

- INTERIM REPORT -

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

VOLUME II:

DATA AND ANALYSIS APPENDICES

Prepared for

TRAFFIC IMPROVEMENT ASSOCIATION
OF OAKLAND COUNTY, MICHIGAN

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FOREWORD

This is Volume II of two volumes summarizing activities and results of Task 2: Analysis of Highway Crash Problems and Priorities, of the Oakland County Safety Demonstration Program. This volume documents the data and analysis material generated during December 1970 - March 1971 in working with the mailed questionnaire survey, mass data analysis, and task force method for developing descriptions and priorities of Oakland County traffic safety problems. Caution in extrapolating the data and conclusions to other locations, times and contexts is urged -- the material is descriptive of Oakland County for this time period and is defensible only under those time and place conditions. Its use is solely intended as reference material for further development of the traffic safety program for Oakland County and its attendant County Traffic Safety Management System.

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

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APPENDIX A

PRACTITIONERS' SURVEY OF PROBLEM IMPORTANCE

One major input to the process of assessing the importance of various traffic safety problems in Oakland County was felt to be the perception of the practitioners--those who are actively involved in the operations of the traffic system. To obtain this information, one part of a three part questionnaire circulated to the practitioners was focussed on how they perceived various potential problems.

Specifically, the respondents were directed to rate each of a list of thirty-two potential factors relating to the traffic safety situation. The respondents were to use the following rating scale:

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

Exhibit A-1 is a reproduction of the problem rating portion of the questionnaire.

In undertaking a survey such as this there are two primary activities: 1) Selecting the response group and administering the questionnaire, and 2) compiling, scoring, and ranking the returns.

Selecting the Response Group and Administering the Questionnaire. As mentioned above, the survey is focussed on the opinion of traffic safety practitioners--as opposed to the general public. Accordingly, a list was made of all persons involved in a decision-making role relative to traffic safety activities. The resulting list was presumed to be exhaustive of the response group and contained 380 names or offices.

EXHIBIT A-1

PROBLEM RATING QUESTIONNAIRE

The following section is designed to elicit opinion on traffic safety problems and priorities within the many jurisdictions of Oakland County.

A number of factors which may contribute to the traffic accident situation are listed below. Some refer to your particular geographic or political jurisdiction and others to the more general situation. You are requested to indicate the magnitude or seriousness of each factor by marking a "X" in the appropriate box. The scale runs from 1 to 5 and indicates:

- 1. not a problem — an insignificant factor not warranting attention
- 2. minor problem — a minor problem warranting low priority consideration in traffic safety activities
- 3. moderate problem — a recognized problem warranting attention
- 4. serious problem — a significant problem warranting increased attention in current and future traffic safety activities
- 5. very serious problem — a severe or critical problem which should receive immediate and high priority attention

You may also elect 0 for no opinion.

no opinion
 0. 1. 2. 3. 4. 5.
 not a problem
 minor problem
 moderate problem
 serious problem
 very serious problem

- 1. Inadequate emergency service response time
- 2. Inadequate emergency medical treatment at the scene of the accident
- 3. Inadequate emergency medical treatment at the hospital
- 4. Driver or pedestrian impairment due to the use of alcohol
- 5. Driver or pedestrian impairment due to the use of drugs
- 6. Increased use of motorcycles on the road

no opinion

not a problem

minor problem

moderate problem

serious problem

very serious problem

0.

1.

2.

3.

4.

5.

- 7. Use of defective vehicles due to lack of maintenance or faulty repair
- 8. Congestion, overcrowding on the roadways
- 9. Dangerous road conditions due to lack of maintenance (incl. ice, snow)
- 10. Dangerous road conditions due to deterioration of or damage to the road surface
- 11. Dangerous road conditions due to debris on the road
- 12. Lack of public awareness of and concern with traffic safety problems
- 13. Lack of manpower, trained personnel or financial support to adequately conduct traffic safety programs
- 14. Lack of coordination between various people and agencies concerned with traffic safety
- 15. Inadequate roadway lighting
- 16. Inadequate road signs and signals
- 17. Inadequate control and regulation of traffic flow patterns
- 18. Outdated or inadequate roads
- 19. Insufficient traffic accident investigation and reporting.
- 20. Inadequate or inefficient adjudication of traffic law violations
- 21. Inadequate level of police patrol for traffic law enforcement
- 22. Inadequate "beginner" driver education
- 23. Inadequate or absence of court related enforced driver education for traffic law violators

	0.	1.	2.	3.	4.	5.
7. Use of defective vehicles due to lack of maintenance or faulty repair						
8. Congestion, overcrowding on the roadways						
9. Dangerous road conditions due to lack of maintenance (incl. ice, snow)						
10. Dangerous road conditions due to deterioration of or damage to the road surface						
11. Dangerous road conditions due to debris on the road						
12. Lack of public awareness of and concern with traffic safety problems						
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20. Inadequate or inefficient adjudication of traffic law violations						
21. Inadequate level of police patrol for traffic law enforcement						
22. Inadequate "beginner" driver education						
23. Inadequate or absence of court related enforced driver education for traffic law violators						

no opinion
 0.
 1. not a problem
 2. minor problem
 3. moderate problem
 4. serious problem
 5. very serious problem

	0.	1.	2.	3.	4.	5.
24. Lack of or inadequate "refresher" driver education for experienced or elderly drivers						
25. Lack of or inadequate pedestrian safety education						
26. Inadequate equipment or efforts for the removal of damaged vehicles and roadway cleanup						
27. Insufficient driver skill and knowledge						
28. Inappropriate driver attitudes and driving behavior						
29. Insufficient testing and licensing of drivers						
30. Absence of or inadequate motor vehicle inspection						
31. Inadequate emphasis on "safety" in vehicle design						
32. Inadequate emphasis on "safety" in roadway design						

The space below is provided for any comments you may have on the above, including any additional factors which you can identify as traffic safety problems in your area.

The questionnaire was mailed to each person on the list on December 18, 1970, and a follow-up letter was mailed to all who had not returned the questionnaire on January 7, 1971.

Ultimately, 217 questionnaires were returned, including 6 returned blank or incorrectly filled out. The resulting total of 211 represents a return rate of 56% which is considered to be quite good for a mail out — mail in survey. Exhibit A-2 presents the overall response rate as well as the response rates for the various subgroups of the target population. With very few exceptions, the response rate was fairly uniform across the subgroups.

Compiling, Scoring, and Ranking the Returns. The responses for each of these potential problems were summed (including zeros) and the mean over the 211 responses calculated. The 32 potential problems were then ranked according to descending values of the means. Exhibit A-3 shows this ranking with the respective means for all 211 responses in column (a).

To present a measure of relative importance for each of the 32 potential factors, a scoring device was prepared as follows using X as the mean value on an item, with X_{\max} and X_{\min} equalling the highest and lowest means respectively.

$$\text{Relative Score for } X = X - X_{\min} \left(\frac{100}{X_{\max} - X_{\min}} \right)$$

Thus, the relative score for X_{\max} would be 100 and for X_{\min} would be 0. Exhibit A-4 shows the potential problems in rank order with their relative importance scores for all 211 responses in column (a).

While the primary objective of this survey was to obtain ratings from traffic safety practitioners in general, it was felt that there may be some differences between various subgroups of this total target group. Accordingly, the responses

EXHIBIT A-2

Questionnaire Return Rates

	Sent	Rec'd	%
City Managers	24	15	63
City Mayors	23	8	35
Village Presidents	13	5	38
Twp. Supervisors	23	11	48
County Commissioners	3	3	100
Pol. Chief, Dr. Pub. Safety	44	29	66
Traffic Commanders	14	9	64
Judges	38	14	37
Hospital Emergency Dept. Head	7	4	57
Ambulance Co. Head	12	5	42
Driver Education people	34	27	77
School Superintendents	29	24	83
Attorneys	46	15	33
Financial Officer	1	1	100
Planning Directors	10	7	70
Traffic, City Engineers	12	8	67
D.P.W. Heads	8	6	75
Alcohol Program, Drug Program, Health Department Directors	13	8	62
Road Commissioners	4	2	50
Miscellaneous	11	9	82
Private Driving School	11	1	9
	<u>380</u>	<u>211</u>	<u>56</u>

were disaggregated in three ways. The first was according to jurisdictional level, i.e., whether the respondent was employed by 1) county government, 2) city government, or 3) school boards. These are represented in columns (b) through (f) of Exhibits A-3 and A-4. The second disaggregation was according to respondent's position and is represented in columns (g) through (s). The final disaggregation was according to urban or rural location. Urban was defined as being within the boundary of the southeast nine townships of the county and included all cities, villages, school boards therein. All other locations were considered rural with county officials being excluded completely. This classification is shown in columns (t) and (u) of Exhibits A-3 and A-4.

The analysis described above for the total group was applied to each subgroup to determine the mean response and relative scores. These complete Exhibits A-3 and A-4.

Exhibits A-3 and A-4 do indicate some differences, both between the sub-groups and the total group, and among the various sub-groups. These differences are subjectively interesting, but how large must the difference be to be meaningful. In particular, we want to know whether a particular sub-group has a significantly different rating on a given potential problem than the population as a whole, and that such a difference is not likely to be due to chance. For each potential problem the mean of each sub-group was tested against the mean of the total group at the .95 level of confidence. The sub-group means which were significantly different from the total group means are boxed on Exhibit A-3, and the corresponding scores are boxed on Exhibit A-4.

