CHAPTER 1

INTRODUCTION

GENERAL BACKGROUND

Traffic crashes have been characterized as a neglected epidemic, claiming over 45,000 lives in the nation every year (SEMCOG, 1990). [1] These losses include over 1,500 people within the State of Michigan. On average, someone is killed in Southeast Michigan every 14 hours in a traffic crash. Crashes are the leading cause of death for the 16 to 24 year old age group.

In the late 1980s, over $1.7 billion in direct costs were incurred every year in Southeast Michigan as a result of traffic crashes (SEMCOG, 1989). In a more recent study by the University of Michigan Transportation Research Institute, the total cost of crashes in the state was estimated to be approximately $12 billion for 1993. In contrast, the total cost of crime committed in Michigan in 1993 was approximately $5 billion (Streff and Molnar, 1994; DeSmet, 1994).

The impacts of traffic crashes are felt by every resident. These crashes place enormous burdens on medical facilities, police and other public and private institutions, in addition to the physical and emotional sufferings of the victims and their families.

A comprehensive highway safety program is needed to reduce the large and varied impacts of traffic crashes on Southeast Michigan residents. A crucial element of such a program is the collection and effective use of crash data to identify and correct safety deficiencies in the roadway system.

Unfortunately, there is a general lack of relevant engineering assistance available to or within communities in the seven-county area of Southeast Michigan (Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw and Wayne counties). The U.S. Department of Transportation has recommended that cities with a population greater than 50,000 employ at least one full-time traffic engineer and cities with a population of 25,000 to 50,000 have access to traffic engineering services through consultants or other governmental agencies. Currently, only seven cities in the seven-county SEMCOG region have full-time traffic engineers: Ann Arbor, Detroit, Farmington Hills, Novi, Pontiac, Rochester Hills and Southfield. There are 11 other cities in the region with populations exceeding 50,000 and many other cities with populations over 25,000 which do not have access to an adequate level of traffic engineering assistance.

While several communities use consultants for special projects or are assisted by county road commissions on limited issues, the overall lack of adequate engineering assistance indicates that numerous traffic safety problems are probably being overlooked in many communities. SEMCOG believes that more engineering assistance will translate into an overall improvement in traffic safety. However, with the limited resources available to most communities, hiring a traffic engineer is often not viewed as a viable option. Many communities in Southeast Michigan are forced to assign traffic safety as a collateral duty to law enforcement officers and public works personnel. While these people often do a good job of addressing traffic safety issues, it is not the primary focus of their jobs. SEMCOG has created this manual, therefore, to assist these personnel (and others) in their analysis of roadway-related traffic safety problems.

[1] Full citation for source and year in parentheses can be found in list of References in Appendix G.

Many engineering disciplines have "sketch-planning" tools which allow them to evaluate specific projects or alternatives without conducting an in-depth engineering analysis. For example, a highway engineer can usually estimate how much it will cost to add a lane to an existing roadway simply by using sketch-planning techniques and without doing a complete site evaluation. Similarly, traffic volume-to-capacity ratios are often used in congestion analyses. Such techniques are primarily used to prepare budgets and proposals and are not considered to substitute for the detailed engineering analysis often needed later in the implementation process.

In the past, traffic safety personnel have not had the means for quickly and efficiently evaluating suspected safety problems and proposed solutions. However, the SEMCOG Traffic Safety Manual now provides a set of user-friendly tools for checking a location's crash history, identifying possible crash causes and countermeasures and conducting a preliminary benefit/cost analysis of those countermeasures selected for further consideration. Benefit/cost analysis is an economic tool for assessing and comparing possible countermeasures. For each countermeasure considered, it compares expected benefit to expected cost.

PURPOSE OF THE TRAFFIC SAFETY MANUAL

This manual has been designed to aid in identifying:

1. information relevant to safety analysis;

2. high-crash locations;

3. significant crash patterns and generally related causes and countermeasures;

4. default values for countermeasure service life, cost and effectiveness; and

5. safety project benefit/cost ratios, for use in planning and budgeting.

In addition, many communities have witnessed a growing portion of their limited budgets being consumed by the increasing costs of litigation resulting from crashes within their jurisdictions. The systematic use of this manual to develop traffic safety improvement priorities within available budgets will prove useful in defending against traffic crash litigation.

USING THE MANUAL

This manual describes a comprehensive approach to traffic safety analysis, from collecting potentially useful information to ranking tentative solutions. The scope of each remaining chapter is as follows:

- *Chapter 2* - Data Collection and Maintenance -- Eight types of data useful in understanding traffic safety problems are described, along with manual and computerized methods for maintaining such data for easy access.

- *Chapter 3* - Identification of High-Crash Locations -- Considerations in defining suspect locations are first reviewed. Seven methods of analyzing and ranking crash histories are then presented in detail. Lastly, several of these alternative methods are illustrated using data for a hypothetical intersection.

- *Chapter 4* - Determination of Countermeasures, Crash-Reduction Factors and Costs -- A methodology is presented and illustrated for identifying a location's crash patterns and possible causes

and countermeasures related to those patterns. Specific countermeasures are listed for consideration, along with representative values for their effectiveness and cost.

- *Chapter 5* - Benefit/Cost Analysis -- A methodology for evaluating the economic attractiveness of alternative crash countermeasures is presented and the application of a detailed worksheet reflecting this methodology is illustrated using a continuation of the previous intersection example.

- *Chapter 6* - Summary and Conclusions -- The manual is summarized, parts open to expansion and/or refinement are identified and conclusions are drawn regarding the expected near-term usefulness of the manual.

While the Traffic Safety Manual presents a comprehensive process for safety analysis, it should be recognized that opportunities will arise for applying selected parts of this process. For example, a mayor or council person may perceive a safety problem at an intersection on the basis of citizen complaints alone. He or she may immediately think that a traffic signal would be the best solution to the perceived problem. When staff is asked for its reaction, the first thing to do would be to see if the location is, indeed, a high-crash location possibly deserving of a significant capital investment. Applying the techniques demonstrated in Chapter 3 may show that the location has a better safety record than several other locations already on the waiting list for a signal. If the proposal lingers, Chapters 4 and 5 might be used to show that a signal would not be nearly as cost-effective as improved marking and signing. The importance of meeting the state's signal warrants should also be noted.