed video cameras coupled with time-lapse video recording equipment provides an interesting and cost effective alternative to traditional data collection activities.

## VEHICLE BORNE MEASUREMENT:

The vehicle borne data collection system can be installed in almost any type of vehicle ranging from an eighteen wheeler to a bicycle. However, when one desires to obtain the maximum detail possible, a properly outfitted test vehicle can provide the most information. Tests will be conducted from the point of departure to the final destination and will measure all intervening transit times.

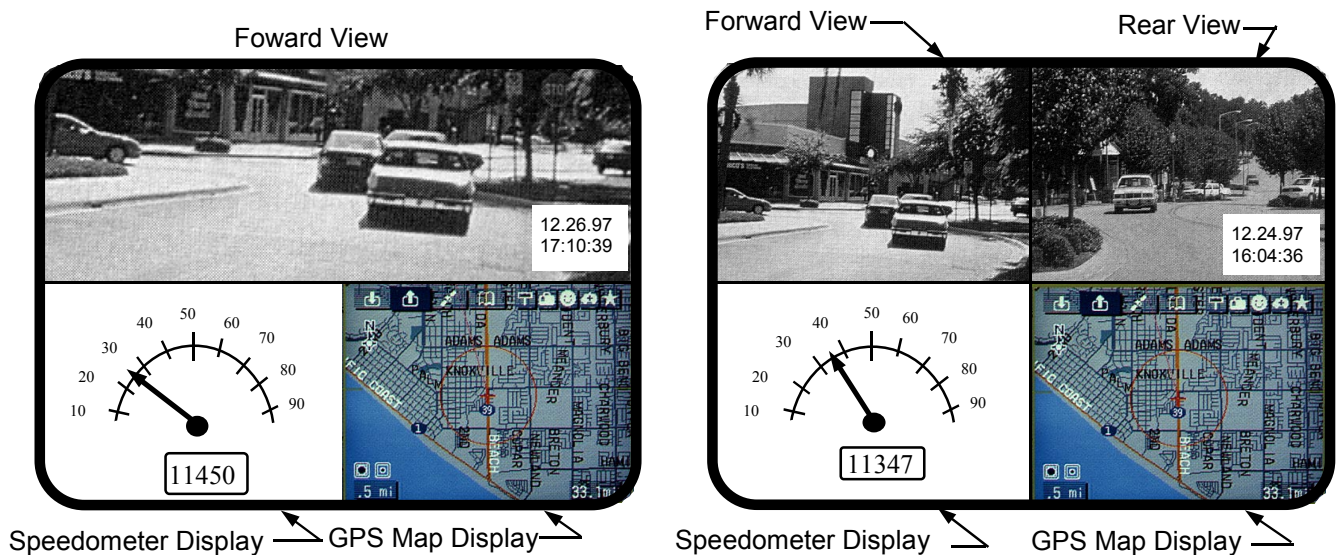
The basic system consists of a 12 volt battery powered color video system that can operate for up to twenty-four hours without replacing the battery or video tape recording medium. A tiny video camera, approximately the size of your thumb, is mounted from the rear view mirror in most vehicles. The camera is placed so that there is a forward looking wide angle field of view through the windshield of the vehicle. A time and date generator is included so that the time and date is super-imposed over the video image. Time is recorded to the nearest second. In addition, a lavalier microphone is attached to the operator so that he may make appropriate comments concerning the roadway and driving conditions for the duration of the trip.

This system is particularly important when door-to-door assessment is desired. It can be installed in a delivery truck, a transit vehicle or Mom's Van and measure all the timing elements. In addition to recording the times between stops, the system provides information as to the cause of each delay, i.e... traffic congestion.. boy-scout leading aged grandmother across the street, ..... accident ahead, ... construction work, ... gaggle of geese...etc.