Rank	Problem	Question #	All Respondents	County Persons	City Persons	Village Persons	Township Persons	School Bd. Persons	City Managers	Maysors, Vill. Pres. & Twp. Supervisors	Police Chiefs	Traffic Commanders	Judges	E.M.S. People	Attorneys	Traffic Engrs	D.P.W. Heads	School Superintendents	Driver Ed. People	All Drug & Health Heads	Planners	Misc. County Officials	Urban	Rural
1	Congestion, Overcrowding	8	3.45	3.55	3.43	2.78	3.51	3.69	3.46	3.12	3.37	3.22	3.42	3.44	3.64	4.0	3.62	3.62	3.62	3.00	3.14	3.00	3.71	2.85
2	Cutaded, Inadequate Rd.	18	3.16	3.83	2.90	2.78	3.45	3.30	3.13	2.96	3.17	3.66	2.57	2.33	2.92	3.64	3.29	3.29	3.29	4.37	2.71	3.16	3.23	2.77
3	Inapprop. Attitude, Behavior	28	3.10	3.33	2.88	3.21	2.74	3.41	2.86	2.56	3.24	3.22	3.07	3.22	3.42	2.78	3.12	3.12	3.70	3.50	2.14	2.83	3.15	2.68
4	Alcohol	4	3.09	3.77	3.02	3.00	2.58	3.04	3.26	2.48	3.17	3.44	3.71	2.66	3.50	2.50	2.45	3.70	3.70	3.75	1.57	3.50	3.12	2.65
5	Public Concern	12	2.86	3.66	2.58	2.35	2.51	3.04	2.46	2.40	2.86	3.22	3.07	3.11	2.50	2.57	3.04	3.14	3.25	3.25	1.85	3.33	2.79	2.25
6	Manpower	13	2.73	3.05	2.55	2.78	3.06	2.58	2.53	2.12	3.31	3.55	2.57	2.55	3.07	2.64	2.04	3.22	2.87	2.87	2.14	3.00	2.82	2.29
7	M. V. Inspection	30	2.61	2.11	2.72	1.92	2.48	2.97	2.66	2.48	2.65	2.22	2.00	2.88	2.57	2.42	2.58	3.40	2.75	3.57	2.16	2.78	2.50	
8	Police Patrol	21	2.46	2.50	2.03	2.64	3.41	2.45	2.06	2.36	3.10	3.66	1.57	2.55	2.78	1.92	2.58	2.51	2.00	1.71	2.00	2.50	2.43	2.43
9	Damaged Rd. Surface	10	2.44	2.55	2.13	2.14	2.64	2.89	2.26	2.48	2.10	2.00	2.28	2.44	2.21	2.64	2.87	2.77	3.00	2.57	2.00	2.43	2.52	
10	Motorcycles	6	2.43	2.88	2.09	2.28	2.06	2.86	2.06	2.36	2.48	1.88	2.14	3.22	2.00	1.71	2.58	3.18	2.62	1.57	2.16	2.38	2.20	
11	Testing and Licensing	29	2.38	2.50	2.30	1.78	2.22	2.56	2.60	1.96	2.20	3.00	2.14	3.22	2.07	2.64	2.37	2.70	2.37	1.85	2.16	2.49	1.93	
12	Road Condition - Ice, snow	9	2.37	2.44	1.97	2.21	2.70	2.71	2.06	2.68	2.03	1.88	2.21	2.66	2.42	2.00	2.75	2.74	2.50	2.14	1.83	2.31	2.45	
13	Driver Skill & Knowledge	27	2.37	2.55	2.26	2.42	1.96	2.50	2.20	1.92	2.51	2.55	3.00	2.66	2.00	2.21	2.37	2.74	2.62	1.42	2.50	2.44	1.93	
14	Safety in Road Design	32	2.37	2.83	2.25	1.71	2.09	2.65	2.13	2.08	2.20	2.77	2.78	2.22	1.71	2.07	2.94	2.74	3.02	2.16	1.83	2.43	1.84	
15	Safety in Car Design	31	2.33	2.44	2.16	1.92	1.74	2.84	2.46	1.96	1.89	1.77	2.35	2.88	2.07	1.71	2.91	2.81	3.75	2.14	1.83	2.33	2.04	
16	Traffic Flow Control	17	2.26	2.83	2.18	1.92	2.22	2.28	2.26	2.16	2.37	2.44	2.28	2.33	1.92	1.78	2.08	2.48	3.75	1.71	2.16	2.34	1.84	
17	Lighting	15	2.23	2.22	2.15	2.07	2.51	2.28	1.93	2.20	2.34	2.66	1.92	2.33	1.92	2.42	2.12	2.37	3.00	2.71	2.00	2.38	1.90	
18	Defective Vehicles	7	2.18	2.11	2.05	2.57	1.90	2.23	2.26	2.00	2.34	1.55	2.71	2.55	2.00	2.14	2.04	2.55	2.37	1.57	2.00	2.08	2.25	
19	Coordination	14	2.12	3.11	1.88	1.78	2.00	2.21	1.66	1.64	2.20	2.11	2.21	2.11	2.07	1.85	1.91	2.51	3.12	1.71	3.00	2.12	1.68	
20	Refresher Dr. Ed.	24	2.10	2.72	1.95	1.14	2.03	2.50	1.86	1.56	2.17	2.44	1.85	2.22	1.92	2.00	1.54	3.55	2.50	1.71	2.16	2.24	1.63	
21	Drugs	5	2.07	2.94	1.76	1.78	1.93	2.28	2.06	1.68	1.86	1.22	2.14	2.11	2.35	1.50	2.00	2.66	3.00	1.57	2.83	2.03	1.68	
22	Adjudication	20	1.99	1.77	1.70	2.07	2.25	2.17	1.93	2.00	2.41	2.44	1.35	2.22	1.71	2.35	1.95	2.48	2.48	0.12	1.28	1.83	1.96	2.00
23	Signs & Signals	16	1.92	2.33	1.77	1.42	2.03	2.04	1.60	1.76	1.79	2.00	2.28	1.88	2.00	1.64	2.08	2.07	2.87	1.28	2.00	1.98	1.59	
24	Fed. Safety Ed.	25	1.86	2.00	1.66	1.14	1.70	2.47	1.46	1.80	1.75	1.55	1.50	1.66	1.64	1.92	2.00	2.96	2.12	0.57	2.00	1.93	1.65	
25	E.M.C. at Scene	2	1.72	2.11	1.51	2.14	1.87	1.89	1.86	2.12	1.86	1.66	1.07	1.66	2.00	0.92	1.75	1.81	2.25	1.14	2.00	1.65	1.97	
26	Court Enforced Dr. Ed.	23	1.67	1.88	1.18	1.07	1.54	2.32	1.06	1.24	1.72	1.88	1.21	2.00	1.57	0.71	1.91	3.00	2.00	0.85	1.50	1.50	1.72	
27	Acc. Invest. & Reporting	19	1.52	1.66	1.31	1.21	1.61	1.60	1.60	1.40	1.62	2.11	1.21	2.44	1.07	1.50	1.37	1.92	0.87	0.57	1.66	1.43	1.50	
28	Beginner Dr. Ed.	22	1.48	1.77	1.14	1.28	1.48	1.50	1.40	1.20	1.48	2.11	1.71	1.88	1.00	1.07	1.20	2.00	2.00	1.37	0.71	1.50	1.39	1.20
29	E.M.S. Response Time	1	1.46	1.94	1.19	1.64	1.51	1.69	1.73	1.64	1.20	1.33	1.07	1.55	1.85	0.92	1.58	1.62	1.75	0.85	2.00	1.28	1.84	
30	Accident Debris Removal	26	1.45	1.16	1.29	1.14	1.45	1.58	1.40	1.68	1.34	1.22	1.14	1.88	1.07	1.28	1.33	2.22	1.12	1.28	1.33	1.37	1.45	
31	Debris on Road	11	1.45	1.88	1.22	1.42	1.45	1.47	1.40	1.48	1.31	1.00	1.35	1.66	1.35	1.35	1.45	1.66	1.66	1.87	1.42	1.66	1.31	1.45
32	E.M.S. at Hospital	3	1.19	1.44	1.01	1.00	1.09	1.52	1.20	1.32	1.03	1.00	0.78	1.33	1.07	0.64	1.37	1.62	1.25	0.85	1.66	1.11	1.27	

