

- INTERIM REPORT -

"TASK 2: ANALYSIS OF HIGHWAY CRASH  
PROBLEMS AND PRIORITIES"

VOLUME I:

SUMMARY OF PROBLEMS, RELATIVE  
PRIORITIES, AND METHODOLOGY

Prepared for

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## FOREWORD

This is the first of two volumes summarizing activities and results of Task 2: Analysis of Highway Crash Problems and Priorities, of the Oakland County Safety Demonstration Program. As originally stated,

"The goal of this task is to produce a thorough and deep understanding of Oakland County and its highway crash problem. Incisive and accurate facts must be the foundation upon which the ultimate management system and the countermeasure programs are constructed. Both the facts themselves and the procedures to obtain these facts need be documented and communicated in an effective manner, so that HSRI and a broad spectrum of the Oakland community can creatively respond with focused remedial action."\*

This volume offers the results of that task and summarizes the methods used for problem identification and priority setting. Volume II, separately bound, is a data appendix containing all the analysis material generated in working with the mailed questionnaire survey, mass data analysis, and task force operations.

Although prepared by HSRI, the material presented in this working-paper report reflects the joint efforts of the TIA and HSRI staffs, supported by several hundred County traffic safety practitioners who participated by mail or in person as interviewees or Task Force members.

\*From "A Proposal to the Traffic Improvement Association of Oakland County, Michigan for consultative Support to the Safety Demonstration Program for Oakland County, Michigan;" Highway Safety Research Institute, p. 11.

## CONTENTS

1.0	Introduction .....	1
2.0	Identified Problems and Priorities .....	3
2.1	General Considerations .....	3
2.2	Specific Priority Problems: Rationale and Description .....	7
2.2.1	First Priority Problems .....	11
2.2.2	Second Priority Problems .....	30
2.2.3	Third Priority Problems .....	46
3.0	Review of Problem and Priority Identification Methods ...	57
3.1	Mass Data Analysis .....	63
3.2	Mailed-Questionnaire Survey .....	73
3.3	Task Forces .....	81
4.0	Conclusions and Recommendations .....	91
4.1	Problem Content .....	91
4.2	Problem Methods .....	92



## 1.0 INTRODUCTION

The development of a County-wide, coordinated traffic safety program must start with a County-wide coordinated effort to identify the variety of problems, and symptoms of problems, that are reflected in failures, i.e., crashes, violations, retarded flow, etc., in the County's traffic system. The federally-funded demonstration program being operated by the Traffic Improvement Association for the Oakland County Board of Commissioners has completed that program phase involving initial, coordinated identification of problems and their apparent relative criticality.

This problem identification phase actually had two goals:

1. The development of practical, effective methods and procedures for identifying traffic safety problems, and hopefully their root causes, and concomitantly,
2. The application of those methods and procedures to produce, for this time period, an ordered listing of the County's problems and causal factors.

The report that follows summarizes the activities and results to date relative to those two goals. Thus, Section 2.0 presents in considerable detail those characteristics and activities of the human, vehicle and roadway elements of the traffic system that have been identified as problems in Oakland County. Subsequently, Section 3.0 treats the combinations of data analysis, interview, questionnaire and task force methods used to generate the priority

problem descriptions of Section 2.0. Included in that final section is a critique of the problem identification and priority establishment methods used, from which is derived a recommended set of methods for continued use by the County for periodic up-dating through analysis of regional traffic safety problems.

## 2.0 IDENTIFIED PROBLEMS AND PRIORITIES

### 2.1 GENERAL CONSIDERATIONS

This section focuses on the identification of those factors in the Oakland County traffic system which are most important in their contribution to traffic crashes and crash effects. To minimize confusion and to encourage concentration within the perspective of this discussion, it is necessary first to define what is encompassed in this problem description and to state what is excluded.

The problem-oriented approach undertaken in this analysis concentrated on the highway crash as the ultimate problem. Component elements--and their complex inter-relationships--of the highway transportation system were examined in an attempt to identify their contributions to the highway crash experience in Oakland County. Therefore, the resulting description of problems deals with factors with a rather direct role in crash causation and crash severity. The problem description specifically omits study of deficiencies in traffic safety program operation which may or may not be a partial cause of the problems herein specified as priority problems. For example, a first priority problem is characterized as "poor attitude and emotional immaturity." This problem area is seen as an immediate factor operating toward crash causation. It might be that insufficient law enforcement, inadequate emphasis on driver education, etc., combine to allow poor attitude to continue. Nonetheless, for the purposes of an initial problem description, it is felt that the immediate link with the ultimate problem--the crash--has to be of foremost concern. In the next phase of the demonstration program dealing

with countermeasure design, detailed attention will be given to current Oakland County traffic safety program activities and any of their deficiencies which may be critical factors in the problem area.

Furthermore, consistent with this approach concerned with those factors intimately related to the highway crash, problems described herein pertain to failures manifested within the highway transportation system--which might appear to neglect crucially important "root" causes. That would, indeed, be an inaccurate depiction of the traffic accident problem, and, if treated as such in countermeasure program design and operation, would severely inhibit long-term amelioration of the County's crash experience. Therefore, it is important that these specific problem and priority statements be placed in a larger, more general context.

We know, for instance, that the traffic accident problem has its derivation as well as consequences in the very fabric of our society. And so it is with all of the complex problems of our society. We also know that there are not simple unilateral answers to these complex problems. So while considering primarily "crash causation," we must also consider the "complex," or the relationship between these crashes and other phenomena. Each crash includes interacting human, vehicle, and environmental factors which, when taken collectively over our society, produce the current undesirable accident situation. For instance, the road and environment in which accidents occur is partially determined by a traditional and outmoded city form which places home and work in random relationship to each other, and requires



over 30% of its land surface for the transportation of people and goods from point to point. Human performance on the road is a complex function of the "human condition,"--the demographic, social, and political conditions under which people live, as well as the absence of convenient, alternative forms of transportation. We must consider the short run problem of the accident itself, but we must also consider those larger, long run conditions which ultimately license the overall problem.

Oakland County itself has a traffic accident problem which is in many ways typical of other geographic areas which are similar in social and political content. We cannot at this point say that Oakland County is better or worse off than those other typical counties, or that any particular jurisdiction within the county is better or worse. We simply do not have sufficient understanding of those human and environmental conditions in each unit which host accidents. We can, however, generalize about these overall considerations.

Oakland County is a rapidly urbanizing area of approximately 900,000 people and is growing at about 30% per decade. The population could double by the year 2000. That means twice as many people and vehicles and twice the facilities, including transportation, to accommodate the conduct of society. The accident situation will change with this dramatic change in environment. It behooves Oakland County to become, in a coordinated fashion, involved in the consideration of environmental and social problems in order to eventually realize a better and safer environment.

Oakland County does not, of course, exist by itself. 21% of the accidents in the County have drivers who live outside the County. Freeway traffic composition runs as high as 40% non-resident in some sections. This would seem to indicate that the County must participate as much as possible in the "regional" consideration of mutual problems.

Because this project is conceived primarily as a County-wide effort to remedy highway crash problems within the region, project staff consciously attempted to limit the problem analysis to those problem areas which could be influenced by County action--perhaps with state and federal assistance, and about which the local practitioners had expertise and knowledge. A result of this limitation, however, was to remove from immediate purview the consideration of initial issues stemming from problems directly within the highway transportation system. Most important of these issues was that of motor vehicle design defects contributing both to accident causation and accident severity. Task force participants were most adamant that this problem area be cited because of their conviction of the importance of design-related, vehicle defects. To the extent that County activities can cause improvement in this area, the nature and magnitude of the problem may warrant such activity. The knowledge available to this study and the potential within Oakland County to significantly impact this problem provides little more than the recognition of national progress toward solving this problem and an encouragement to vigorously proceed--as national priorities may indicate.

In summary, the priority problems in this report are actually

symptoms of problems in a larger context. We must attack these because we cannot wait for long-run solutions. However, we cannot neglect the large problems, if we are really to succeed in the amelioration of traffic accidents.

## 2.2 Specific Priority Problems: Rationale and Description.

Given those general contextual considerations, the remainder of this section seeks to provide a comprehensive and in-depth discussion of the deficiencies within the highway transportation system which contribute to crash causation and crash severity in Oakland County. The presentation of these problems is organized into three levels of priority--levels which are intended to reflect the importance of each problem area in terms of crash causation and severity. The three priority levels establish the relative importance of groups of problems, and no attempt is made to rank specific problems within the major category. In the problem discussion, the rationale for each priority position is stated.

The actual problems discussed are those deemed important or significant to the Oakland County highway crash situation. The discussion will not include all possible problems, nor will it deal with identifiable traffic problems which are not significant to the Oakland County crash situation. Further note that the problems identified are "pure" problems--"pure" in the sense that the methods used to identify the problems emphasized total concentration on what appears wrong with the County traffic

system, exclusive of what might be done to correct the wrongs.  
A problem is a problem regardless of its current tractability.  
Further, a complete problem review is necessary for coordinated  
countermeasure design, an activity planned for later in this  
Oakland County demonstration program.

Throughout this analysis, there was a constant awareness  
that a number of inter-related factors had to be present for a  
crash to occur and that perhaps another set of inter-related  
factors in combination with crash causation factors would  
determine the severity of the crash. Therefore, this report is  
offered with full recognition of the difficulty in divorcing these  
factors from each other and subsequently singling out individual  
contributing roles. Furthermore, the task of ascribing values  
of importance to individual factors in isolation from others is  
equally complex. Nonetheless, as an initial step toward devising  
an effective countermeasure program, it is necessary to define  
with some precision and accuracy the most critical components of  
the accident experience of Oakland County.

This sensitivity to the intricacies of the crash problem  
lead to a comprehensive examination of various deficiencies,  
problem sources, and their inter-relationships. In terms of  
criticality to the County's actual crash experience, problems  
contributing to crash causation should be given foremost priority--  
without overlooking some very important and specific deficiencies  
which contribute to crash severity. Within problems of crash  
causation, the human and roadway elements of the highway trans-  
portation system are found to be of primary importance--with the

vehicle of important, but secondary concern. Of those problems which combine to determine the severity of the crash, again the roadway and human elements are considered to be of major importance in this County--with the vehicular role of a relatively lesser concern.

Within the above general statements of priority, of most significance are the specific inadequacies and their position among the three levels of priority used here. These will be examined below--again, reiterating that problems within a priority level are not ranked. Recognizing the multifaceted nature of the highway crash problems, comparative importance is conveyed by establishing first, second, and third levels of priority; and problems described within a level are deemed to be of relatively equal importance to the crash experience. It should be noted that problems included in the third priority level are not regarded as being of no importance. Rather, they constitute a third level of significant problems. There may be other unmentioned problems which exist but which are relatively unimportant to the traffic crash situation.

To provide an overview of the discussion that follows, Table I summarizes the groups of problems contained in each of the three priority levels. The discussion that follows treats each of those identified problems in turn. A note of caution relative to the following discussion: the problem description is only as precise and valid as the methods used in the identification process. Those methods, and their inherent limitations, are examined in Section 3.0 of this report.

