# Methods of Conducting and Benefits of a Comprehensive Sign Inventory

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## INTRODUCTION

Traffic signing is one of the most effective means of transmitting messages to the motorist. If the operating traffic engineer is to take advantage of this tool, he must have some way of evaluating the total signing function and the basic requirement in this evaluation process as data relative to the number of signs, their type, condition and location.

Unfortunately, traffic signing in most urban areas is done on a situational basis. For the most part, the only records kept are work orders and these are normally filed according to the date of sign installation. This system results in substandard or irrelevant signs remaining on the streets. Sign replacement is a hit and miss proposition which results in high cost and duplication. And costly on-the-street investigations are necessary in any study of traffic sign conditions.

Because of the voluminous quantities of data and the time and expense of processing this data manually, comprehensive sign inventories were rarely conducted in the past. However, the recent developments in photologging and the greater emphasis placed on automatic data processing by local governmental units has made data collection and processing easier and faster and has led to a greater interest in traffic control device inventories.

A scientific inventory process in an urban environment not only minimizes the cost of searching data files for desired information, but also provides the foundation for the development of an orderly sign-replacement program and a better sign system for traffic control which in the long run will result in a smoother, safer and more efficient flow of street traffic.

There are three basic ingredients of a sign inventory: (a) data collection, (b) data processing, and (c) updating.

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## DATA COLLECTION

The two most frequently used methods of data collection are manual and photologging. Information obtained is the same regardless of the method selected and normally includes such things as:

1. General location—street, block
2. Exact location—side of street, distance from an established reference point such as feet from the nearest cross street.
3. Sign type
4. Sign size
5. Sign face material
6. Sign blank material
7. Sign condition
8. Visibility
9. Number of posts
10. Post type
11. Post condition

The manual method of data collection is usually performed by two people from an observation vehicle. The vehicle must be equipped with a fifth wheel or some other means of measuring distances with a reasonable degree of accuracy, say plus or minus two feet. The observers must travel each street and record the pertinent information relative to each sign that they encounter. In order to simplify data processing, the field data form should be designed so that the information can readily be transferred to computer cards. The manual method is a slow process and is open to errors of both commission and omission. An inventory conducted by the City of Saginaw, Michigan in 1969, using the manual method, took some five months to collect data on 18,000 signs. The field crew was able to inventory about 190 signs a day at a cost of roughly 88 cents per sign. While the manual method is expensive and time consuming, it does offer some advantages:

(a) Requires no special equipment.
(b) Does not require the use of highly skilled personnel, can be performed by summer help, etc.
(c) Weather is not a deterrent.

In addition to the high cost and time consumption, there are other disadvantages:

(a) Must rely on the judgment of the field crew.
(b) Difficult to check the accuracy of the information.
(c) Additional field trips are often required.

(d) The process creates traffic problems, especially on major streets. Often the crew is unable to find convenient places to stop to record data.

(e) The greatest disadvantage is that the information collected is limited. Once the field work is completed, there is no way to extract additional information.

The second method of data collection and one which is now receiving a considerable amount of attention involves utilizing the photologging technique. This is a photographic process of data collection whereby pictures of the traffic and parking signs and their environment are taken from a moving vehicle. The result is a static pictorial record of all signs on the roadway and surrounding environment. Thirty-five milimeter color movie film is used. There is a 16-digital data display in each frame on which the following data is normally recorded:

(a) Julian date
(b) Year
(c) City or county
(d) Route
(e) Direction
(f) Mileage

This information is imaged onto the film at the same time the photograph is taken.

All two-way streets are photographed twice, once in each direction, with the camera pointing toward the right side of the road. One-way streets greater than three lanes are also shot twice. The film is then processed and edited to establish a continuous photolog file. A series of log sheets are developed to indicate where specific roadways are found on the roll of film. The edited film is then viewed in the laboratory on a calibrated distance grid screen. This grid permits the viewer to determine the exact location of the sign and other roadside items. The viewer also extracts other pertinent information relative to the sign and records in a coded form on the data sheet.

Data collection by photologging requires considerable equipment and instrumentation. As with the manual method, the photologging technique requires two technicians on the road. However, their only task is to locate signs and actuate the camera as and when necessary.

Photologging offers many advantages:

(a) Fast
(b) Reliable

(c) Provides unlimited information—not only sign data but also pavement condition, curb condition, roadside obstacles, pavement markings, commercial signs, curb cuts, landscaping, drainage structures, guard rail, to mention a few.

(d) Provides a permanent record.

(e) Data collection process does not interfere with traffic flow.

(f) Less expensive than the manual method.

(g) Repeat field trips are minimized.

(h) Agency can control data extraction cost by expanding or contracting information needs.

However, photologging does have some disadvantages:

(a) Requires special equipment and trained personnel. Camera cost would be approximately $10,000 with projector cost at approximately $5,000. Large agencies can spread the cost over many units, i.e., the Michigan Department of State Highways has one camera and will provide projectors and calibrated screens for all district offices.