n = 211

18 73 13 30 27

15 24 29 9 14 9

15 15 14 24 27

8 7 6

17 44

EXHIBIT A-3
MEAN SCORES

Rank	Problem	Question #	All Respondents	County Persons	City Persons	Village Persons	Township Persons	School Bd. Persons	City Managers	Mayors, Vil. Pres. & Twp. Supervisors	Police Chiefs	Traffic Commanders	Judges	E.M.S. People	Attorneys	Traffic Engrs D.P.W. Heads	School Superintendents	Driver Ed. People	All Drug & Health Heads	Planning Directors	Misc. County Officials	Urban	Rural
1	Congestion, Overcrowding	8	100.0	89.5	100.0	80.5	100.0	100.0	100.0	100.0	100.0	83.5	90.0	100.0	100.0	100.0	100.0	96.2	67.8	85.6	74.9	100.0	100.0
2	Outdated, Inadequate Rd.	18	87.2	100.0	78.1	80.5	97.5	82.4	86.2	91.6	91.5	100.0	61.0	47.5	72.7	89.2	90.5	80.0	100.0	71.2	84.2	81.6	92.7
3	Inapprop. Attitude, Behavior	28	84.6	81.3	77.3	100.0	68.2	87.4	75.0	70.8	94.5	83.5	78.1	89.8	91.7	63.7	79.4	100.0	80.6	52.3	69.1	78.4	96.2
4	Alcohol	4	84.2	97.8	83.0	90.5	61.6	70.8	91.6	66.6	91.5	91.8	100.0	63.1	94.8	55.3	51.6	100.0	85.5	33.3	100.0	76.9	68.4
5	Public Concern	12	73.9	94.7	64.9	61.9	58.7	70.8	58.3	62.5	78.2	83.5	78.1	84.5	56.8	57.4	75.1	72.8	73.7	42.6	92.1	64.7	66.4
6	Manpower	13	68.2	70.8	63.6	80.5	81.4	50.0	61.2	47.8	97.5	96.0	61.0	57.9	78.4	59.5	34.2	76.7	64.8	52.3	74.9	65.8	66.4
7	M. V. Inspection	30	62.9	35.6	70.6	41.6	57.4	67.6	66.6	66.6	69.3	45.9	42.0	73.6	59.5	53.0	57.0	35.3	61.9	100.0	38.2	64.2	79.3
8	Police Patrol	21	56.2	50.2	43.0	74.2	57.4	44.2	41.6	60.4	87.5	100.0	26.8	52.7	67.5	38.1	57.0	42.7	44.2	38.0	30.8	53.5	75.0
9	Damaged Rd. Surface	10	55.3	52.1	46.3	51.6	64.1	64.0	50.0	66.6	45.7	37.6	51.2	52.7	45.9	59.5	69.0	55.0	67.8	66.7	30.8	50.7	80.5
10	Motorcycles	6	54.9	64.4	44.6	57.9	40.1	62.6	41.6	60.4	62.0	33.1	46.7	89.8	37.9	31.8	57.0	74.9	58.8	33.3	38.2	48.8	61.0
11	Testing & Licensing	29	52.7	50.2	55.3	35.3	46.7	49.1	64.1	39.5	50.0	75.2	46.7	89.8	40.6	59.5	48.3	51.8	52.9	42.6	38.2	53.1	44.5
12	Road Condition - Ice, snow	9	52.2	47.9	39.5	54.7	66.5	55.8	41.6	77.0	42.8	33.1	48.8	63.1	53.8	40.4	64.0	53.7	56.0	52.3	23.0	46.1	76.3
13	Driver Skill & Knowledge	27	52.2	52.1	51.7	64.8	35.9	46.4	47.5	37.5	63.2	58.3	75.7	63.1	37.9	46.7	48.3	53.7	58.8	28.3	53.9	51.2	12.6
14	Safety in Road Design	32	52.2	62.6	51.2	32.1	41.3	53.2	44.6	48.8	50.0	66.6	68.2	42.2	26.9	42.6	55.3	53.7	82.4	52.3	23.0	50.7	39.0
15	Safety in Car Design	31	50.5	47.8	47.5	41.6	26.8	61.7	58.3	39.5	36.8	28.9	53.6	73.6	40.6	31.8	70.6	57.5	85.5	52.3	23.0	46.9	51.2
16	Traffic Flow Control	17	47.8	62.6	48.3	41.6	46.0	36.4	50.0	50.2	57.3	54.2	51.2	47.5	34.8	33.9	35.8	41.3	35.5	38.0	38.2	47.3	39.0
17	Lighting	15	46.5	39.7	47.1	48.4	58.7	36.4	36.2	52.1	56.0	62.4	38.9	47.5	34.8	53.0	37.5	36.0	67.8	71.2	30.8	48.8	42.6
18	Defective Vehicles	7	43.8	35.6	43.0	71.0	33.2	34.2	50.0	41.6	56.0	20.7	65.8	57.9	37.9	44.6	34.2	44.7	52.9	33.3	30.8	37.3	64.0
19	Coordination	14	41.1	23.1	35.9	35.3	37.6	33.3	25.0	22.9	50.0	41.8	48.8	37.0	40.6	36.0	28.9	42.7	70.6	38.0	74.9	38.8	29.2
20	Refresher Dr. Ed.	24	40.2	58.4	38.7	6.3	38.8	46.4	33.2	19.7	49.7	54.2	36.5	42.2	34.8	40.4	13.9	92.5	56.0	38.6	38.2	43.4	26.2
21	Drugs	5	39.0	66.7	30.9	35.3	34.7	36.4	41.6	35.4	35.4	8.3	46.7	37.0	51.1	25.6	32.6	49.9	67.8	33.3	69.1	35.4	29.2
22	Adjudication	20	35.4	22.0	28.4	48.4	48.0	31.5	36.2	41.6	59.1	54.2	19.3	42.2	26.9	50.9	50.6	41.3	0.0	28.3	23.0	32.6	48.7
23	Signs & Signals	16	32.3	43.8	31.3	19.0	38.8	25.6	22.5	29.1	32.5	37.6	51.2	26.1	37.9	29.8	35.8	21.6	34.8	28.3	30.8	33.4	23.8
24	Ped. Safety Ed.	25	29.6	31.4	26.8	6.3	25.2	35.0	16.6	31.2	30.8	20.7	24.4	15.6	24.2	38.1	32.6	63.2	47.1	0.0	30.8	31.5	27.4
25	E.M.S. at Scene	2	23.4	35.6	20.4	51.6	32.2	18.9	33.2	47.8	35.4	24.8	9.8	13.6	37.9	8.3	22.4	9.1	50.2	19.0	30.8	20.7	46.9
26	Court Enforced Dr. Ed.	23	21.2	27.0	7.0	3.1	18.6	38.3	00.0	2.1	29.5	33.1	14.6	31.8	21.6	2.1	28.9	66.1	44.2	9.3	7.8	15.0	31.7
27	Acc. Invest. & Reporting	19	14.6	18.7	12.4	9.5	21.4	5.9	22.5	10.4	25.2	41.8	14.6	52.7	2.6	25.6	6.9	14.4	17.6	0.0	15.2	12.3	18.3
28	Beginner Dr. Ed.	22	12.8	22.8	5.3	12.6	16.2	1.4	14.1	00.0	19.2	41.8	31.6	26.1	9.0	12.8	0.0	18.2	29.5	4.7	7.6	10.8	0.0
29	E.M.S. Response Time	1	11.9	29.2	7.0	28.9	17.3	9.9	27.9	22.9	7.3	12.4	9.8	10.4	32.2	8.3	15.5	0.0	38.2	9.3	30.8	6.5	10.2
30	Accident Debris Removal	26	11.5	00.0	11.5	6.3	14.9	5.0	14.1	25.0	13.2	8.3	12.2	26.1	2.6	19.0	5.3	28.8	23.5	28.3	0.0	10.0	15.2
31	Debris on Road	11	11.5	27.0	8.7	19.0	14.9	0.0	14.1	14.6	12.0	0.0	19.3	15.6	13.2	21.1	10.2	1.9	41.2	28.3	15.2	7.7	15.2
32	E.M.S. at Hospital	3	0.0	10.5	0.0	0.0	0.0	2.3	5.8	6.2	0.0	0.0	0.0	0.0	2.6	0.0	6.9	0.0	26.6	9.3	15.2	0.0	4.3
		n =	211	18	73	13	30	27	15	24	29	9	14	9	15	14	24	27	8	7	6	117	44

EXHIBIT A-4
RELATIVE RANKING

APPENDIX B

MASS DATA ANALYSIS: SUMMARY AND TABLES, GRAPHS AND NOTES

This appendix contains 1) a brief summary of findings of the mass data analysis, and 2) tables, graphs, and notes used in the analysis. Both are keyed to the cells of the data and problem matrices as shown below, although mass data did not address each cell and therefore some cells have been omitted.

	1. HUMAN	2. VEHICLE	3. ROAD, ENVIRONMENT
1. Pre-conditions	1-1	1-2	1-3
2. Pre-crash	2-1	2-2	2-3
3. Crash	3-1	3-2	3-3
4. Post-crash	4-1	4-2	4-3

Questions of methodology, data sources, validity, etc., are addressed in Volume II of this report.

SUMMARY

Section 1-1, Pre-Conditions, Human

This section is concerned with driver skill and knowledge. The data address primarily the driving records of Oakland County resident drivers, their violations and accident experience, both inside and outside Oakland County.

Summary points are as follows:

1. Overinvolvement of the Young

The young driver appears to be overinvolved in both violations and accidents. Drivers between the ages of 16 and 25 represent 23.5% of the driving population and 22% of the miles driven, but 43% of traffic law violation convictions and 37% of the accidents. This overinvolvement is observed in

nearly every type of violation, and is most pronounced in the more serious D.U.I.L., Drunk, and Reckless Driving categories.

This overinvolvement is, in fact, characteristic of all Michigan, except that Oakland County has a slightly larger percentage of drivers, and thus violations and accidents, in the younger age groups than all Michigan

2. Sex.

Men (51.3%) and women (48.7%) are about equally divided in the registered driver population in Oakland County, but men have 3.7 times as many convictions and nearly twice as many accidents as women. However, men also drive more than twice the mileage of women. Thus, per mile driven, men have more convictions but fewer accidents than women.

3. Type of License.

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

Section 2-1, Pre-Crash, Human

This section deals with physical and mental impairment of drivers. The data address problems of drivers with "special restrictions" licenses, old age, violations and circumstances which contribute to accidents, and alcohol involvement.

Summary points are as follows:

1. "Restricted Licenses"

Approximately 800 drivers in Oakland County have driver's licenses with "special restrictions." These usually involve the requirements that the vehicle driven have some special equipment to facilitate a physically handicapped driver. Inspection of a

sample of these drivers' records show that they have about the same violation and accident rate as all other drivers.

2. Old Age.

Drivers of age 65 and over represent approximately 10.3% of the driving population in Oakland County, but only 4.7% of the mileage driven. They have approximately 4.1% of the accidents and only 2.1% of the convictions. The violations they do receive are mostly of the "license" type.

3. Violations and Circumstances.

Several accident contributing violations and circumstances involving impairment of some type are addressed by the data.

"D.U.I.L. or drugs" is noted in 3.4% of men's accidents and in 0.7% of women's accidents. "Reckless or careless" driving shows up in 2.1% of men's accidents and 1.1% of women's accidents. "ill, fatigued or inattention" is noted in 1.6% of men's and 1.1% of women's accidents, and is concentrated in the younger age groups.

The percent of accidents which have an associated "contributing violation" varies with the age of the driver. Drivers of age 16 have a high rate with a "contributing violation" noted in 57% of their accidents. This rate decreases with increasing age to a low of 43.9% for drivers in the 30-34 age group and then rises again to the highest rate of 57.9% for drivers 65 and over.

4. Alcohol Involvement.

Data on alcohol involvement in accidents comes from several sources. These various sources show that alcohol is involved in anywhere from 15% to 28% of the accidents. Male drivers show a higher drinking involvement in accidents of 15.4% than females at 4.2%.

Drinking involvement also varies with age. There is an

overinvolvement in the ages 20 to 30, with that group representing 24% of the driving population and 34% of the alcohol involvement. Drivers of age 45 and over are slightly under-involved. The overinvolvement in the 20-30 age group is attributed mostly to male drivers in that group.

Drivers involved in accidents in which they "had been drinking" had a higher incidence of contributing violations or circumstances than drivers who had not been drinking.

Leaders for drivers who had been drinking were:

D.U.I.L.	22.4%
Reckless Driving	5.3%
Speed too fast	35.1%
Failed to yield	8.8%
Left of center	7.8%
Followed too closely	5.6%

Younger drivers are not over-represented in the D.U.I.L. category (contributing circumstances to an accident) but they are quite over-represented in D.U.I.L. convictions. (Drivers in the age group 20-21 represent 6% of the driving population but 14% of the D.U.I.L. convictions).

Alcohol-involved accidents appear to be more severe than non-alcohol-involved accidents, with a fatality in 1.3% of the alcohol-related accidents and only 0.4% of the non-alcohol-related accidents.

The type of accident also varies with alcohol involvement. Alcohol-involved accidents show a higher incidence of "vehicle overturning or running off road" and "collision with a fixed object" than non-alcohol-related accidents.

The time distribution of accidents involving alcohol differs from those not involving alcohol. Alcohol-related accidents tend to peak on Saturday rather than on Friday and during evening and early morning hours rather than at 4-5 p.m.

Section 3-1, Crash-Human

This section focuses on the human involvement in crashes which occur in Oakland County, regardless of the place of residence of the drivers involved. The data come primarily from the Oakland County Crash File.

The sex and age breakdowns for accidents parallel the data given in the previous section, so they are not repeated here. Other summary points are as follows:

1. Violations which contribute to accidents.

Violations most noted on the accident report form as having contributed to the accident are:

speed too fast 15.3% of all accidents
failed to yield right-of-way... 14.8%
followed too closely 6.8%

2. Types of Accidents.

The data show that male drivers tend to have more "motor vehicle overturns or runs off road" accidents than females (13.8% to 7.8%) while female drivers tend to have more "collision of two motor vehicles" accidents than males (84.5% to 79.1%). Also, drivers in the younger age categories seem to have more "motor vehicle overturns or runs off road" type accidents than drivers in older categories.

3. Time of Accidents.

The number of accidents is nearly evenly distributed from Monday through Thursday, but is higher on Friday and Saturday, and lower on Sunday. Within each day accidents numbers peak at about 4-5 p.m., with lesser peaks at noon and at 8 a.m. Differences between males and females are not pronounced, but males tend to have higher percentages of their accidents in evening and nighttime hours than females.

Section 1-2, Pre-Conditions, Vehicle

This section addresses primarily the relationship between vehicle design and accidents. The problem of vehicular design is, however, beyond the scope of this project and indeed, beyond the capabilities of any county-size jurisdiction.

There are, however, several variables in the Crash File which address the vehicular characteristics of crash-involved vehicles. We cannot determine whether or not particular types of vehicles are "over-represented" in accidents because we do not know how many of each type of vehicle are on the road in Oakland County. So we are left with looking at the numbers involved and the accident severity.