TABLE I: PROBLEM AND PRIORITY SUMMARY

FIRST PRIORITY PROBLEMS:\*

1. Poor attitude and emotional immaturity of the young and the bad driver.
2. Impairment induced by alcohol and/or stress
3. Low skills in non-routine and crisis situations
4. Inadequate extrication and treatment of injured at crash scene; delivery to inappropriate hospital emergency facility
5. Inadequate roadways

SECOND PRIORITY PROBLEMS:\*

1. Impairment induced by prescription drugs, fatigue and distraction
2. Inappropriate child and teenage pedestrian behavior
3. Poor vehicle condition
4. Improper operation of bicycles, motorcycles and snowmobiles
5. Inadequate crash scene management
6. Lack of qualified hospital trauma care facilities

THIRD PRIORITY PROBLEMS:\*

1. Impairment induced by narcotics and hallucinogenic drugs
2. Inadequate routine driving skills
3. Low knowledge of hazards, risks and regulations
4. Impairment due to chronic physical or mental disability
5. Accident prominence of commercial and special-purpose vehicles
6. Inadequate vehicle assembly
7. Failure in detecting crashes
8. Inadequate traffic control at crash scene
9. Low preparedness for crash fire response
10. Low preparedness for crash debris removal
11. Disrepair of roadway and accessories
12. Specific hazards in roadway

\*Order of problems within a "priority" block does not indicate relative order of importance.

## 2.2.1 FIRST PRIORITY PROBLEMS

### A. HUMAN ELEMENT

Among the human conditions which lead to over-involvement in highway crashes, severe problems originate in the state of the individual just prior to crash involvement. This is further defined as encompassing three specific problems:

- (1) Poor attitude and emotional immaturity
- (2) Induced impairment: alcohol and emotional stress
- (3) Insufficient skill in non-routine and crisis situations

Although these characteristics are common to most persons who become involved in Oakland County accidents, they are most evident in three groups which are indicated as highly involved in crashes: the young driver from 16 to 25 years of age, the drunk driver, and the bad driver who exhibits chronic deviant characteristics through a long history of violation and crash experience.

#### 1. POOR ATTITUDE AND EMOTIONAL IMMATURITY

##### a. General Problem Description.

This problem is felt to be an extremely important factor in the causation of Oakland County crashes. It is placed among those of highest priority, because of

the strong concern expressed in the questionnaire survey and the task force meetings. Although it cannot be analyzed directly through the crash data, the problem is well documented in current literature examining the young, and the chronically bad drivers. It seems equally well established in the experience of officials who must deal with those errant drivers as part of their professional responsibilities.

The problem of poor attitude and emotional immaturity is generally defined by characteristics of the mental outlook and decision-making framework of the driver, opposed to any mental or emotional impairment of a chronic or continuing nature. As discussed below, the Oakland County driver--on the average--is relatively knowledgeable, skillful, and physically and mentally capable. However, often the knowledge is ignored and the skill and capabilities are severely taxed because attitudinal and emotional factors become paramount, thus superceding rational decision-making and impeding safe driving performance. Unfortunately, we know very little about the detailed causes of this type of behavior.

With less than full attention to the traffic tasks and with a mental outlook which does not perceive--or drastically under-values--risk or hazard, the driver



fails to assess accurately a potentially dangerous situation as it evolves--or may fail to make any assessment. The individual then finds himself in a near-crash situation from which he must attempt to extricate himself immediately--relying on accident avoidance skills in which he probably has very little experience (see later discussion).

Therefore, poor attitude and emotional immaturity can be seen as critical components in the crash causation chain. They often cause the motorist to trap himself in urgent situations which carry him up to, and possibly beyond, his limits of knowledge and skill.

b. Specific Problem Concerns.

A major facet of this problem is a generally poor attitude which disregards the risks of physical harm, property damage, or legal sanctions. This is attributed, in part, to the American ethic which idealizes the daring and the adventuresome. This attitude problem is especially prevalent in three areas:

- 1.) The Young Driver -- many users of the highway transportation system lack sufficient emotional maturity to respond to the urgent demands for reasoned decision-making. Symptomatic of this problem is an inalertness coupled with an ability

to think quickly and rationally where serious risks are involved. This mental outlook, reinforced and encouraged by youth peer-group pressures, produces a young driver who is handicapped because of attitude and immaturity. This phenomenon appears to be more prevalent in young males than in young females. In Oakland County, drivers between the ages of 16-25 represent 23.5% of the driving population and 22% of the miles driven, but 43% of the traffic violation convictions and 37% of the accidents.

2.) The Bad Driver -- certain members of our society chronically exhibit anti-social behavior which is often manifested in the highway environment. It has been well documented that those drivers with "bad driving records" tend to have more accidents. Extensive and flagrant violations of traffic laws as well as repeated involvement in crashes seems to be primarily a function of attitude.

3.) Seat Belt Use -- a highly specific, but critically important problem relating to attitude is that of utilization of available safety equipment. Most popular of these is the neglect and refusal to use seat belts in cars.

2. INDUCED IMPAIRMENT: ALCOHOL AND EMOTIONAL STRESS

a. General Problem Description.

In Oakland County, a large number of highway crashes result from the temporary impairment of a driver's physical and mental capacities due to the abusive use of alcohol, and to severe emotional upset. Both types of impairment operate to reduce substantially the driving performance and thus lead to crash involvement--often in the most severe crashes.

All three analyses--mass data, questionnaire survey, and the task forces--confirm that the alcohol impairment of drivers is an extremely serious problem. The role of severe emotional stress is difficult to ascertain, but considerations within the task force meetings indicate that this also is a problem meriting a high priority position.

b. Specific Problem Concerns.

1.) Alcohol -- Consistent with the growing awareness across the nation, concern is evident in Oakland County about the traffic toll involving the driver who is under the influence of alcohol.

Admittedly, there is an absence of clinical evidence about the role of alcohol in these crashes,

but the Oakland County crash statistics report alcohol as a factor in a large portion of the accidents (15.2% and is believed to be under-reported) and show alcohol to be especially over-represented in fatal crashes (38.3%). Unquestionably, the crash involving alcohol is usually more severe: a fatality occurs in 1.3% of the alcohol involved crashes compared with .4% of those where drinking is not detected; 49.1% of the alcohol-involved crashes result in personal injury, whereas only 37.1% of the crashes where drinking was not involved resulted in personal injury. Through the task forces and the questionnaire survey, there was a strong expression from those who daily deal with highway crashes that alcohol is a major contributor to highway crashes and their severity.

Alcohol is seen as a primary factor in crashes involving all age groups, but is dramatically over-involved in the young, male driver. Drivers within the age group of 20 to 30 years represent 24% of the driving population and 34% of the alcohol-involved crashes--with this over-involvement attributed mainly to the males within that group. The ages 20 and 21 are heavily over-involved in convictions of the

violation "Driving Under the Influence of Liquor," representing 6% of the driving population and 14% of the DUIL convictions. The young driver, ages 16-20, is judged to be particularly dangerous with his alcohol use, as he is both an inexperienced driver and an inexperienced drinker.

The alcohol-related crash stems from both "social" and "problem" drinkers who drive. An estimated 25,000 persons within the County are considered to be alcoholics, with an additional 25,000 problem drinkers or near alcoholics. It is assumed that many of these people drive and therefore must have drinking-driving problems.

A serious problem related to the use of alcohol and driving concerns the combined use of prescription and over-the-counter drugs with alcohol. Combined use may have a compounded deleterious effect-- a fact of which few drivers are aware.

2.) Severe Emotional Stress -- This is an area about which little definitively is known, but much is suspected. Often temporary conditions of emotional upset will surface in the traffic environment in such a way as to play a major role in causing a crash. Conflict, repressed aggression, severe grief

and other emotional stresses are released in driving, often substantially overriding normal precaution and attention to driving tasks. It was felt that this mental stress occurred frequently enough to warrant major priority as a crash causation factor.

3. INSUFFICIENT DRIVER SKILL IN NON-ROUTINE AND CRISIS SITUATIONS

a. General Problem Description.

It seems that Oakland County residents are adequately skilled to operate a vehicle under normal or optimal driving conditions. However, serious problems arise when new or unfamiliar conditions are encountered--for which skills have not been previously developed. The range of roadway environments and vehicles experienced in the County, when coupled with the problems of induced impairment, emotional condition, and attitude, over-tax these minimal skills and lead toward crashes. This is a problem of high priority which became evident primarily through the task force examination of crash problems.

b. Specific Problem Concerns.

1.) Panic Conditions -- There was unanimous concern for this problem, identified as the inability of most drivers to react to panic, or near-crash situations,

in a manner that will avoid or minimize crash consequences. Recognizing that a mix of human, vehicular, and roadway elements will cause individuals to enter situations with a high probability of a crash occurring, it is apparent that few have any skill in extricating themselves from such situations. Critical reactions in the moments immediately prior to a potential crash will substantially determine whether or not the crash results and, if so, the degree of severity. Yet, skills in these reactions are inadequate--either because of infrequent exposure to the situation or neglect in training.

2.) The Young Driver -- The young driver develops skill through actual driving experience. Until he has gained a variety of experiences in a range of both normal and unusual driving conditions, he is inadequately prepared for the spectrum of hazards which can be anticipated in Oakland County travel.

3.) Varying Environmental Characteristics --

Hazardous weather conditions--Michigan suffers extreme road conditions due to inclement weather, such as rain, snow, ice, etc. Most motorists are not adequately trained to handle these conditions. Some 3% of the crashes involved factors of either snow or "slippery when wet."

Varying roadway environments--Oakland County offers the full gamut of roads, traffic densities, congestion, and speeds--from expressways, to dense urban arteries, to unpaved rural roads. Motorists develop fine skills for use in their normal travel routes, but do not have a broad range of skills sufficient to meet the widely varying conditions and rapid changes in traffic character and composition.

In summary, the various aspects of driver behavior discussed above are seen as important to the total crash picture, but yet very difficult to assess and measure, and perhaps even more difficult to change. Even so, they constitute a very important problem--properly placed in the high priority category.

B. POST-CRASH ELEMENT

1. EXTRICATION AND TREATMENT OF INJURED AT THE CRASH SITE

a. General Problem Description.

Crashes resulting in serious injury are a relatively small proportion of the total crash experience. But the full severity of the crash and the toll on the humans involved will be determined, in large part, by the rapidity and quality of medical treatment and repair. Even though the numbers are not large, the consequences are



crucial and, thus, deficiencies in this area warrant relatively high priority in terms of the total highway safety needs. The Task Force agreed that the most critical aspects of treatment and repair deal with actions taken at the scene of the crash.

This problem area consists of three specific phases:

1.) Extrication of the injured from the wrecked vehicle or removal of the injured from hazardous location. This involves an important evaluation of the injured's exposure to further hazards versus the relative probability that moving the injured might aggravate the injury. Two factors are critical in this phase; timeliness in terms of reducing further risk, and skill in moving the injured so as not to compound the injury.

2.) First aid at the accident scene. The seriously injured must have immediate initial treatment which is appropriate to the injury. Again, the critical factors here are twofold: the period of time from when the injury occurred to initial treatment, and the quality of that treatment.

3.) Transportation of the seriously injured to a qualified hospital emergency facility. Three factors operate here: (1) quality care should be available during the transportation process; (2) transportation should be expeditious, but not unsafe for the injured

victim or hazardous to other motorists; and most importantly, (3) the transportation should deliver the injured to a competent and capable hospital emergency facility.

b. Specific Problem Concerns.

1.) Most severe highway accident injuries pertain to the upper thorax, neck, and head. Not only are these potentially lethal injuries; but they are difficult to properly diagnose, easy to aggravate by improper handling, and require highly-skilled specialists and equipment. This suggests a need for high quality initial treatment at the accident scene which is often not met for the following reasons:

a.) Citizens are usually the first to be involved at the scene and are poorly trained or equipped to administer proper first aid.

b.) Professional assistance may arrive too late. Although not considered a major problem in urban and suburban areas, accidents in remote rural regions may experience some delay before police and/or ambulances are on the scene.