(b) Many communities cannot afford the cash outlay required to do an inventory with this method, but could provide the labor for a manual study.

(c) Weather can interfere with field work. The Michigan Department of State Highways has experienced 20 percent downtime, 19 percent due to the weather and 1 percent due to equipment.

Photologging costs generally range from $17 to $20 for one mile of roadway photographed in both directions. If photologging had been used for the Saginaw study referred to earlier, the cost of data collection and extraction would have been 67¢ versus 88¢ per sign. This difference is even more significant when considering the fact that the Saginaw manual cost data are on 1969 price levels whereas the photologging cost data are current.

## DATA PROCESSING

Automatic data processing is the only practical way to handle the vast amount of data collected in a sign inventory. Furthermore, collation and cross reference of the material would be an enormously expensive, tedious and time consuming task of questionable accuracy if it were done manually. And the problem would be a continual one if the information had to be manually updated.

Programs have been written in most of the common computer languages to segment information in virtually any manner the engineer

desires. For example, the city of Saginaw has broken down data into the following:

(a) Total number of signs by legend
(b) Location of sign by districts and streets
(c) Number of signs in each condition category (good, bad, etc.)
(d) Number of signs in each visibility category
(e) Number of signs reflectorized versus nonreflectorized
(f) Listing of sign types by location, example YIELD signs

Some inventory models have search routines which can select signs from the files which satisfy any two or more criteria. This capability allows the engineer to obtain lists of signs which satisfy combinations of criteria such as signs damaged and low reflectivity. By using various combinations, the engineer can establish priorities for replacement programs.

Plotters are often used in conjunction with the central processing unit to produce drawings of sign locations on roadway segments and intersections, thus freeing draftsmen of this time consuming task.

## UPDATING

One of the most important and probably the most neglected elements of a sign inventory is updating. If the inventory is to be of value to its user, it must be kept current. This can easily be accomplished with an automatic system. Most software packages include automatic updating and work order routines. They can produce blank work order forms for emergency replacements and partially filled work order forms for planned replacement programs. The planned replacement work orders can be programmed on a weekly or monthly basis by setting the total number of signs to be replaced in a particular time period following a priority system established by the engineer. The sign crew fills out part of the work order after completing the job and returns it to the data processing facility for key punching and updating the inventory file.

## BENEFITS OF A COMPUTERIZED SIGN INVENTORY SYSTEM

The direct and indirect benefits of a city-wide computerized sign inventory system are extremely wide and varied. The traffic engineer needs an account of the traffic control system for any traffic study, analysis and design. The time spent by the traffic engineer and his staff in determining the traffic control devices at various situations for problem solving is quite significant and often requires site visits

and scale drawings. With a computerized inventory system, the listing of signs at an intersection or at any specific roadway section can be obtained quickly. A plotting module can also produce a sketch of the locations, types and condition of the signs at any intersection or on any roadway segment.

Most traffic engineering departments estimate the cost of yearly sign replacement and installation programs on the basis of past records, and often these records are not a true reflection of the real needs. The community with a comprehensive computerized sign inventory can get a listing of all damaged, substandard, illegible, etc., signs at a very nominal cost, and can evaluate the cost of the signing program well ahead of time and can plan for it.

A comprehensive sign inventory can serve as a catalyst in bringing in outside resources for financing sign replacement programs. Primarily, because of its inventory, Saginaw was able to obtain TOPICS funds for the replacement of signs on the Type II system and HUD funds for the replacement of signs in five code enforcement areas that comprised about 30-35 percent of the city's total land area. The total cost of these projects was about $250,000. The city's participation was in the form of noncash services.

Traffic engineers often receive inquiries from the public regarding traffic signs and signing policy at specific locations. The answer to such inquiries often becomes time consuming, in absence of a comprehensive inventory. However, with the inventory system, answers to such inquiries are a matter of minutes.

Urban environments generally have codes of practice for billboards. However, the detection process of violation of codes in posting billboards in most areas is extremely weak. The photologging system of data collection provides an excellent and very inexpensive means of detecting such violations. Some cities in the west coast picked up the cost of the photologging system from the billboard violation fees alone.

The real value of the inventory of signs is not in the tally of sign types, but in its contribution for the long range planning of the traffic engineering department. Knowing the location and types of signs, the city traffic engineering department will be able to establish a systematic program of continual sign replacement and installation. They can use this information to establish work crew schedules and performance standards. While inventories, I believe, are basic to any operation, be it in private industry or government, their existence in traffic engineering functions have been woefully lacking. And before we can become good managers, as well as technicians, we must know where we are, where

we are going, how long it is going to take, and how much will it cost to get there. Without the basic data provided by inventories, we will never be able to accomplish our ultimate goal to move traffic as safely and efficiently as possible.