Summary points are as follows:

1. It appears that accidents involving motorcycles and accidents involving pedestrians have higher levels of injury and fatality than other types of accidents.

2. The percentage of uninjured drivers has increased significantly with decreasing car age, i.e., the older the car, the higher the incidence of driver injury.

Section 2-2, Pre-Crash, Vehicle

This section concerns vehicle condition. Summary points are as follows:

1. Approximately 3% of crash-involved vehicles had some type of defect. Most of these involved defective equipment such as lights, brakes, steering, etc.

2. The percentage of crash-involved vehicles with defective equipment rises with increasing vehicle age, from a low of 0.9% for current year models to 7.7% for 10 year old models. The number of tire blowout peaks at 3 and 4 year old models.

3. The percentage of vehicles that pass the "vehicle check lane" inspection program in Michigan decreases with vehicle age

up to eight year old models. Only 35% of the vehicles inspected in 1970 passed the inspection, with the most common violations being:

Lights	73.5% of rejected vehicles
Washers and wipers	52.2%
Brakes	23.0%
Tires	28.7%

(These data were derived from Michigan State Police records and are not presented in this appendix.)

Section 3-2, Crash-Vehicle

This section concerns the vehicle at the time of the crash. Summary points are as follows:

1. The majority of single vehicle accidents (84%) involve the vehicle overturning on the road, running off the road, or colliding with a parked vehicle or other fixed object. Most of these (70.6%) involve leaving the road at a non-intersection area, and in most cases (72.4%) the driver was driving straight ahead just before the accident.

2. 74.2% of all vehicle crashes involve a collision between two or more vehicles, 39.5% of which are rear-end, and 30.0% of which are at an angle. Head-on and side-swipe collisions account for 9% of the accidents. 65.8% take place at an intersection.

3. Almost 90% of motorcycle accidents involve a collision between a motorcycle and another motor vehicle. Of these two-vehicle crashes, one-half (50.4%) involve one vehicle making a left turn, and 21.3% involve a head-on, rear-end, or broadside collision.

4. Most pedestrian accidents (72%) occur at non-intersection areas, and most of these (90%) involve a vehicle which is traveling straight.

Section 1-3, Preconditions, Road-Environment

This section concerns itself with the general road and geographic environment as it exists in Oakland County.

Summary points are as follows:

1. Accident phenomena do show differences across geographic units, particularly across the population density gradient (from a high density in the southeast corner to a low in the northwest corner of the County). Total accident rates generally increase and fatal accidents generally decrease with increasing population density. Also, single vehicle accidents, accidents involving alcohol, and nighttime accident rates increase with decreasing density.

2. Approximately 21% of the drivers involved in Oakland County crashes have residence some place outside the County. On the other hand, residents of Oakland County had 10% of their accidents outside the County. Thus, the net burden (of the cost of safety-related services such as emergency medical, police, highways, etc.) falls on Oakland County in an amount of 11% of accidents in Oakland County.

Section 2-3 Pre-Crash, Road-Environment

This section deals with the roadway environment just before the accident. Summary points are as follows:

1. 1207 or 4.2% of the 1969 crashes involved some road defect such as obstruction, loose surface, holes, etc. 810 of these involved "slipper when wet," of which 401 (24.9%) involved a single vehicle running off the road or a collision with a fixed object, and 587 (or 72.5%) involved a collision of two motor vehicles, 250 (42.5%) of which were rear-end collisions.

2. 186 or 0.6% of the 1969 crashes occurred within a

construction zone. 114 of these involved a collision of two motor vehicles while 31 involved the collision of a motor vehicle with a fixed object.

Section 3-3 Crash, Road-Environment

(The environment at the time of the crash)

Summary points are as follows:

1. Accident types and severity vary with time. Single vehicle crashes tend to peak at around midnight, while multiple vehicle accidents tend to have more than twice the fatality rate of daytime accidents.

Section 4-3, Post-Crash, Road-Environment

1. 121 or 0.4% of 1969 accidents involved a previous accident -- any accident involving a vehicle noted as being in the road due to a prior accident or any accident in which one or more vehicles were stopped or avoiding a previous accident. Of the 121, 112 involved a collision of 2 or more motor vehicles.

TABLES, GRAPHS AND NOTES

The following index relates to those data which were used in the course of the mass data analysis.

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I. CHARACTERISTICS OF OAKLAND COUNTY DRIVERS

A. Type of License

(Source: MDR sample)

*VARIABLE	2 LIC TYPE	
	OPERATOR	CHAUFFER
CODE VALUE:	1	2
FREQUENCY:	9548	452
PERCENTAGES:	95.5	4.5

B. Sex

(Source: MDR sample)

*VARIABLE	6 SEX	
	FEMALE	MALE
CODE VALUE:	0	1
FREQUENCY:	4868	5132
PERCENTAGES:	48.7	51.3

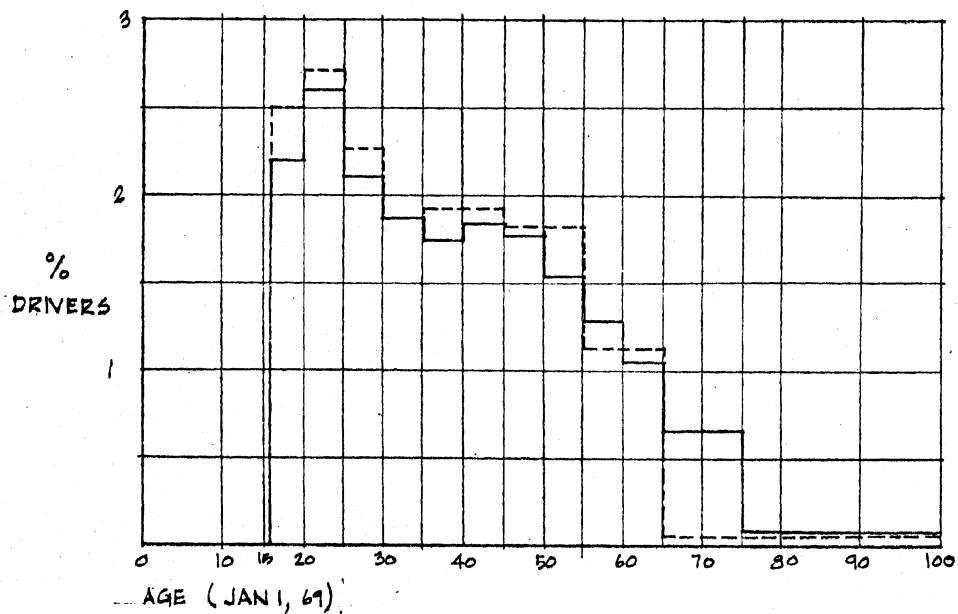
C. Age of Driver

(Source: MDR sample)

*VARIABLE	7 AGE GROUP AS OF JAN/1/70 N= 10000					
	0-15	16	17	18-19	20-21	22-24
CODE VALUE:	0	1	2	3	4	5
FREQUENCY:	3	174	265	595	556	790
PERCENTAGES:	0.0	1.7	2.6	5.9	5.6	7.9

	25-29	30-34	35-44	45-54	55-64	65+
	6	7	8	9	10	11
	1128	925	1935	1834	1125	670
	11.3	9.2	19.3	18.3	11.2	6.7

D. Age Distribution of Drivers



———— All Michigan Drivers (Mich. Driver Statistics #3, 1970)

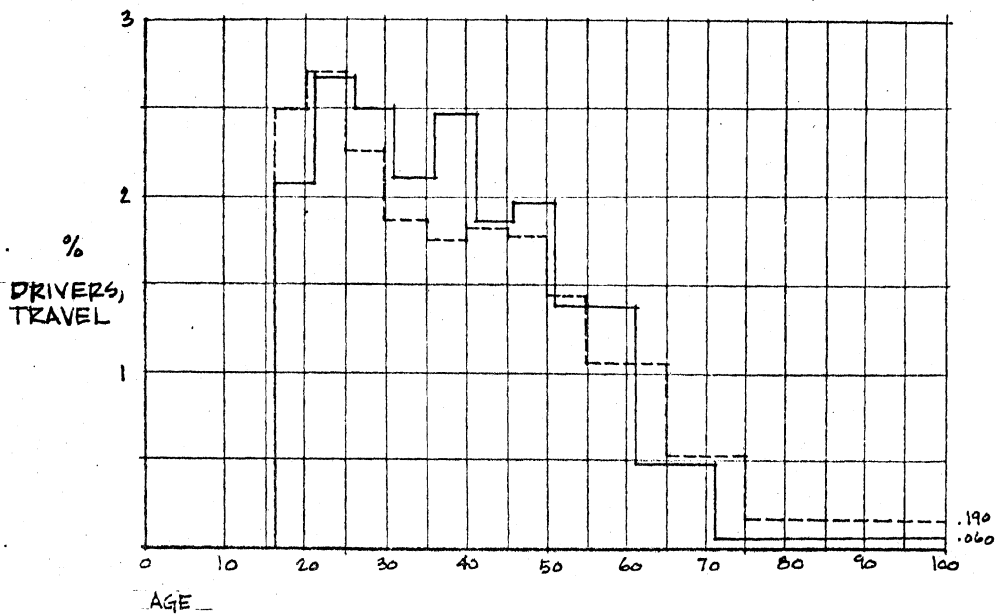
----- Oakland County Drivers (MDR File)

II. DESCRIPTIVE STATISTICS, ALL M.D.R. SAMPLE VARIABLES

VAR #	VARIABLE NAME	MEAN, NUMBER PER REGISTERED DRIVER	NOTES: REGISTER DRIVERS = 544,000.
8	TOTAL# CONVICTIONS 68,69	.355	193,000 = APPROX. TOTAL IN COUNTY
9	TOTAL# ACCIDENTS 68,69	.166	90,000
10	SPECIAL REST. COUNT RESTRICTIONS ON LICENSES	.0015	815
11	# OF ARRESTS IN 1968	.177	96000
12	# OF ARRESTS IN 1969	.178	97000
13	# OF ACCIDENTS IN 1968	.075	41000
14	# OF ACCIDENTS IN 1969	.091	49000
15	# OF 1 CAR ACCIDENTS	.0138	MEANS FROM THIS POINT ON ARE DOWNWARD BIASED, USE % ONLY
16	# OF 2+ CAR ACCIDENTS	.1346	
17	# OF 0 INJ. ACCIDENTS	.0900	60.2 %
18	# OF 1+ INJ. ACCIDENTS	.0592	
19	# OF 0 KILL ACCIDENTS	.150	99.09 %
20	# OF 1+ KILL ACCIDENTS	.0004	
21	# OF GROUP 1 VIOLATIONS FELONY, 6PTS	.0003	100 %
22	# OF GROUP 2 VIOLATIONS D.U.I. DRUNK 6PTS	.0022	
23	# OF GROUP 3 VIOLATIONS RECKLESS	.0026	
24	# OF GROUP 4 VIOLATIONS MOVING 3PTS	.0599	
25	# OF GROUP 5 VIOLATIONS OTHER 2PTS	.2139	
26	# OF GROUP 6 VIOLATIONS EQUIPMENT 2PTS	.0304	
27	# OF GROUP 7 VIOLATIONS LICENSE 2PTS	.0167	
28	# OF GROUP 8 VIOLATIONS OTHER ZERO PTS	.0001	
29	# OF GROUP 9 VIOLATIONS D.U.I. DRUGS 6PTS	.0001	
30	# OF VIOLAT. TP. 1 ACCS. ACCIDENTS WITH VIOLATIONS	.0770	
31	# OF VIOLAT. TP. 2 ACCS. ACCIDENTS WITH NO VIOL.	0	
32	# OF IMPAIRMENT 1 ACCS. ACCIDENTS WITH IMPAIRMENT	.0041	
33	# OF IMPAIRMENT 2 ACCS. ACCIDENTS WITH NO IMPAIR.	.1363	
34	# OF IMPAIRMENT 3 ACCS. NOT KNOWN	.0046	
35	# OF UNDER INFL. 1 ACCS. ACCIDENTS UNDER INFL.	.0037	
36	# OF UNDER INFL. 2 ACCS. ACC. NOT UNDER INFL	.0045	
37	# OF UNDER INFL. 3 ACCS. NOT KNOWN	.0053	
38	# OF CHEM TESTS ACCS. CHEM. TEST GIVEN	0	
39	TIMES ACC DATE=ARR DATE	.0158	