- c.) The first aid and medical training of police and ambulance personnel often is inadequate for the seriousness of the injury.
- d.) The ambulance equipment is not used efficiently, as they are called to many injury accidents which are not sufficiently severe to require extensive treatment or special transportation. Furthermore, there seems to be no other method of transportation available to those who suffer relatively minor injury, but do require further medical attention.
- e.) The frequency of automobile accidents and other events requiring emergency medical services varies with population density, resulting in a heavy concentration of emergency services in the urban and suburban areas. However, the data suggests that many serious vehicle crash injuries occur in the less populated, rural areas which are not so readily served by the existing emergency medical service system.
- f.) The high costs attendant with offering qualified personnel and sophisticated equipment on a continuous basis seem to be beyond the ambulance companies and perhaps beyond the financial limits of the public user.

2.) Serving to compound the problem of quality treatment for the injured is the fact that the entire "system" seems to operate against the delivery of the victim to the most appropriate and qualified trauma center. Throughout the various steps in the transportation of the injured, there is little consideration, or knowledge, of the need to match the severity or complexity of the injury with the competence or capability of the emergency hospital unit. Many factors seem to be in collusion against the traffic victim:

- a) It is often difficult to accurately diagnose the nature and severity of the injury.
- b) The victim--if capable--has the right to name the hospital to which he goes. Often this choice is based on confusion, or ignorance of his injury and the variance in hospital trauma care quality.
- c) Public opinion operates against taking an injured person past a neighborhood hospital to a more distant, yet more competent, emergency facility. Both the police and ambulance personnel are reluctant to risk individual or collective criticism in this regard--especially when they lack confidence in evaluating either the injury or the available facilities.
- d) Hospitals offering quality trauma care are often poorly identified, in terms of geographic location

as well as their competence or capabilities relative to the severity or complexity of the injury. Emergency service professionals-- such as police and ambulance personnel--are relatively unaware of the varying quality in trauma care offered by the various hospitals throughout the County and, therefore, are unable to deliver seriously injured accident victims to facilities capable of responding to the victim's full needs. Laymen are generally ignorant of the quality of care available in the various hospitals and are also not familiar with the location of the facilities in the County. This problem is further complicated in non-resident motorists who may develop emergency problems. In the infrequent cases of severe injury, a most critical factor is the quality of emergency care in hospital facilities. Quality care on the scene and rapid transportation to a hospital emergency room may be irrelevant if the victim is delivered to a hospital unable to provide intensive care, surgical specialists, etc. Not all hospitals advertizing an emergency service can provide the critical elements required for severe trauma.

In general, the entire field of emergency medical services is an area of public ignorance and apathy. A basic cause of the problems discussed above stems from an unawareness of the critical need for these services, the inadequate quality of the services currently available to much of Oakland County, and an unwillingness to pay the rather expensive costs necessary for substantial improvement.

C. ROADWAY AND SURROUNDING ENVIRONMENT

The roadway and its surrounding environment is a significant problem, meriting a position within the first priority category in Oakland County. However, this opinion is given with full recognition that not enough knowledge is available to precisely describe the role of the roadway and its related environment in the Oakland County crash experience.

There is ready admission that an important number and variety of deficiencies exist within the County roadway network and its adjacent environment. Furthermore, there is agreement that these problems are often important factors in determining the severity of the crash. Yet, it is more difficult to attribute these recognized deficiencies to highway crash causation--even though there is reluctant agreement that roadway is an important causal factor.

The evidence indicating the criticality of roadway factors comes from all three analytical sources--the mass data, the questionnaire survey, and the task forces. The questionnaire survey analysis reported the strongest indictment of the roadway problems, singling them out as the greatest concern of the highway safety practitioner sample. Congestion, over-crowded roadways, and outdated or inadequate roads were the highest priority items. Dangerous road condition due to lack of maintenance and inadequate emphasis on safety in roadway design were considered to be important problems in the County as was the problem of inadequate roadway lighting. The mass data analysis gives some further insight into this overall problem area. Accident and severity rates are generally functions of population and traffic density. The accident rate increases and the severity rate decreases as the population density increases. Therefore, as the County undergoes increased urbanization, one would expect:

(a) more accidents and a higher overall accident rate, and (b) more fatalities but a lower fatality rate. The problem is increasing in magnitude and changing in character.

The task forces concluded that many problems encompassed within the roadway and its environment often serve as important contributors to both crash causation and crash severity, but were unable to relate with confidence a specific deficiency to a direct crash factor. It is evident, however, that there are a multitude of roadway deficiencies within Oakland County--many of which stem

from the rapid pace of urbanization and the lag in the development, expansion, and maintenance of the County's transportation system. This transportation system is heavily burdened by the transport needs of its rapidly growing population, the immense commuter traffic traveling relatively long distances for recreation and occupation, and the large amount of general transit through the County between the metropolitan Detroit area and out-state Michigan.

The rapid growth and change in Oakland County has created some severe problems in highway transportation. Highway planners are confronted with the need to improve existing roadways as well as to design new roadway systems. Furthermore, highway plans often are prematurely obsolete because of major changes in land use adjacent to the roadway. On the other hand, it seems that land use planning does not give sufficient attention to expanded transportation needs and attendant safety problems.

Heavy road use, combined with a climate hard on roads, produces a great number of repair and maintenance problems, which require the use of resources otherwise available for expanding and improving the system. As a result, there are heavy traffic demands on roads often inadequate to the high demand and type of traffic. Constant growth and change have sapped the ability of the County's highway network to safely transport people and goods.



In summary, this report is unable to specify in detail the critical problem components other than by the following general statements--which ought to receive amplification as the County safety effort progresses. Principal roadway factors in crash causation and severity seem to be:

- 1) Road use -- defined as heavy traffic density, speed, congestion, over-capacity, and major traffic spillover on to secondary routes;
- 2) Roadway and environmental dynamics -- in terms of poor traffic flow due to road design, geometrics, abutting land use, combined with the above described road use; and
- 3) Roadway condition -- as surface traction and state of repair, obstacles, lighting and visibility, shoulders, lane markings, inclement weather, etc.

## 2.2.2 SECOND PRIORITY PROBLEMS

The problems discussed in this section are considered to be important contributors to the Oakland County accident experience, but less critical in overall highway safety deficiencies than those problems described in the corresponding section under First Priority Problems.

The reasons for placing these problems in this priority position are twofold:

- (1) There is not sufficient documented evidence of the problem's role in crash causation and severity to warrant a highest priority ranking, but experienced practitioners indicate the impact of the problem to be significant and therefore to merit a mid-priority position; or
- (2) The available statistics and research findings strongly suggest these problems deserve a priority subordinate to others; yet are problems more important than some, and therefore should be characterized accordingly.

### A. HUMAN ELEMENT

There are two major problems pertinent to this second priority level:

- (1) Induced Impairment in the forms of the effects of prescription drugs and over-the-counter medicines, fatigue, and other miscellaneous driver distractions; and
- (2) Pedestrians -- especially the child and teenage pedestrians.

1. INDUCED IMPAIRMENT: PRESCRIPTION DRUGS AND OVER-THE-COUNTER MEDICINES, FATIGUE AND DISTRACTION

- a. General Problem Description.

As depicted in the previous section dealing with problems of induced impairment, the concern here focuses on the temporary incapacitation of the human (primarily the driver), which reduces the driving performance so that it becomes an important causal factor in accidents--often the most severe crashes. Rational assessment of traffic risks is inhibited or obliterated, leading to the near-crash situation and the problems discussed earlier relative to accident avoidance skills.

- b. Specific Problem Concerns.

- 1.) Drugs -- Drugs generally are a serious social problem, but are yet to be manifested in large numbers in the County crash experience. This is suspected to result, in part, from the current inability to detect the presence of many drugs within the human body.

Nonetheless, drugs are considered a significant problem in the adult use--or abuse--of licit drugs, prescription and over-the-counter medicines. In today's society, one can assume that a large portion of the driving population is using prescribed drugs, as well as diet pills, pep pills, tranquilizers, patent medicines, etc. Most are unaware of the potential side effects of these drugs--especially as they might relate to driving tasks. A very serious side effect can be the synergism between drugs and the consumption of alcohol. It is felt that this problem of licit drugs greatly exceeds popular notions and warrants extensive study and action.

2.) Fatigue -- Fatigue greatly diminishes one's ability to remain alert and perform complicated traffic tasks. Yet, many persons drive after exhausting recreational or occupational activity. The afternoon commuter rush hour experiences a heavier accident rate than morning rush hours-- which may be partially related to fatigue. Also, the weekend traffic toll may reflect crashes occurring after long periods of driving which followed a full day of work or a tiring period of recreation.

3.) Driver Distraction -- Inattention and distraction are frequent contributing factors to highway crashes. The dynamic and complex nature of the traffic environment requires concentration and attention to the driving tasks. Factors which dilute or distract this concentration may be the following:

-Monotony arising from boredom, "highway hypnosis," etc.

-Pre-occupation with problems unrelated to the immediate traffic tasks, such as problems with the job, at home with the wife or children, conflicts with other people, etc.

-Distraction due to activities outside the car-- confusion over signs and routes, gawking at a crash, etc.

-Distraction due to activities within the car-- active children and pets, a sick or crying child passenger, etc.

## 2. PEDESTRIANS: CHILD AND TEENAGE

### a. General Problem Description.

The pedestrian accident deserves priority concern because of its severity, even though occurrence is relatively rare. 1.9% of all the highway crashes in Oakland County, during 1969, involved a pedestrian.

However, the fatality rate for pedestrian accidents was ten times greater than that for all crashes--6.2% for pedestrians compared to .6% for all persons involved in all crashes.

b. Specific Problem Concern.

The principal victims of pedestrian accidents are young people. The heaviest involvement occurs to those of pre-school age through age 15; a slightly less rate continues through the later teenage years.

Most pedestrian accidents happen during the daylight hours from early afternoon through early evening. Thus, it can be assumed that most child and teenage pedestrian problems are not related to transportation to and from school, but concern after-school activities in the neighborhood.

Child pedestrian crashes are a function of their immaturity--a general inalertness coupled with an inability to think quickly and rationally where serious risk threatens. Emotional immaturity is also a problem with the teenage pedestrian, but equally important is the problem of poor attitude--similar to the problems discussed pertaining to the young driver.

B. VEHICLE ELEMENT

Generally, there exists little evidence to link motor vehicle factors directly with crash causation, although the vehicle contribution to injury severity is well documented in the literature. Injury severity due to automobile factors is related primarily to the vehicle's design and manufacture, which is beyond the immediate purview of this County effort. Therefore, the vehicle role in crash and injury causation does not justify consideration as highest priority in Oakland County's total highway safety problems.

However, in the process of applying local expertise, practical experience, and intuition to the examination of possible vehicular problems, there was increasing indication of problems that could or should lead to accident involvement or serious injury. Two problem areas were of particular concern, such as to warrant treatment among second priority items. The following two problems are recognized deficiencies which play an important, though ill-defined, role in the County's accident experience:

- (1) Motor Vehicle Condition -- Due to deterioration from normal wear and use and from previous crash involvement, vehicle performance degradation may occur to the point of contributing to crash causation and/or injury severity.
- (2) Bicycles, Motorcycles, and Snowmobiles -- This group of vehicles requires special skills in their operation and afford little protection to the operator in a crash.