Since the video signal is recorded in a time lapse mode, the entire trip can be reviewed in a 12:1 time compression mode. In other words, if the trip of interest required an hour of travel time, the entire activity can be reviewed in a period of five minutes. Of course it will require a longer time to extract the intermediate travel times, enter them into a spread sheet and tabulate the results. The prime advantages of this system is the fact that one has an archival record that may be reviewed at any time in the future. A second advantage is that it only requires one individual to perform the survey.

When additional information is desired, additional cameras may be added in a split-screen mode. Some options are shown below.

- In addition to the forward looking view of the highway with its superimposed time signature, the research engineer may also want to have a speed log to determine how fast the vehicle was traveling at any given time during its trip. A second camera may be installed so that the vehicle's speedometer is shown in a lower quadrant in the video recording.
- If the exact location of the vehicle with respect to the roadway is desired for any time period, we can insert a picture derived from a GPS map generator in the available lower quarter of the picture as shown in Figure 1.
- When the vehicle is traveling during morning or evening rush hour, it may be desirable to place an additional camera looking out the back of the vehicle to observe the status of the following vehicles...How crowded is the roadway behind the vehicle? ... How deep is the trailing queue? This image may be placed in the fourth quadrant of the picture as shown in Figure 2.



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# **ON-BOARD VIDEO TRAVEL TIME MEASUREMENTS**

## **(WHAT DO THEY COST?)**

There are basically eight elements to conducting a Video Travel Time Survey.

### **Planning:**

A traffic engineer or planner must first decide why the survey is to take place. One must then decide where and when the activity will be performed. The various participants must be set forth ..... driver, vehicle, time, date, frequency... etc. The cost of such a pre-planning activity will be impacted by the seniority of the individual engineer and the scope of the project. Each agency will have to determine these costs from their own experience.

### **Equipment:**

The video system recommended for such an operation consists of one or two miniature color video cameras, a color split screen generator and a time-lapse video tape recorder or a computer with video storage capability. An auxiliary deep cycle marine battery should also be supplied along with a color video monitor. A typical video system will rent for approximately \$700 to \$1,000 dollars per week plus to & from shipping charges. Thus with proper planning , one can accomplish a number of trip tests at a modest daily cost.

### **Video Engineer:**

A competent video engineer will be required to set up the first installation and to train your operators for future tests. Daily charges for such an engineer run approximately \$500/day plus travel and per-diem expenses. If long distances are involved, one or two daily charges may be required to cover flight time.

### **Vehicle:**

These costs must be calculated with respect to each individual job. Sometimes the vehicle may be provided by a trucking firm or transit company. Other times it may be a rented vehicle. It may be a bicycle or a motorcycle. Costs will vary as widely as the form of transport.

### **Driver-Participant:**

A driver must be available to conduct the necessary trip test. If the driver is an employee, then the current daily rate for such an employee must be calculated. If the ATD company engineer is elected as the driver, such costs may be covered by his daily rate. Sometimes the driver will be a participant such as a truck driver, buss driver, willing mother or other interested party. Costs of driver and insurance will vary depending on the situation.

### **Data Reduction Equipment:**

Depending on the number of trips involved, it may be necessary to employ some fairly sophisticated video data analysis equipment and a computer for a week or two. Such a system rents for about \$300.00 per week.

### **Data Reduction Specialist:**

Someone must review the video tapes. The data must be summarized into a spread-sheet or data base. Computer print-outs of the data, various reports and a summary must be produced. Such a data entry person will cost somewhere between \$20 to \$30 per hour and may be required for up to 20 hours per run....

### **Data Analysis:**

Finally, a qualified traffic engineer must review the data and make recommendations to the using entity as to present or future action that must be taken with respect to the information received. Back to square one. The costs for this individual and the time required rest with the using organization.

**Note:** On occasion, it may be desirable to use a GIS tracking device that provides a real time moving map display. A third camera is used to record this map as the vehicle traverses its pre-determined path. The image of the map is inserted into the lower left quadrant of the video signal. The speedometer display is placed in the lower right quadrant of the video signal. The forward looking camera occupies the top half of the signal. Thus a very complete rendering of all the elements of the trip are recorded in one compact display. There are added costs for this capability.

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