III AGE ANALYSIS

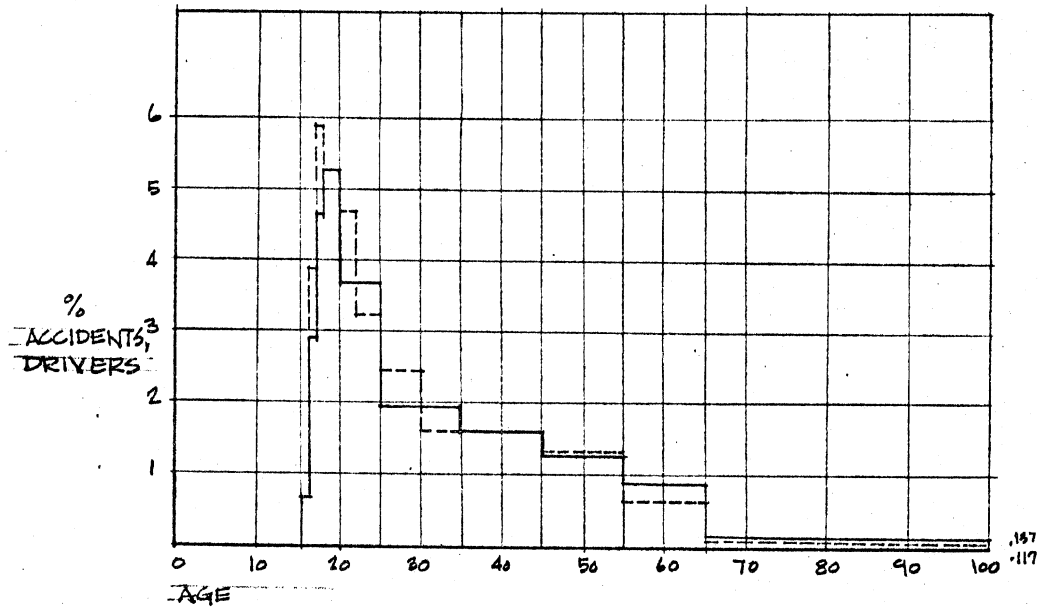
A. Age Distribution of Oakland County Driver Population and Total Travel



— Miles Driven (HSRI Exposure FH-11-7293, 1970, National Sample)

---- Drivers, Oakland County (M.D.R. File, 1969)

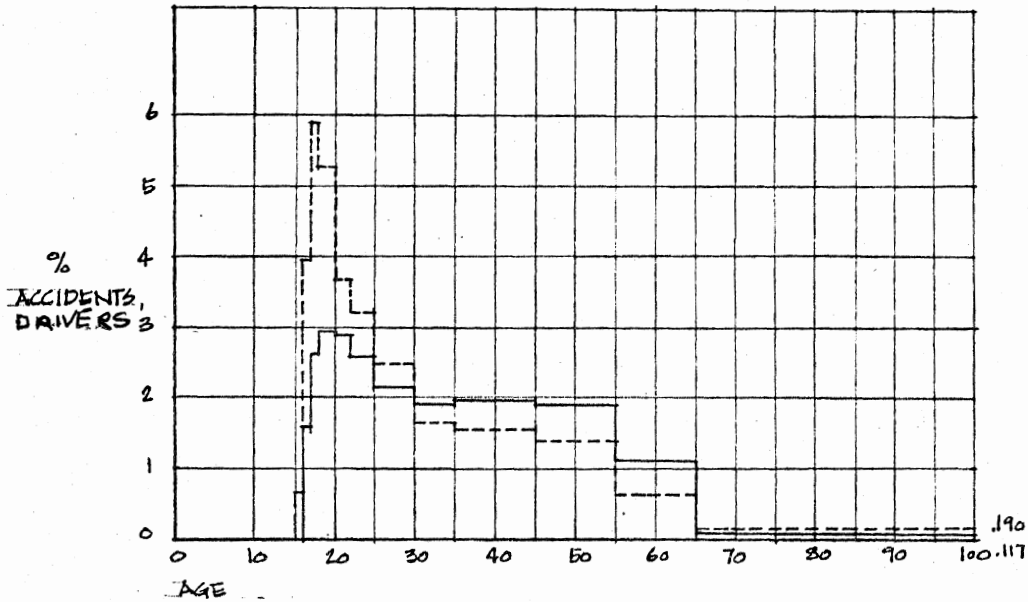
B. Age Distribution of Accidents, All Michigan and Oakland County Drivers



— All Michigan Drivers (Michigan Traffic Accident Facts, 1969)

---- Oakland County Drivers (Oakland County Crash File, 1969)

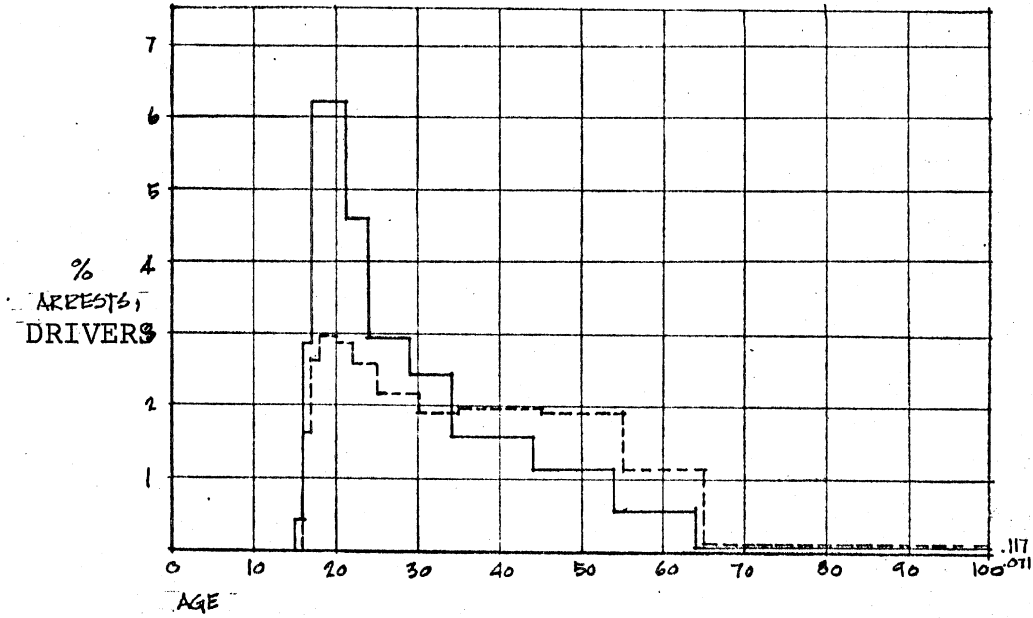
C. Age Distribution of Oakland County Accidents and Drivers



— Oakland County Drivers (MDR File)

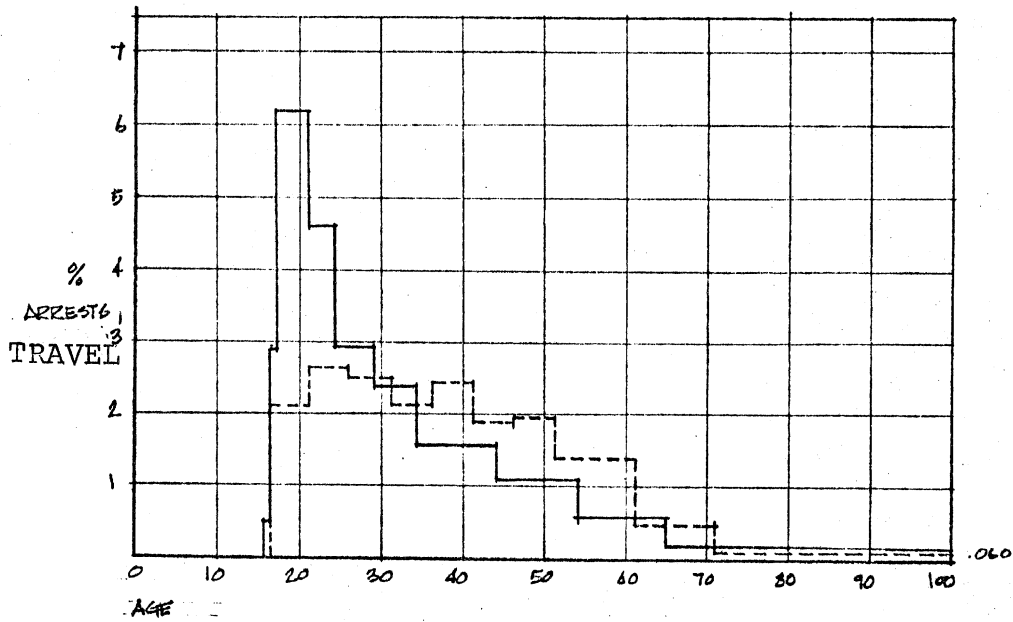
---- Oakland County Accidents (Oakland County Crash File, 1969)

D. Age Distribution of Arrests and Drivers, Arrests and Travel



----- Oakland County Drivers 1969 (MDR file)