1. MOTOR VEHICLE CONDITION

a. General Problem Description.

The automobile is not constructed to last forever. Normal motorist use and abuse of the car will cause gradual deterioration within the overall machine and its components. Climatic and road conditions in Michigan could accelerate that deterioration.

Furthermore, many motor vehicles are critically damaged in highway crashes--damage that is severe, difficult to diagnose or detect, and complex and expensive to repair. It is suspected that many cars which have been previously involved in a crash have not been repaired adequately, yet are driven regularly.

The Oakland County vehicle population contains a significant number which are in various states of disrepair. This is supported by the high rate of failure in the random motor vehicle inspection program. The Oakland County crash data indicates that some 3% of the vehicles involved in crashes were reported by police to be defective. This rate increases with age--for cars ten years old, it was almost 8%. Many feel that this problem is under-reported because of the difficulties in detecting such defects after a crash.



When this deterioration or crash damage occurs to a critical point, it often will effectively reduce the safety-related performance of the vehicle and contribute toward accident causation and possibly injury severity.

b. Specific Problem Concerns

1.) Normal Deterioration -- This problem of vehicle condition is further compounded by the ignorance and neglect of the vehicle's owner or operator. In normal use, most owners are unaware of their vehicle's general condition and potential deficiencies. When aware of seemingly less-than-critical or inconvenient deficiencies, owners fail to have repairs made. This is particularly true in neglect of "housekeeping" maintenance, such as functioning windshield washers, etc. Insurance experience indicates that owners will often recognize damage, collect insurance proceeds, and still not have the car repaired.

2.) Inadequate Repair -- Another aspect of this problem concerns inadequate vehicle repair practices as may be performed by a repair garage, auto dealer, etc. The problem, to the extent that it may exist, is that a vehicle owner may become aware of a deficiency or hazardous performance and yet be unable to secure adequate repair services and a full correction of the problem. Often the problem arises when the

owner expects that regular, routine servicing will locate deficiencies, bring them to his attention, and/or cause their repair. In either event, the problem is compounded by the owner thinking that the repair has been made satisfactorily and continuing to operate his car with a false sense of confidence that it is capable of expected performance.

3.) Inadequate Repair Practices -- The following are offered as possible causes for this problem.

- a. A serious under-supply of qualified mechanics.
- b. The economics of the repair business and the inability to pay high salaries for competent personnel or to purchase expensive diagnostic and repair equipment.
- c. The unwillingness of the consumer to pay for expensive, high quality service.
- d. The highly-competitive merchandising practices which promise expert safety-related services which cannot be performed at the advertised low cost.

## 2. BICYCLES, MOTORCYCLES, AND SNOWMOBILES

a. General Problem Description.

With its diversity in recreation and population--plus its relative affluence, a variety of vehicles are used

in transportation within Oakland County. Bicycles, motorcycles, and snowmobiles have become significant problems in the accident experience--with relatively infrequent occurrence, but high fatality and serious injury rates.

Registration and accident records are not maintained for each of these vehicle types, so that one cannot ascertain over-involvement in crashes in proportion to the vehicle population, but crash figures indicate these vehicles are involved in 2% to 4% of the total crashes in the County. The factor that causes these accidents to merit a high priority position is that an extremely high percentage of the accidents are accompanied by death or severe injury.

b. Specific Problem Concerns.

The design of these vehicles afford no protection to the user in a crash.

Most driving skills are acquired in the operation of cars, providing little in development of the specialized skills required for the rather demanding operation of motorcycles and snowmobiles. The same pertains to the bicycle, except for the youth who has even had no experience or training in vehicle operation in traffic conditions--plus is handicapped further by his immaturity and attitude.

Bicycles, motorcycles, and snowmobiles fare poorly in traffic conditions because of their treatment by other drivers. These smaller vehicles are less visible. Also, the car driver tends to disregard the need for extreme caution when operating in an environment with these other vehicles.

C. POST CRASH ELEMENT

As described previously, problems within this element encompass deficiencies in the emergency response to a highway crash. Inadequacies in that response will contribute further to the severity of that crash--especially in terms of the seriously injured victims, but may also lead to additional crashes caused by traffic conflict with the crash site and its debris.

These problems and their criticality became evident primarily through task force consideration of the County's crash experience. The police-reported crash data was not amenable to analysis in this area. The low level of concern for these problems expressed in the survey questionnaire is attributed to a general lack of awareness of these, nonetheless, important deficiencies.

Several specific problems were identified which hinder the efficiency and effectiveness of the emergency response. Although these are not of a magnitude to dramatically cause further severity or additional crashes, if not soon remedied, these problems have

the potential to amplify considerably the crash consequences. These problems which deserve second priority position are:

(1) Inefficiency in Crash Scene Operations:

- (a) the absence of a designated and qualified person in charge of coordinating the multitude of activities and service operations at the crash scene;
- (b) the inability of those on the scene to accurately diagnose the emergency needs and then to communicate definitively those needs in terms of specific emergency services; and
- (c) the absence of a communications network that can rapidly command into action and coordinate the battery of services that are required.

(2) Need for Qualified Hospital Trauma

Care Facilities -- The quality of trauma treatment and repair available to seriously injured crash victims is a primary determinant of survival and the extent to which a return to full health and capabilities will be possible. The severe and complex injuries associated with the serious crash require continual availability of qualified personnel and appropriate facilities and equipment.

1. INEFFICIENCY IN CRASH SCENE OPERATIONS

a. General Problem Description.

The multitude of urgent needs at the accident scene often result in confusion and inefficiency. Needs are many and pressing: the extrication of and medical treatment for the injured, traffic control around the crash site, crash-related fire, crash debris hazardous to traffic, and critical disrepair of the roadway, roadside fixtures, or utilities. The specific nature of these needs must be ascertained in a short period of time and priorities established. Appropriate emergency services must be contacted and brought into action in a coordinated manner so that priority objectives are promptly achieved.

b. Specific Problem Concerns.

The absence of a designated and competent person in charge of coordinating the concurrent activities and service operations can crucially impede action and aggravate crash consequences. Few professionals are trained and equipped to manage effectively the full emergency operation.

First to arrive on the accident scene is usually a citizen or even a professional who is insufficiently prepared to analyze the complex spectrum of emergency problems.

Often the crash is reported in an irrational or excited manner which does not provide full and accurate information on specific needs. This then leaves the recipient of the report with the burden of determining the emergency status and establishing his own priority and sense of urgency. Some agencies are reluctant to provide full and immediate services until the report has been confirmed and the needs properly ascertained. On the other hand, some agencies will rapidly supply maximum services and later discover that the needs did not justify that response.

The need for rapid communication with a variety of service agencies is obvious. However, some problems exist here in that few of the pertinent agencies maintain communications systems on a continuing basis which connect several agencies across jurisdictions. To the extent that these exist, they often are utilized only for catastrophic situations.

A specific aspect of this problem is the general lack of communication between those transporting the injured victim and the intended destination--an absence of radio communication between the emergency vehicle and the hospital emergency room. This impedes alerting the hospital to the forthcoming delivery and the use of hospital medical staff in advising treatment and care while in

transit. Unfortunately, even where communication equipment does exist, it is not fully utilized. Doctors are reluctant to advise care without seeing the victim, and hospitals often are equally reluctant to initiate expensive preparation for receipt of injured persons without an authoritative diagnosis.

2. NEED FOR QUALIFIED HOSPITAL TRAUMA CARE FACILITIES

a. General Problem Description.

As stated before, severe accident injuries usually involve damage to the upper thorax, neck, and head. Injuries of this type often demand intensive care and repair by highly skilled medical specialists assisted by sophisticated equipment. In these cases, the quality of care appropriate to the complicated injury is initially important--perhaps even more critical than promptness of treatment.

To further compound the problem, severe crashes involving serious injury occur relatively infrequently, often in the early morning and on weekends, and are distributed throughout the more remote regions of the County. Thus, competent hospital trauma care facilities



must be somewhat distributed through the County and must maintain expensive personnel and equipment on a readiness basis which is difficult to justify solely on anticipated usage by highway crash victims.

b. Specific Problem Concerns.

While the common problem of insufficient hospital emergency facilities may exist in Oakland County, the task force discussion indentified a much more subtle problem. There seem to be too many ill-equipped and poorly staffed facilities offering inadquate trauma treatment. Within the County, however, there are several facilities currently capable of high quality care for the injured. However, the design and maintenance of these facilities is not geared primarily to the treatment of traffic accident victims. Unfortunately, the injured persons are not always delivered to the most qualified institutions.

### 2.2.3 THIRD PRIORITY PROBLEMS

Discussion of third priority problems will be brief and cursory. The emphasis will be on establishing the rationale for this priority placement, rather than in-depth characterization of each specific problem. These problems are treated in this fashion for the following reasons:

-Problems cited in this section are considered to be of potential importance, but presently merit a ranking of least priority in context of the Oakland County crash experience. These problems are presented so that they are recognized as such. It is urged that they be carefully monitored to observe increases in importance as the County changes and hopefully remedies problems of higher priority.

-Deficiencies in these areas were anticipated and analyzed as part of this comprehensive effort to define the County's priority problems. However, the available evidence indicates that these specific problems do not deserve priority consideration.

-Extensive discussion of these problems would only serve to detract from the higher priority problems and dilute energies. Until symptoms appear to indicate that these areas are more critical, it is not worth extensive effort in characterization. However, it is of value to document the reasons for placement in the lowest level of priority--so that future observations can measure change from an established departure point or bench mark.

The fundamental rationale for considering these problems to be of lowest priority is the determination of their relatively insignificant contribution to the Oakland County crash experience. This was rather unanimously expressed through all three sources of information: the crash data, the questionnaire survey, and the task force deliberations.

A. HUMAN ELEMENT

1. INDUCED IMPAIRMENT: ILLEGAL DRUGS

It was suspected that use of, and possible addiction to, illegal narcotics and hallucinogenic drugs would be observed in the traffic behavior of young persons. These drugs are sometimes discovered in cars. However, current detection methods make it difficult to determine significant driver or

pedestrian involvement. Also, in the opinion of many highway safety practitioners, this is not presently a serious problem in the traffic environment.

## 2. ROUTINE DRIVING SKILLS

It seems that Oakland County residents are adequately skilled to operate in normal or optimal driving conditions. The demands of daily and routine driving tasks seem not to be beyond the average motorist.

## 3. LACK OF KNOWLEDGE ABOUT HAZARDS, RISKS, AND REGULATIONS

### a. General Problem Description.

This area is considered to be a minor problem, as most drivers and pedestrians are generally knowledgeable about the consequences resulting from their traffic behavior. Furthermore, they have a basic comprehension of vehicle operation, laws, and the inherent risk of crash involvement or disciplinary sanction.

Yet, some aspects of knowledge need attention. This results because of the dynamic character of the traffic environment and its constant change. Also, as society learns more about highway transportation, it tries to minimize the undesirable affects by new regulations, road design, etc.--which may cause knowledge gaps in certain drivers.

b. Specific Problem Concerns.

Although most citizens are familiar with traffic law, the middle-aged and older drivers have not kept abreast of the increasing number of changes in the law.

Certain concepts in traffic regulation, such as right-of-way, are not understood nor properly practiced.

The transportation of children to and from school seems to occur amid some confusion and ignorance among the parents. Parents and motorists generally are unaware of the safety concerns related either to the pedestrian child or the child driven to school. Regulations are not understood which pertain to other motorists approaching a school bus which is depositing children.

4. GENERAL PHYSICAL OR MENTAL IMPAIRMENT

a. General Problem Description.

This is a problem area about which little is known and therefore is thought to be a relatively minor contributor to highway crashes.

The problem is based upon the premise that a certain segment of the population suffers either physical or mental impairments which are more than temporary in nature, such as amputees, the deaf, the near-blind, those with serious mental disorders, etc. These impairments might impede significantly an individual's driving

or pedestrian performance. However, the broad problem of physical or mental handicaps do not seem to be of such magnitude as to cause concern in the highway safety field.

The reasons why this problem is not currently of major highway crash concern may be the following:

- a. The size of the severely mentally or physically handicapped population is relatively small.
- b. Those with severe and obvious impairment do not attempt to use the highway transportation system or are prohibited from such use by those responsible for their care and welfare.
- c. The licensing process may screen out those who are incompetent to drive, but attempt to qualify.
- d. Those not drastically impaired are able to perform the driving functions satisfactorily because they compensate in other ways for their known limitations.
- e. Accident investigations currently performed are unable to detect less obvious and insidious causal factors. Perhaps the problem is greater than now known--primarily because accident statistics do not report these phenomenon.

b. Specific Problem Concerns.

The senior citizen is singled out as the driver or pedestrian most likely to be afflicted with mental or physical impairments--of which he is unaware or unwilling to acknowledge. The older driver does not appear to be over-involved in automobile crashes. Some feel this to be misleading, as the elderly may cause more accidents than they themselves become involved in directly.

Persons afflicted with chronic diseases which periodically manifest symptoms in the form of some physical or mental impairment may contribute to a crash. Little is known about the role of heart conditions, epilepsy, diabetes, and others which may temporarily cause disfunction in the driver or pedestrian.

5. OPERATORS OF SPECIAL VEHICLES

Operation of school buses, commercial vehicles, and emergency vehicles is an area appropriate for concern, as the driving exposure is generally more hazardous and crash consequences can be severe. However, the analysis of the Oakland County crash data indicates that these categories of vehicles are not a significant problem--although, because the size of the vehicle population is unknown, over- or under-involvement cannot be ascertained.

Drivers with chauffer's licenses represent 4.5% of the driver population, but 13.5% of the total mileage driven. They have 10% of the convictions and 7.5% of the accidents. Thus, per mile driven, chauffer license holders have fewer convictions and accidents than do holders of operator's licenses.

B. VEHICLE ELEMENT

1. VEHICLE DEFECTS THROUGH MANUFACTURING PROCESS

Admittedly, there is dangerous potential in vehicles which are improperly fabricated and have serious deficiencies in critical parts. Furthermore, these defects do actually occur. Yet, there is no evidence that automobiles with these defects are disproportionately over-represented in highway crash statistics.

Often the suspected defect is corrected before a failure occurs--either by the manufacturer or dealer before the vehicle was sold or by the subsequent owner. There is some concern that difficulties in notification and owner neglect cause a minority of these automobiles to go without appropriate repair of the defect.



C. POST CRASH ELEMENT

1. UNDETECTED CRASH REQUIRING EMERGENCY ATTENTION

a. General Problem Description.

Undetected crashes are not a significant problem in Oakland County. As a highly populated region with heavy use of its roads, few automobile accidents occur unnoticed.

b. Specific Problem Concerns.

Infrequently, crashes may go undetected for some time-- in either remote, rural areas, or where the vehicle has gone off the road or an over-pass and has submerged under water.

Although a relatively minor problem, the reluctance of citizens to "become involved" can be critical.

2. TRAFFIC CONTROL AROUND THE CRASH SITE

a. General Problem Description.

This is an area which is considered important as it is potentially dangerous; however, most jurisdictions within Oakland County seem to have this prospective problem under control.

Traffic control at the accident scene is essential for the following reasons:

- (1) To prevent further tragedies from happening in the form of another vehicle striking the crashed vehicles, hitting an exposed and injured victim, etc.
- (2) To direct traffic so that emergency vehicles can approach the accident scene and operate effectively.
- (3) To route traffic so that there is minimal delay and inconvenience to the other motorists.

All the above functions are expeditiously performed in Oakland County--on the average. The police have sufficient authority to use whatever means necessary--even if it necessitates closing off that section of the road. Working with the respective highway departments, traffic is detoured around the accident site. To the extent to which this is a problem, it usually involves chain collisions--a series of crashes, where it would be impossible to get to the original crash location in time to prevent the others. Therefore, within a reasonable time frame, effective traffic control is established around crash locations.

### 3. CRASH FIRE

#### a. General Problem Description.

The possible rupture of fuel tanks and spillage of gasoline in automobile accidents poses an imminent threat of fire. However, fire in crashes has not been a significant experience in Oakland County.

#### b. Specific Problem Concerns.

Although relatively rare in occurrence, the highway crash which involves large tank trucks carrying flammable fluids can be catastrophic. Enough of these, with dramatic fires, have happened in the County to cause deep concern.

When the fuel spills or leaks from the ruptured tanks, the liquid follows curbs and flows into sewage systems. In a densely-populated area, a resulting fire could be a holocaust. The problem has been further compounded when such accidents occur in the expressways below ground level. Escape there is difficult--especially when traffic is heavy as in the commuter rush hours.

### 4. CRASH DEBRIS HAZARDOUS TO TRAFFIC.

This is not a serious problem in Oakland County experience, probably ameliorated through traffic control at the crash site and rapid removal of the debris.

5. CRITICAL DISREPAIR OF ROAD, ROADSIDE APPURTENANCES, OR UTILITIES

Again, a problem area which is seen as a minor problem in Oakland County experience. Obvious needs for these kinds of repairs are quickly reported and most highway departments, departments of public works, and utility companies respond rapidly. Here, as with emergency medical services, an efficiency problem surfaces, in that so many complaints are received which do not fully depict the urgency or nature of the problem. Yet, if the roadway environment is unsafe, the police will exercise their authority to close temporarily that portion of the road. If the emergency detour is of some duration, then cooperation of the appropriate highway department is necessary. Communication and coordination may be somewhat lacking here.

D. ROADWAY AND SURROUNDING ENVIRONMENT

1. ROADWAY HAZARDS

A number and variety of potential roadway hazards were examined and the following three were determined to be insignificant contributors to the highway crash experience:

- Construction and maintenance zones
- Wild or domestic animals in the roadway
- Railroad grade crossings.

### 3.0 REVIEW OF PROBLEM AND PRIORITY IDENTIFICATION METHODS

As suggested earlier, this problem identification phase of the Oakland County demonstration programs has two goals:

1. The development of practical effective methods and procedures for identifying traffic safety problems, and,
2. The application of those methods and procedures to produce, for this time period, an ordered listing of the County's problems and causal factors.

Section 2.0, preceding, presented the results to date toward the second goal, that of describing and ordering in terms of relative severity what appear to be traffic safety problems in the County. The section that follows addresses the first-listed goal in documenting the several procedures used in developing those problems and priorities. Included is a critical appraisal of the methods used, concluding with a recommended set of practical methods for County use in future, periodic updating of the problems and priorities expressions. This problem methods set is intended, of course, as one of the operational tools of the County Traffic Safety Management System being developed under the demonstration program.

Of the several tasks planned in this management system development, we feel that this phase involving derivation of

methods for county-wide definition of traffic problems and priorities is probably the most critical. This project, as true of all current traffic safety operations in the County, is attempting to solve problems--problems indigenous to Oakland County, many of which are also found in other counties throughout the country. The purpose of any resulting coordinated countermeasure programs, and including any system for planning and managing such programs, will be to remedy these problems. The success of such programs will be evaluated solely in terms of the extent to which these problems are measurably reduced.

Thus, the way in which problems are defined is critical, because the problem definition determines the nature and direction of remedial programs. Obviously, if the problems are not clearly understood and defined, specific countermeasure programs will not be directed toward the true problem--resulting in the waste of money, manpower and public confidence.

Therefore, the complete demonstration program is problem-oriented and any proposed countermeasures will be aimed at specific and well-defined problems. To keep that problem orientation as a consistent theme to the program, an analytical framework was devised which defines the problem from whence it originates--the automobile crash. Using a "systems" approach, which means little more than trying to reduce an extremely complex problem into its component elements and their interrelationships, the automobile crash becomes further defined

into the elements necessary to permit such a crash and then the sequence of causal conditions and subsequent consequences. These elements together combine into the highway transportation system. Our ultimate problem--a highway crash--must be identified by tracing back to a failure in one or more of the system's elements.

Figure 1 depicts this analytical framework. In the uppermost box, the highway transportation system is divided into three principal elements: the human, the vehicle, and the roadway and its related environment. We further divide the crash problem into the time sequence leading up to and through the crash: pre-conditions, pre-crash, crash, and post-crash phases. Thus, our ultimate problem is reduced to smaller elements and their interaction--all of which are systematically organized into this "problem matrix."

Pertinent to later phases of the demonstration program, the remainder of the chart shows the inter-relationship between the highway transportation system's failures as they relate to the crash, the countermeasure programs as they relate to the specific problems, the administrative units or agencies directly responsible for the countermeasure programs, and finally the management system which must weave together the problems, programs, and institutions into an effective and efficient attack on the problems.