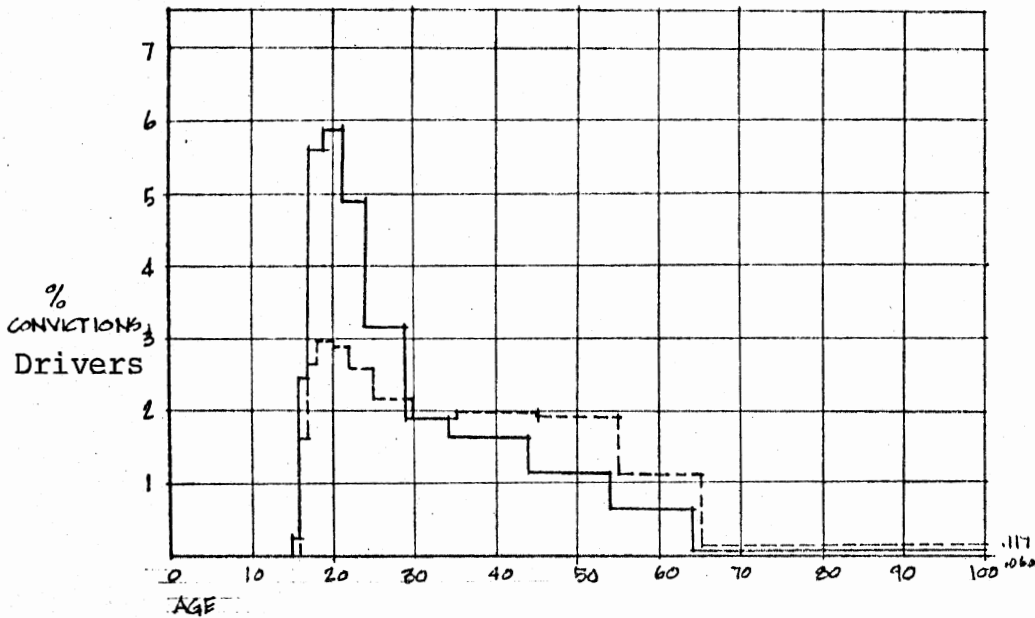
———— Arrests 68, 69 (MDR file)



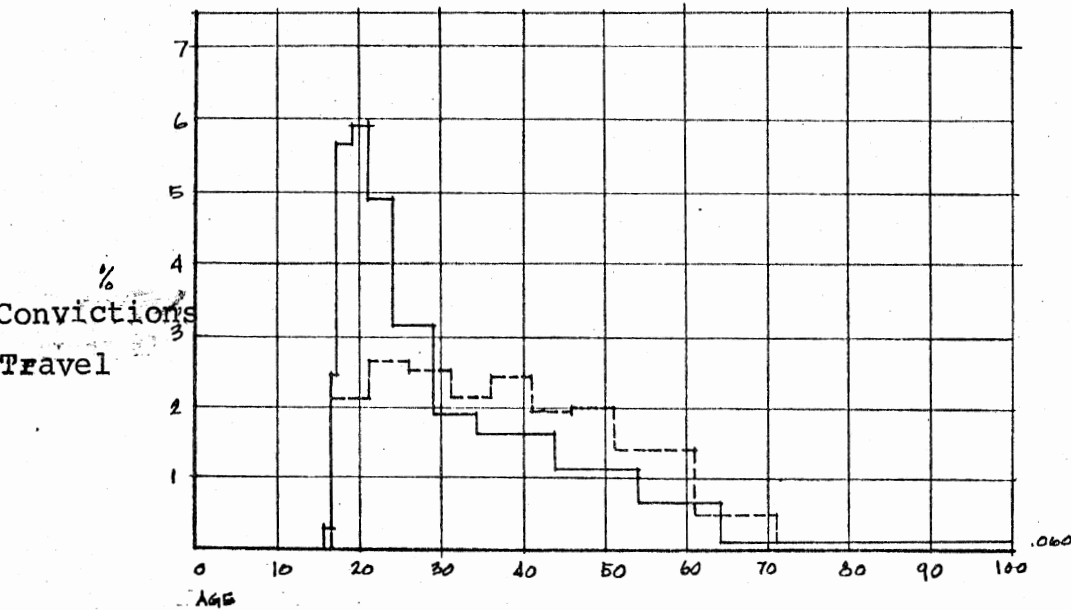
----- Miles Driven (National Sample)

———— Arrests 68, 69 (MDR file)

E. Age Distribution of Convictions and Drivers, Convictions and Travel



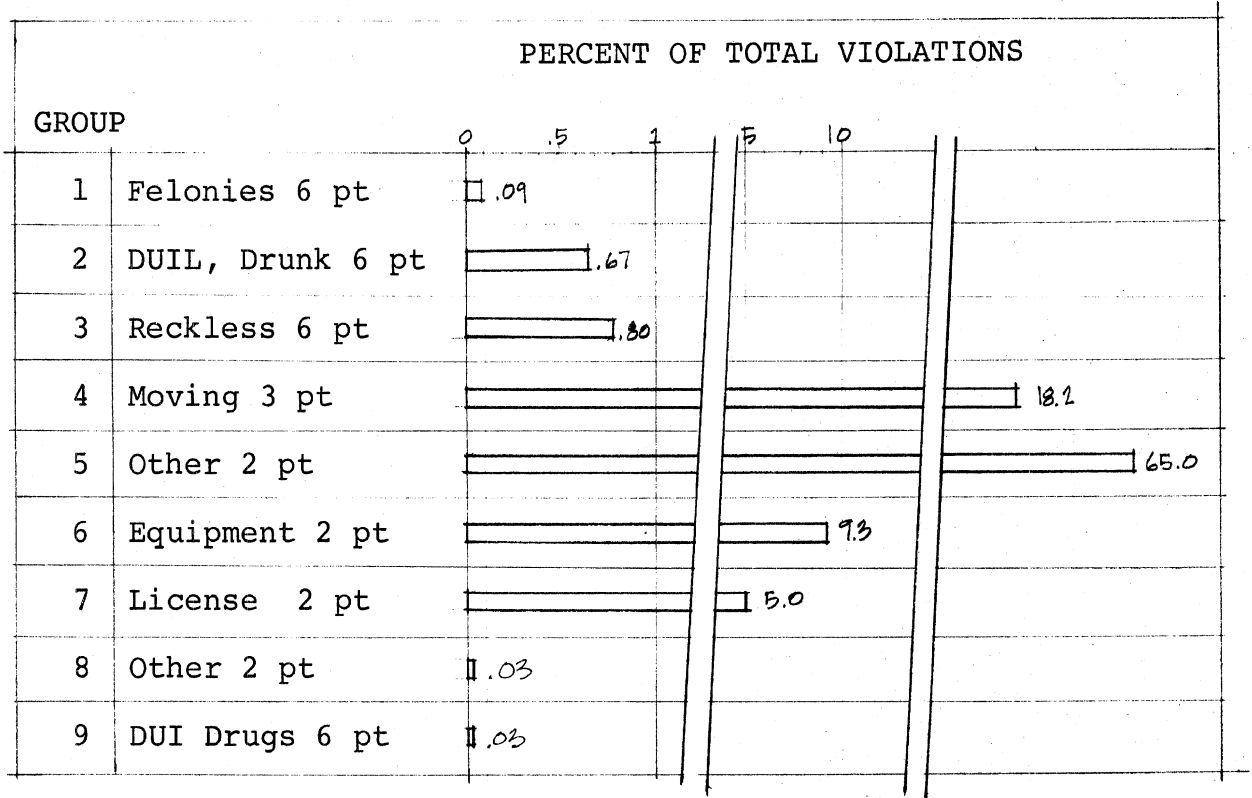
---- Oakland Drivers (MDR file)
 ____ Total Convictions 68, 69 (MDR file)



---- Miles Driven (National Sample)
 ____ Total Convictions 68, 69 (MDR file)

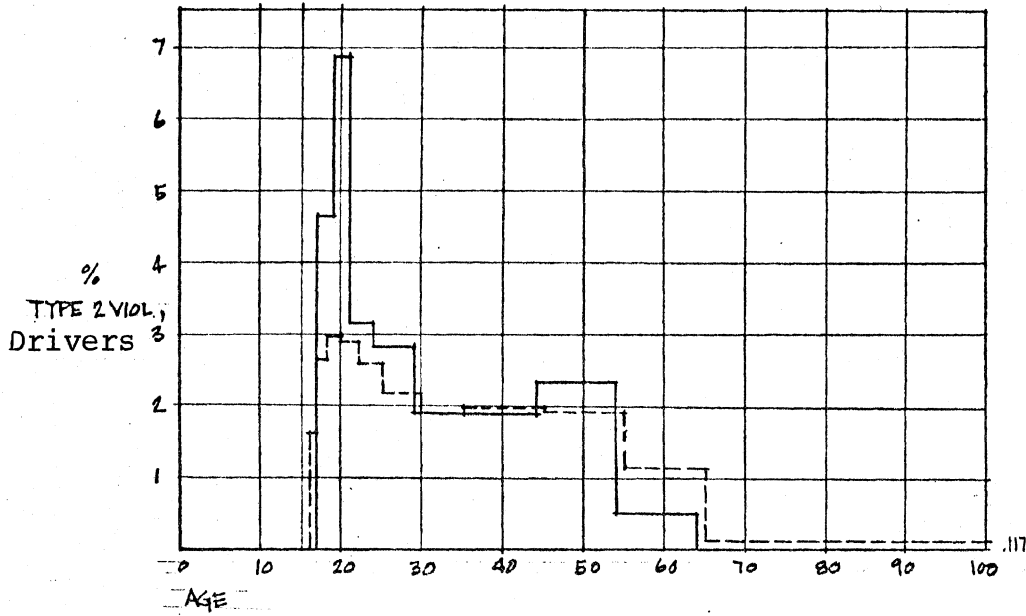
F. Types of Violations, Oakland County Drivers

1. All Violations by Type



2. Type #2 Violations

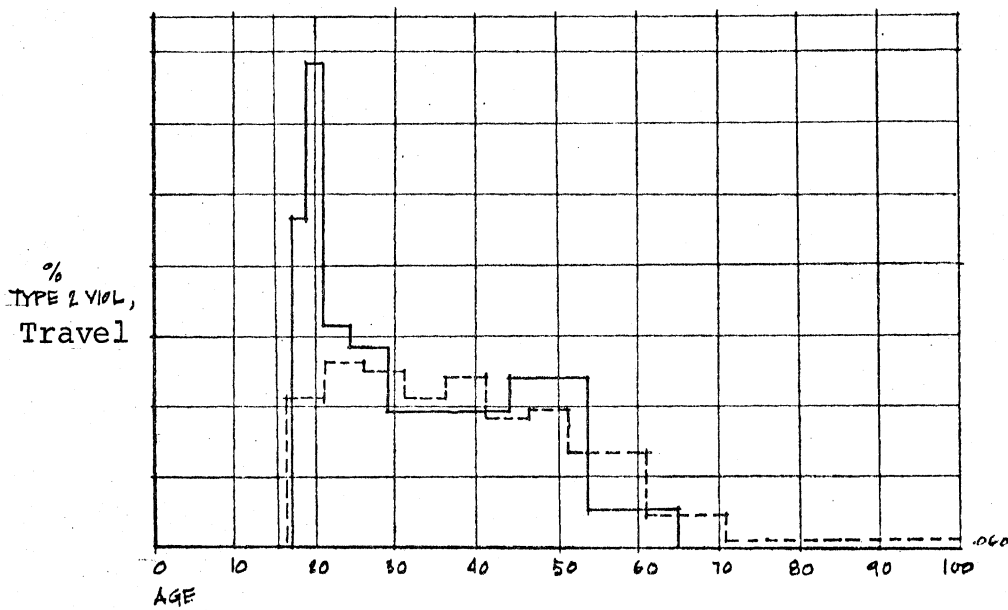
(DUIL and Drunk Driving, 6 points)