Why all this emphasis on a problem orientation? Such an

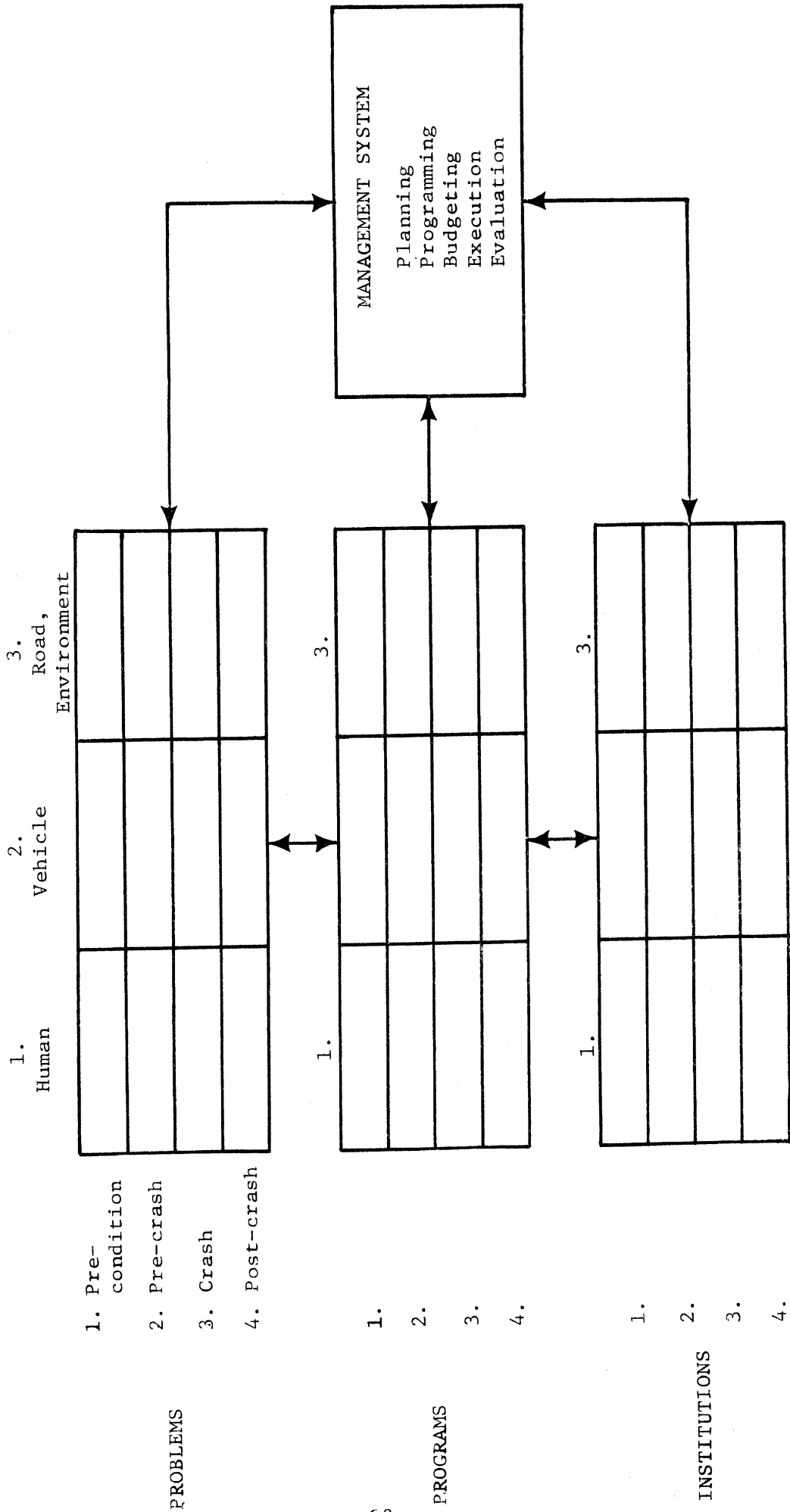


Figure 1. Demonstration Program Analytical Framework



approach forces the problem analysis to be comprehensive and systematic. One rapidly becomes aware of the problem's complexity and the need to carefully examine each of its component parts. This approach also encourages the avoidance of a major pitfall encountered in similar programs. Too often a highway safety problem is defined only in terms of traditional countermeasure programs and/or single professional viewpoints. This not only severely hampers accurate problem identification, but it limits solutions to those problems related only to single programs or agency purviews.

For example, the more traditional approach usually results in defining an accident according to the remedial viewpoint or professional expertise of the observer--the "cause" may be said to be insufficient law enforcement, a lack of judicial "toughness," a malfunctioning or ill-designed vehicle, or poor roads and signs--depending on who the observer is. In fact, in most crashes, all those factors operate to some degree; the task is to ascertain which are most prevalent in Oakland County.

Thus, a problem-oriented approach demands a comprehensive consideration of all factors--tailored to the specific problem. It also reveals the need for a multi-faceted examination of the problem--requiring the skills and talents of a variety of relevant professions and disciplines.

For the reasons above, this project has adopted the problem-matrix organization reflected in Figure 1. Our problem-phase

task has been to examine each of the matrix cells, attempting to determine methods for identifying problems that actually exist within the County, and to what extent. To achieve this, three major problem definition efforts were attempted. (1) An extensive analysis of the computerized data on crashes, drivers, vehicles, roads, etc.; (2) A structured mail survey of individuals with differing highway safety responsibilities; (3) The convening of five task forces, composed of selected individuals from throughout the County knowledgeable about various aspects of the County traffic system.

Note that the three approaches used are not particularly innovative--each has been used extensively in other contexts for traffic safety problem identification. Perhaps a more incisive identification of Oakland County's problems might have resulted from other approaches. However, recognizing that this problem identification phase is part of the development of an indigenous, operational capability for County planning, problem definition methods were selected to be compatible with current, indigenous County capabilities with growth potential possible through modest incremental improvement.

The paragraphs that follow describe each of the three methods used, and include some discussion of the limitations of each.

### 3.1 MASS DATA ANALYSIS

"Mass data" in this context refers to extensive collections of accident reports, driver license statistics, vehicle registration data, highway and road mileage, use and condition information, population data, etc.--effectively any collection of descriptive data on traffic system components and their activities. With the problem orientation of the program, we have naturally keyed on the accident data, using the other available files to amplify, qualify and help interpret findings derived from the accident data.

The availability of accident data in Oakland County is particularly good, of course, since the collection, analysis and use of accident data has been a prime feature of the Traffic Data Center, T.I.A., for some four years. Thus, the Oakland County Crash File is probably the most complete computer-based accident file of any county jurisdiction in the country. Recognizing the excellence of that file several years ago, HSRI arranged for maintenance of a copy of the Oakland file in the University of Michigan Computer Center to be used for research purposes. The two files are basically identical--the HSRI configuration rather than that held for TIA in the Oakland County Data Processing Center was used in this program as a matter of convenience.

#### 3.1.1. Mass Data Sources

3.1.1.1 The Accident File. The particular accident sample used consisted of approximately 71,000 accidents reported by all police in Oakland County during 1968, 1969 and the first half of

1970. Generally each of those accident reports provide values for computer coding of 114 variables descriptive of each accident. Thus a large set of variables describe the drivers, passengers, and any pedestrians, and include age, sex, injury extent, physical state, behavior, etc.; similarly sets of variables describe the vehicles involved and the conditions of the roadway and environment at the accident scene.

3.1.1.2 The Driver Record File. In addition to the accident file, the second major mass data source was a special computer file created by HSRI from Michigan Department of State Driver Record Files, consisting of a random sample of Oakland County resident driver records. This file of 10,000 driver records constitutes only a 2% sample of the approximately 600,000 registered Oakland County drivers, but was judged adequate for exploratory use of driver age, sex, violation rate/type, and license type data. In addition to its independent use for describing the County driver population and recorded violations, the file was used as an "exposure" index to attenuate and help explain the accident data trends.

3.1.1.3 Other Mass Data Sources. In addition to those two active computer files, several other data sources were tapped, again mainly for ad hoc use in understanding and stabilizing the accident file trends. Thus, the massive literature on highway safety state-of-the-art was used, on the one hand, to initiate and guide the Oakland data analysis and, on the other, to provide

rationale for interpreting results of the Oakland data analysis. Similarly, results from special intensive analyses of accident data in other jurisdictions by HSRI and by other institutions were used to guide and interpret the Oakland analysis. In addition to those general accident analyses, considerable use in interpreting the Oakland data was made of the general findings of an HSRI nationwide survey of miles driven by various classes of drivers. These national "exposure" data were utilized for interpreting accident data in terms of driver "availability" for accidents, an interpretation required for judging if indeed any of several driver classes are over-involved in accidents.

3.1.2 Mass Data Limitations. All these types of data have inherent limitations. Accident data in particular have recognized sources of error which must be realized in their use. Some of the more significant error sources are as follows:

1. Variability in Actual Events--Accident patterns vary over time for a variety of reasons, including relatively long-term changes in humans, vehicles, roads and environmental factors. We have available, however, only a few-year sample of mass data from which to generalize accident patterns. The problem, of course, is that the years observed may not be typical. However, only time and concurrent data collection can overcome this potential error source.

2. Non-uniformity of Accident Reporting--The many varying procedures of accident reporting may represent the most serious bias in all accident data including the Oakland County Crash File. Many accidents are not reported, so the file is incomplete. Another bias comes from reporting differences across various jurisdictions. Even when reported, many accidents are incompletely reported. The Crash File, for example, shows "missing data" for up to 35% of the accidents for some of the file variables.
3. Processing Errors--Finally, the techniques for processing accident data themselves introduce distortions. Errors may be made in coding the material for use in the computer, in editing tables and charts, and in the computer itself, where a series of computer operations necessarily rounds and drops numbers, leading to potential misinterpretations.

Despite these error problems, mass data constitute the best composite indicators of traffic system problems. They are invaluable as the source of hypotheses about accident causal factors. Systematic problem analysis logically starts with them.

3.1.3 Mass Data Analysis Methods. In studying the mass data, general directions for analysis were derived from the "problem-matrix" framework described earlier. Filling-in the cells of that matrix with general problem areas identifiable from the

literature and experience in other jurisdictions provided avenues of approaches for querying the mass data files. Figure 2 shows some of the potential problem areas identified with each cell of the problem matrix. Using the general problem areas shown in Figure 2, variables and variable combinations in the mass data files were identified as related to the problem areas. The file-available data sets are identified in Figure 3. Note the empty cells for Human and Vehicle elements in the Post-Crash phase. This reflects the fact that accident data, i.e., accident reports, do not treat all traffic system problem areas.

Analysis of the mass data, following the guidance of the problem matrix, involved simple instructions to the computer to sum and present frequencies and percentages of single variable distributions (univariate analysis) and of various variable combinations (bivariate analysis). Univariate analysis resulted in a large volume of distribution data showing such things as frequency of different driver ages across all accidents, number of accidents at each hour of the day, types of vehicles in accidents, etc. Bivariate analysis simply looked at various combinations of variables in accidents, for example the relative frequency of drivers of various ages in accidents with alcohol involved, number of female versus male accident drivers at various age levels, etc.

This large volume of variable print-outs was categorized by cells in the problem matrix. Graphs were prepared to facilitate the search for trends in the single and multiple variable

	1. Human	2. Vehicle	3. Roads, Environment
1. Pre-conditions	-Driver Skill and Knowledge	-Vehicle Design	-Road Design -Environment
2. Pre-crash	-Physical or Mental Impairment	Vehicle Condition	-System Breakdown -Maintenance
3. Crash	-Driver Response, Error	-Vehicle Dynamics (Internal/External)	-Micro-environment
4. Post-crash	-Detection/Communication/Extrication -Emer. Med. Serv.	Vehicle Repair	-Road Repair -Debris

Figure 2. General Problem Areas



	1. Human	2. Vehicle	3. Road, Environment
1. Pre-condition	Driver Characteristics Descriptive Statistics Age, Sex Analysis License Type	Vehicle Design Accident Severity Driver Injury	Geographic Analysis Road Design
2. Pre-crash	Restricted Licenses Old Age Contributing Circumstances Contributing Violations Alcohol	Vehicle Condition Vehicle Age	Road Geometry Road Condition Construction Sites Highway Area Traffic Control
3. Crash	Driver Profile Accident Severity Residence Contributing Violation Contributing Circumstances Age, Sex Time of Accident	Vehicle Dynamics Number of Vehicles Single Vehicle Crashes Multiple Vehicle Crashes Special Accidents	Time Light Weather
4. Post-crash			Previous Accidents

Figure 3. Mass Data File Variables

distributions.

All of the foregoing refers to processing the accident data from the Oakland County Crash File. Companion processing of the 10,000-item driver records file was accomplished in order to provide for driver variables some "exposure" index to facilitate the search for over-involvement of driver classes in accidents. Similarly, the data available in HSRI on estimated annual mileage by various driver classes was used to evaluate County accidents by those driver classes, again seeking to separate apparent from real over-involvement in accidents.

The product of the mass data analysis was a large workbook of the numerical distributions and comparisons of traffic system variables. While some conclusions on specific problems in Oakland County were derivable directly from that workbook, most of the material, because of the inherent limitations discussed earlier, required judgmental evaluation by personnel experienced in Oakland County traffic operations. Thus, the workbook was configured as a resource for use by the Task Forces as described below in Section 3.3.

3.1.4 Evaluation of Mass Data Analysis. Clearly, analysis of mass data files in their present form represents a convenient method for surveying large numbers of data relative to accidents and attendant system characteristics. Approaching such an analysis, however, with the conviction that mashing such numbers will automatically and unequivocally define traffic problems is

just not justified. With their inherent limitations and without good relative "exposure" indices, the mass data are at best trend indicators or hypothesis-formers for use by experienced practitioners in identifying probable problems. That use alone justifies the inclusion of mass data collection and processing in a traffic safety system. Given that inclusion, the major strengths and weakness of mass data methods for operational use in identifying traffic problems are listed and described below.

1. Completeness--The most obvious limitation of mass data is its inherent variability and bias, discussed earlier. In addition, the data as currently configured address only part of the problem matrix, and, thus, only part of the traffic system. This incompleteness was illustrated in Figure 3, above.

2. Descriptive Profiles--Mass data analysis appears quite adequate for forming general descriptions of Oakland County drivers and accidents. Distributions of driver and accident characteristics are sufficiently detailed and accurate to permit generalizations and comparisons between and within various groups of characteristics, and between Oakland and other counties.

3. Causal Analysis-- Direct development of accident causation conclusions from mass data alone is a tenuous activity. Such data are best used as triggers for practitioner review and as indicators on what particular research conclusions from other contexts apply to the local situation.

4. Problem Identification-- Despite that general "cause-effect" limitations warning, some success in problem identification was achieved in specific instances. With respect to Human Element involvement, both major files (accidents and driver records) were heavily involved with human characteristics. Thus a good basis was provided for direct conclusions on problems. The top ranked priority problems described in Section 2.0 show human characteristics (youth, alcohol abuse, etc.) high on the list--the conclusions were drawn mainly from the mass data. With the Vehicle Element, only moderate success can be achieved. Data analysis did aid in the classification of accidents (single versus multiple vehicle crashes) and in identification of special vehicles, e.g., motorcycles, as "more dangerous" than others, yet "over-involvement" could not be clearly labeled due to lack of good control, or "exposure," data on relative numbers of such vehicles on the road. Some insight into vehicle defects was provided, but with relatively low reliability. With the major element of Roads and Environment, direct identification of problems from accident data is sorely limited by the lack of detailed companion data on traffic densities and flow characteristics. Accident data as currently collected do provide useful location information, but provide little insight into roadway contributions to crash causation.

Those, then, are some of the observed strengths and weaknesses of mass data in traffic problem identification. In general conclusion, mass data methods proved to be extremely useful in helping organize indicators of problems, in suggesting the low

significance of some potential problems, and in establishing bases for insight by task forces and other expertise involved in final identification of problems and assignment of priorities.

### 3.2 MAILED-QUESTIONNAIRE SURVEY

In addition to the quantitative indicators of problems provided by mass data analysis, we early recognized the need for attempting some consensus of the considered opinions of individual county traffic system practitioners relative to safety problems. The two alternatives considered for collecting this problem opinion data involved either in-depth personal interviews of a small group of practitioners or less extensive, mail-system-obtained opinions from a wider group. Several factors mitigated against the personal interview method for obtaining problem opinions.

- 1 - Time commitments for both interviewers and interviewees were judged excessive
- 2 - The large number of governmental jurisdictions in the County coupled with the diversity of professionals in each produces a horrendous sampling problem
- 3 - The requirement for a rigid interview protocol that would probably mask interviewee opinion.

With the selection of a mail sampling procedure, the opinion collection reduced to two tasks--development of a representative sample of practitioners and generation of an opinion sampling instrument.

3.2.1 Practitioner Sample. The target population was defined as all personnel involved directly or indirectly in traffic safety activities in all political jurisdictions in the County.

Sampling to a manageable number of practitioners in that population began with systematic listing of jurisdictions and of traffic safety related offices and individuals within each jurisdiction. In addition, private establishments involved in traffic safety operations, e.g., ambulance companies, auto repair shops, etc., were included in the list along with names and position of individuals in such establishments. Preparation of this target population list was greatly facilitated, of course, by access to TIA files in which resided much of this organization and individual information.

Filtering the resulting list of practitioner names resulted in a target sample of 380 individuals. Table II lists by profession and assignment the categories of practitioners, and number of each represented. Obviously the list contained both traffic safety operatives, e.g., traffic commanders, driver educators, as well as traffic safety policy makers, e.g., mayors, commissioners, etc. The sample list as prepared was felt to be exhaustive of practitioner types and representative of all County areas. In retrospect only several quasi-governmental institutions were not represented, including two safe driving schools to which courts refer violators and a police training academy.

<u>Profession/Assignment</u>	<u>Number</u>
City Manager	24
City Mayor	23
Village President	13
Township Supervisor	23
County Commissioner	3
Police Chief, or Public Safety Director	44
Traffic Commander	14
Judge (Traffic)	38
Hospital Emergency Dept. Head	7
Ambulance Co. Head	12
Driver Educator	34
School Superintendent	29
City or Village Attorney/Prosecutor	46
Financial Officer	1
Planning Director	10
Traffic Engineer	12
D. P. W. Head	8
Health Dept. Director (Alcohol/Drugs)	13
Road Commissioner	4
Driving School Head	11
Miscellaneous	<u>11</u>
Total	380

TABLE II. PRACTITIONER TYPES SELECTED FOR MAILED QUESTIONNAIRE SURVEY

3.2.2 Questionnaire Preparation. Preparing the instrument to solicit problem opinions from that sample group involved, first, selection of the solicitation and response method, and second, formulating the opinion questions.

To elicit problem opinions, three elicitation means were considered. The technique of having each respondent list his beliefs in the form of five or so most important problems was rejected. This procedure would offer no guarantee of comprehensive coverage of all traffic safety problems in the County, and would not force the respondent to consider problems outside of his personal sphere of activities. Further, summing opinions across respondents is a pronounced problem with this open-ended procedure.

The second technique considered, involving respondents rank-ordering a pre-selected, comprehensive set of potential problems, was rejected because of known difficulties in respondents being able to manipulate lengthy items into an ordered list. Here, too, aggregation of the responses across the sample would be difficult.

The technique finally selected involved an extended list of potential problem statements with the respondent asked to indicate his opinion of the importance of each problem in Oakland County. The response categories provided were,

- 0 - No opinion
- 1 - Not a problem
- 2 - Minor problem
- 3 - Moderate problem
- 4 - Serious problem
- 5 - Very serious problem



This rating technique does not require respondents to rank order potential problems, but does permit some statistical manipulation of the individual problem opinions, and the ordering of problems based on "average" opinion.

A set of 32 potential-problem statements was prepared as the questionnaire. Since the use of this practitioner opinion sampling technique preceded in the program full development of our "problem matrix" framework, the questionnaire items were not in all instances directly relatable to the matrix. Rather the items were generated by reference to expressed national safety problems and priorities as keyed to the system components of humans, vehicles and roadways. The problem statements prepared reflect those components, but only incidentally, and not completely, cover the system phases of our problem matrix.

Each of the potential problem statements was prepared as a simple declarative statement, such as, "Driver or pedestrian impairment due to the use of alcohol", "Inadequate emergency medical treatment at the scene of an accident", and "Inadequate road signs and signals." Again, it was recognized that different sub-sets of the statements fell within the professional purview of individual respondents. Thus, some statements were so far removed from an individual's expertise area that his opinion earned no professional authority. Thus, the questionnaire tapped both professional experience and what amounts to "citizen" observation.

3.2.3 Questionnaire Administration. The questionnaire was mailed to the 380 selected individuals in mid-December, 1970, with cover letters generally describing the demonstration program and specifically explaining the purpose and format of the opinion questionnaire. By early January some 40% of the completed questionnaires had been returned. A follow-up letter to non-respondents resulted in a total response by the end of January of 211 completed forms. This response rate of 56% was moderately good--analysis of the non-responding group suggested that most non-respondents were those least directly involved in traffic safety operations, e.g., mayors, village presidents, attorneys, etc. Thus, the response rate from actively involved individuals is considerably higher than the overall 56% response, indicating that the mailed-questionnaire technique is a reasonably painless, efficient method for collecting practitioner opinions on problems.

Analysis of the problem-opinion response was simple and straightforward. The numerical ratings from all respondents on each potential problem statement were averaged to provide a mean "importance" score for each item. The items were then simply listed in order of decreasing "importance" to form an opinion profile of Oakland County traffic safety problems.

The primary use of the opinion profile was input as a companion resource to the mass data analysis results for use by the Task Forces for final problem identification and priority establishment.

#### 3.2.4 Evaluation of Questionnaire Method

Typically, short questionnaires prove to be a quick, economical and efficient means for collecting opinion data. Such proved to be the case with the problem-priority questionnaire in this instance.

Specific use of the questionnaire results here had to recognize several inherent limitations. As suggested earlier, the questionnaire was structured before the "problem matrix" guidelines were available, so that completeness with respect to potential problems cannot be claimed for the questionnaire used. Similarly, the results from the mass data analysis came after the questionnaire, so that specific problems in the County suggested by the mass data were not covered by the questionnaire. Finally, the questionnaire was mailed to the sample group as part of a much larger request for information of respondent traffic safety activities. We suspect that the response rate to the questionnaire might have been higher had it not been coupled with the activities-information request.

Future use of the questionnaire technique should benefit from identification of those problems with our initial venture. In summary, we generally feel that the mailed questionnaire technique is a good one for wide sampling of practitioner opinions on traffic safety problems. The results from the effort proved to be a valuable adjunct to the mass data indicators as working material for the Task Forces. Furthermore, even with the

limitations identified above, the questionnaire results obtained should be used as a foundation for future, periodic opinion sampling, with future forms keyed to explore opinion changes as an indicator of problem change and, in a coarse form, traffic safety program effectiveness.

### 3.3 TASK FORCES

The final culminating phase of the problem and priorities development phase involved sessions with specially composed Task Forces of County practitioners. The use of task forces has proved, in Oakland County and elsewhere, to be an efficient mechanism for coalescing the collective wisdom of local professionals in a wide range of traffic safety matters. Here the goal was the coalescence of that wisdom on traffic safety problems and their relative priorities in Oakland County. The mass data analysis and problem-opinion questionnaire survey were, of course, designed to serve as information sources for these group sessions.

Within that general purpose for task force operations were several identified sub-objectives:

1. Demonstration Program Development -- To stimulate broader involvement and interest in the "demonstration program" specifically and highway safety in general.
2. Practitioner Participation in Planning -- To provide meaningful participation in the highway safety program planning process in order to build support for the County action plan that will be the ultimate product of the demonstration program.
3. Practitioner Education -- To familiarize local practitioners with the needs and processes of effective problem definition and problem solution, including multi-disciplinary interaction, use of research findings

and data analysis, and a true problem orientation as opposed to the traditional functional or program orientation.

4. Problem and Priority Definition -- To enhance through collective experience the definition of County problems and their relative priority by,
  - a. Identifying additional sources of data and information for use in the planning process.
  - b. Providing critical review and augmentation of the demonstration project staff analysis of problems, primarily those analyses involving mass data and opinion surveys.
  - c. Filling voids and otherwise amplifying in problem areas where data, previous study, and research findings are not available.
  - d. Developing problem priorities through expressions of concern, experience, etc.

Achieving that last-named objective, problem and priority definition, was the main theme of the present phase of the demonstration program. However, it may be that whatever was accomplished toward the other objectives, generally the sensitization to needs for county-wide, systematic traffic safety planning, will be more crucial over the years to traffic safety in Oakland County.

The paragraphs that follow describe the organization, composition, schedule, and operation of the Oakland County Traffic Safety Task Forces, followed by an evaluation of the method for problem and priority definition purposes.