---- Oakland Drivers (MDR File)

— Type 2 Violations (MDR File)

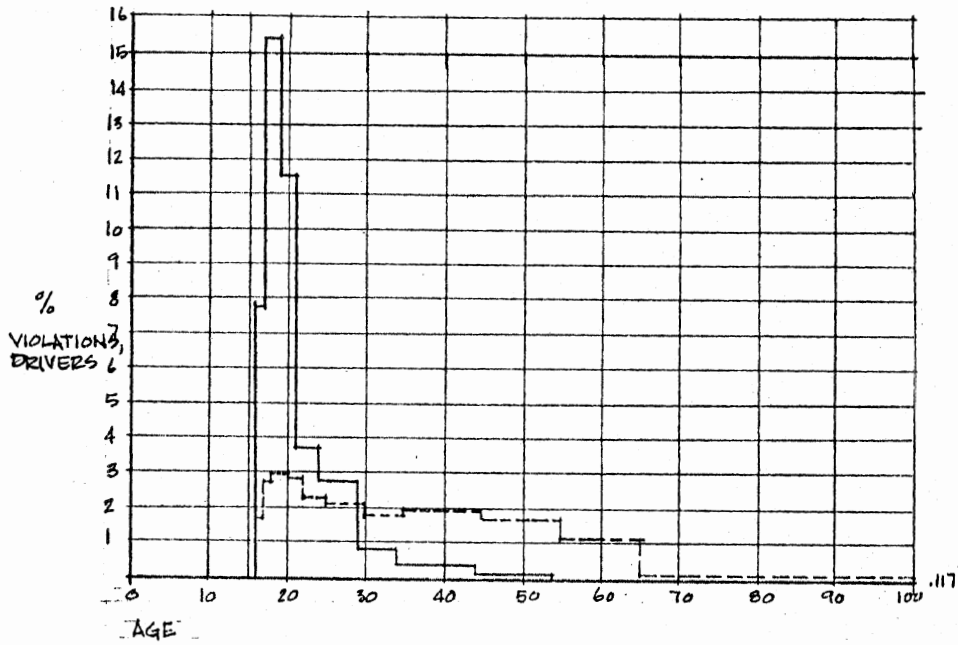
(area under curve = 100% = .67% of all violations)



---- Miles Driven (National Sample)

— Type 2 Violations

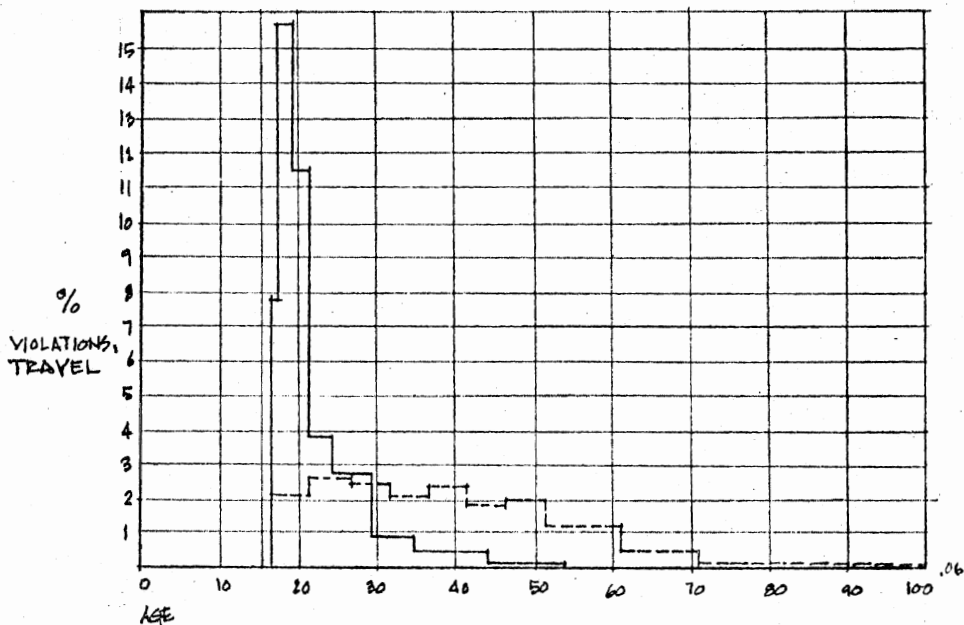
3. Type #3 Violations
 (Reckless Driving, 6 points)



---- Oakland Drivers (MDR File)

—— Type 3 Violations (MDR File)

(area under curve = 100% = .80% of all violations)

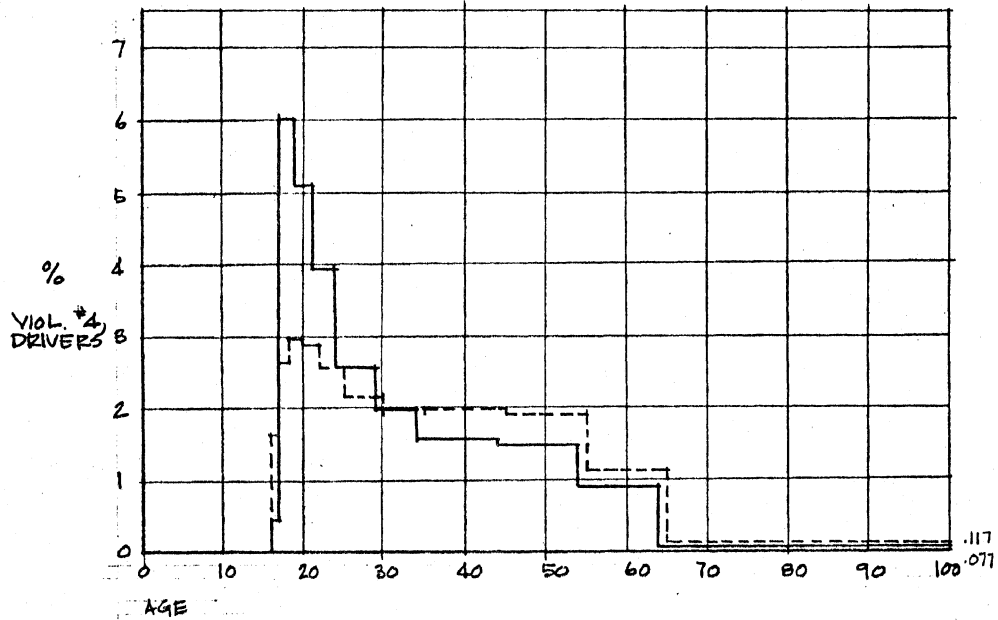


---- Miles Driven (National sample)

—— Type 3 Violations

4. Type #4 Violations

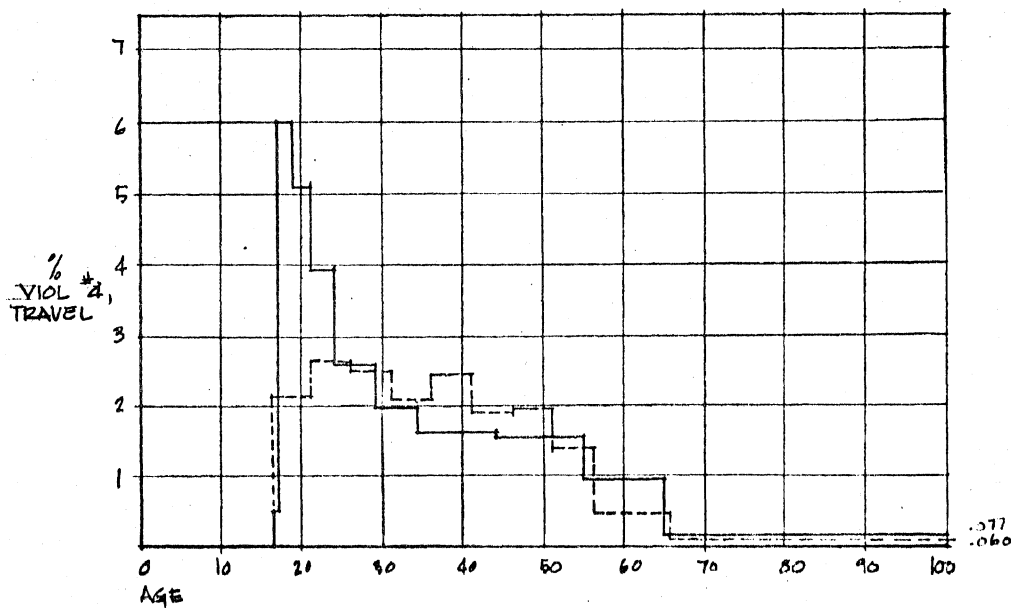
(All 3-point moving violations)



---- Oakland County Drivers (MDR File)

— Type 4 Violation (MDR File)

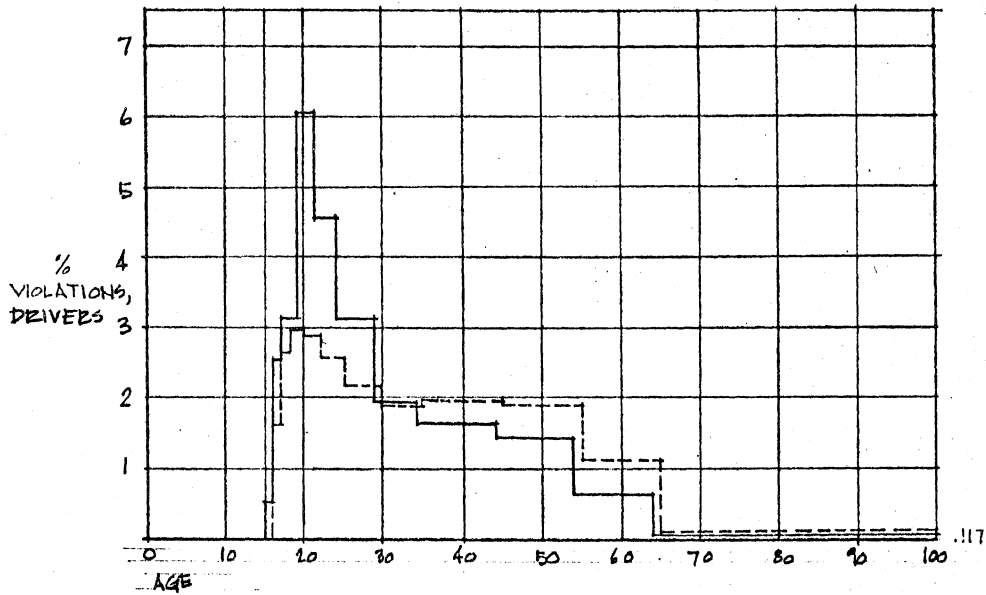
(Area under curve = 100% = 18.2% of all violations)