### 3.3.1 Task Force Organization and Focus

The task forces were structured by reference to the "problem matrix." Thus the groups were caused to focus on the elements and activities of the traffic system, as those elements and activities are predisposed to accidents, accident severity, and delays in return to normal system status. Organizing the Task Forces by groups of closely related cells in the problem matrix resulted in five Task Forces, with each Force charged to look at potential problem cells as assigned in Figure 4.

	1. Human	2. Vehicle	3. Roads, Environment
1. Pre-condition	Task Force I	Task Force IV	Task Force V
2. Pre-crash	Task Force II	Task Force IV	Task Force V
3. Crash	Task Force I	Task Force IV	Task Force V
4. Post-crash	Task Force III	Task Forces III & IV	Task Forces III & IV

Figure 4. Task Force Assignments in Problem Matrix

With those particular matrix cell assignments, each of the Task Forces was encouraged to consider a particular set of problem areas. The areas assigned to each group are listed in Table III. Note that these were "starter" area assignments--adding problem areas by the Task Forces was of course encouraged.

### 3.3.2 Task Force Composition:

Given the nature of the problem areas within each Task Force, an exhaustive list of professions and disciplines in public and private institutions related to those problem areas was prepared. A coarse assignment of degree of traffic safety involvement was made for each of the professions, and candidate names from the extensive TIA practitioner files were selected. In selecting candidates, systematic review assured that participation for each Task Force covered the range of geographical and jurisdictional areas of the County, as well as the full complement of professional roles pertinent to the several problem areas. Using those procedures a list of 15-20 candidates for each Task Force was prepared. The diversity of disciplines in each Task Force is typified by the "specialties" of the candidates identified with Task Force I.

- 3 - Driver Educators
- 3 - Police Specialists (City, County and State Depts.)
- 2 - Public Information Specialists (Newspaper and State Safety Commission)
- 3 - Pedestrian Safety Specialists (Juvenile and Senior Citizen)
- 2 - Driver Licensing Specialists
- 2 - Traffic Court Specialists (Judge and Prosecutor)



TABLE III. TASK FORCE PROBLEM AREA ASSIGNMENTS

TASK FORCE I: SKILLS AND ATTITUDES: PEDESTRIAN, PASSENGER, AND DRIVER

1. Insufficient driver, passenger, or pedestrian skill or knowledge
2. Improper attitudes or motivations
3. Failure to utilize available safety equipment
4. Incorrect reactions during crash

TASK FORCE II: PHYSICAL OR MENTAL IMPAIRMENT: PEDESTRIANS, PASSENGERS, OR DRIVERS

1. Physical disabilities
2. Impairment in aged
3. Alcohol-induced impairment
5. Immaturity of young
6. Emotional stress -- grief, anger, etc.

TASK FORCE III: HIGHWAY CRASH EMERGENCIES

1. Undetected crash requiring emergency attention
2. Injured persons in need of extrication and emergency medical services
3. Crash fire
4. Crash debris hazardous to traffic
5. Critical disrepair of road, roadside furniture, or utilities
6. Traffic control around crash site

TASK FORCE IV: MALFUNCTION OF MOTOR VEHICLES

1. Defects through manufacturing process
2. Degraded performance due to normal wear, abuse and deterioration
3. Degraded performance due to crash involvement
4. Inadequate vehicle repair practices

TASK FORCE V: DEFICIENT ROADS AND ROADSIDE FURNITURE

1. Road utilization
2. Road condition
3. Roadside furniture
4. Other environmental factors

1 - Auto Insurance Specialist

1 - Commercial Fleet Safety Officer

Each of the candidates was contacted in person or by phone, and briefed on his expected participation. Of the 85 individuals contacted, nearly three-fourths (63) agreed to participate. Those declining pointed to scheduling problems. In no instance was disinterest evidenced, suggesting a refreshing willingness of the practitioner at large to participate in this type of operation. (Oakland County is perhaps atypical in this respect, due to the diligence and success of TIA over the years in operating similar committees and ad hoc groups for community action projects.)

### 3.3.3 Task Forces Schedule and Agenda

Each Task Force met three times over a 45-day period during February-March, 1971. Meetings were scheduled such that all Task Forces met independently during a one-week period, with successive meetings separated by about three weeks. Specially prepared materials relevant to each meeting of each group were mailed to participants a week in advance of each meeting. Individual sessions were scheduled for 2-3 hours each, during normal working hours generally at the end of the day.

Each Task Force session was chaired by the TIA Project Director, with discussion leader support provided by HSRI project staff. Agenda were prepared for each of the three sessions, with specific material tailored to each group but with the same general agenda for all groups as follows:

### First Session:

- Further orientation to the total program; more discussion of task force roles; and initial sensitization to the problem areas through group discussion.
- Preliminary problem identification and tentative problem priority listing
- Identification by group of data and information sources to augment project staff sources.

### Second Session:

- Consideration of and reaction to technical conclusions by project staff resulting from mass data analysis and questionnaire survey
- Re-assessment of problem identification and problem priorities

### Third Session:

- Evaluation of project staff compilation of problems and priorities from previous meetings. (See Section 2.0, above)
- Final assessment of problem identification and problem priorities
- Critique of Task Force operations

#### 3.3.4 Task Force Attendance

Task force member participation was generally good for this type of operation. Considering the number, duration and schedule of the meetings, highway safety practitioners in Oakland County seemed responsive to the need for the demonstration program, and willing to attend and contribute to problem discussions.

The "box-score" attendance by member practitioners for each Task Force for each session is shown below.

	TF-I (12 members)	TF-II (14)	TF-III (16)	TF-IV (9)	TF-V (12)
First Session	9	11	11	6	9
Second Session	7	11	12	6	8
Third Session	5	5	7	4	8

In the majority of instances, attendance failure was attributed by the missing member to schedule conflicts. The decided drop in attendance with the final session was somewhat compensated by the many phone calls from members to the TIA Project Director. Most of those calls involved member concurrence with the problem-priority listings provided them by mail, and request for release from the final session due to personal work-load or schedule.

### 3.3.5 Evaluation of Task Force Operation

On the whole, the Task Force sessions were informative and provided insight, both to the project staff and to the individual participants, into the County and its highway safety problems. Participants were refreshingly willing to contribute to the meetings, and showed commendable candor in volunteering information and observations from their experience and perspective. Adaptation to the problem orientation and the problem matrix concept was rapid, once the several stages of the problem-programs-institutions approach were discussed.

A few general observations are relevant here in terms of inhibitors to fuller success of the task force operation. First,

except for those force members with previous working experience with TIA, few were familiar with the analytical approach to examining experience in order to identify problems and propose solutions. Second, and related, task force members were, not surprisingly, relatively unaware of recent research results and methods relative to their individual fields. Some of the more publicized findings were recognized, but accepted with considerable reluctance and suspicion of non-applicability to their problems. Finally, in the unstructured group discussions, most members seemed confident in their personal appraisal of problems. However, once confronted with the project staff analysis and data, although these were clearly identified as imprecise, task force members seemed less confident and reluctant to challenge tentative conclusions from the project staff. Because their program posture minimized data collection, individuals had little if any base information on which to build alternatives to the data and analysis presented by the project staff.

As suggested earlier, scheduling of meetings with such groups is a problem. With most of the participants, meeting attendance was a voluntary add-on to already crowded schedules. Thus, despite high interest, attendance in many instances was just not possible. Any future iterations of similar task force

operations must recognize this problem and attempt mitigation by considering off-hour scheduling, more formal, job-related participation arrangements, longer lead-time in meeting notices, etc.

Other than those general observations, attempts at any thorough evaluation of the task force operation in terms of the objectives stated earlier are premature. The more peripheral objectives of developing greater enthusiasm for highway safety pursuits, sensitivity to problems and problem-solving processes, etc., can be reviewed only after time has tested any impetus and its duration. Relative to the prime objective, problem-priority development, some subjective conclusions are possible. Though this iteration through the planning process was brief and somewhat superficial, it was systematic and reasonably comprehensive in coverage. There is no question that the task forces contributed substantially to the substance of the problem analyses, and in many instances provided insight totally unobtainable from any other source. Further, task force deliberations produced considerable consensus on problem definition and priority, which unanimity must enhance the validity of the problem analysis as well as give impetus to later phases of the demonstration program, particularly countermeasure design and implementation. In summary, we conclude that the task force method can and did pay valuable dividends. Inclusion of such procedures in an operational configuration for continuing county-wide highway safety planning is highly recommended.

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

The problem definition/priority establishment operation discussed in this report had two major goals:

1. Using data and practitioner expertise within the County, develop a substantive description of traffic safety problem priorities in the County, and
2. Use of that operation with the County to exercise and evaluate methods for systematizing and facilitating future substantive problem definition activities of the County.

Each of those goals has a particular purpose in the Oakland County Demonstration Program, relative to the development and implementation of a county-wide Traffic Safety Management System.

### 4.1 PROBLEM CONTENT

The substantive descriptions of problems and priorities developed in this operation with County data and practitioners were presented in Section 2.0. As a parallel task to this problems task, the demonstration project staff has been preparing a summary of current institutions and programs active in traffic safety throughout the County. This summary is intended as both an index of County capabilities and resources, and of current County programs.

We recommend, therefore, that the problem listings of Section 2.0 be formatted for use by specially-formed Task Forces

of County practitioners as the primary working material for planning countermeasure programs consistent with the problem/priority listings. In addition to those problem listings, the project staff will prepare as input material for the Countermeasure Task Forces the summary information on current county programs and institutions.

#### 4.2 PROBLEM METHODS

Review and evaluation of the mass data analysis, practitioner survey and Problem Task Forces methods for problem definition and priority establishment were summarized in Section 3.0. In that instance, the intent was development of a set of tools for periodic use by the County Traffic Safety Management System for reviewing and up-dating expressions of the County's traffic safety problems and their relative priorities. Each of the methods used proved reasonably successful--their combination was particularly effective with mass data analysis and practitioner survey providing, respectively, quantitative and qualitative indicators and the Task Forces providing the seasoned review and integration.

We, therefore, recommend the inclusion of the three problem analysis methods as candidate features of the county-wide management system being developed under the Oakland County Demonstration Program. Some specific considerations with each of the methods follow.

Mass Data Analysis: The collection, processing and analysis of traffic-records data is currently a major function of the Traffic Data Center, TIA. That operation



is completely capable of performing the continuing crash data analysis requirements of the County Traffic Safety Management System. It is hoped that Countermeasure Task Force deliberations will identify means for improving that data operation, particularly with respect to encouraging the data generators, e.g., police, highway engineers, etc., to greater completeness and uniformity in preparing individual reports, and with respect to identifying other data, and sources, for mass data analysis, for example, driver and vehicle population data.

Practitioner Survey: As concluded in Section 3.2.4, this technique is quite effective in capturing problem consensus from a broad base of practitioners. Future use of the technique should place heavy concentration on development of the opinion-questionnaire instrument, in order to assess opinions more completely than was possible under demonstration program conditions. Consideration should be given to the adaptability for Oakland County use of several pertinent developments elsewhere, for example, the current development of community traffic safety self-assessment techniques being done by the Traffic Safety Center, Michigan State University, for the Michigan Office of Highway Safety Planning.

Task Forces: The major problem with task forces is attendance. Even with high interest of individual members, formal mechanisms for facilitating attendance are required. Thus, further use of this method must recognize this problem, and, by well-before-hand scheduling and formalized membership arrangements, relieve some of the individual schedule conflicts that damage full participation of task force members.