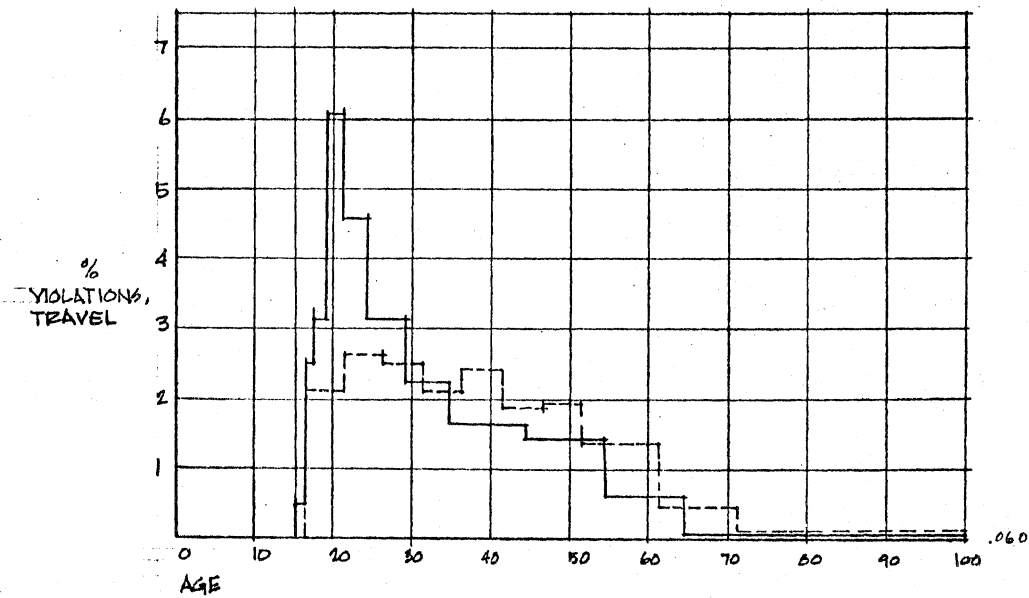
---- Miles Driven (National sample)

— Type 4 Violations

5. Type #5 Violations
 (other 2-point violations)

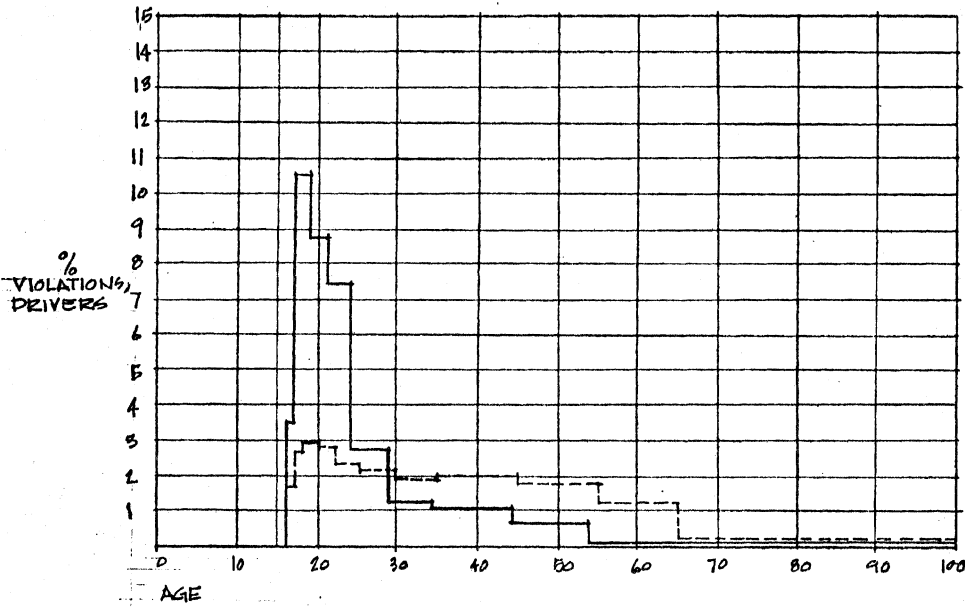


---- Oakland County Drivers (MDR File)
 —— Type 5 Violations (MDR File)
 (Area under curve = 100% = 65% of all violations)

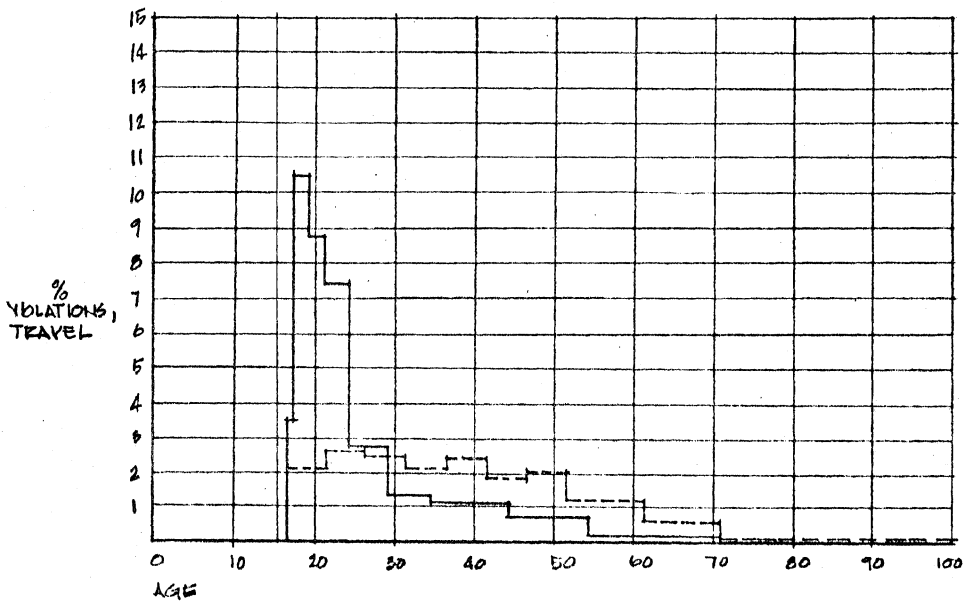


---- Miles Driven (National sample)
 —— Type 5 Violations

6. Type #6 Violations
 (All equipment violations)

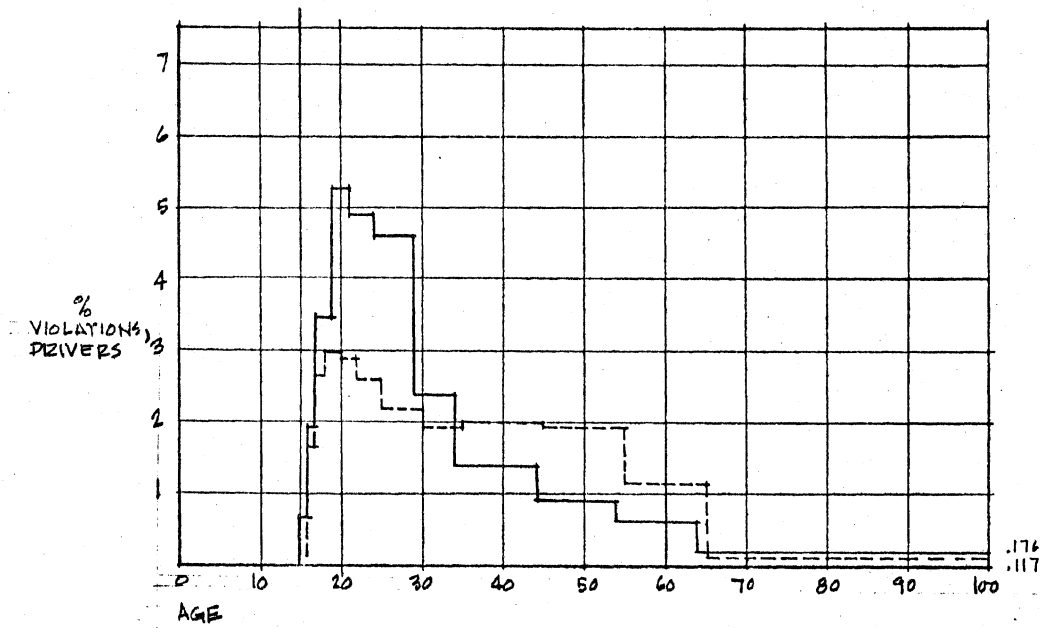


---- Oakland County Drivers (MDR File)
 —— Type 6 Violations (MDR File)
 (Area under curve = 100% = 9.3% of all violations)

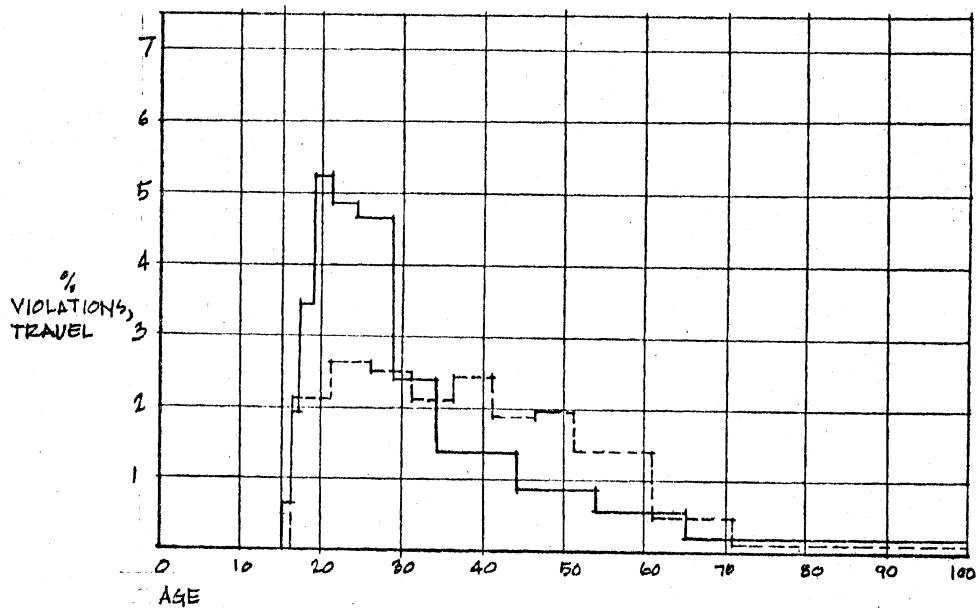


---- Miles Driven (National sample)
 —— Type 6 Violations

7. Type #7 Violations
 (License Violations)



----- Oakland County Drivers (MDR File)
 ——— Type 7 Violations (MDR File)
 (Area under curve = 100% = 5% of all violations)



----- Miles Driven (National sample)
 ——— Type 7 Violations

IV. SEX ANALYSIS

A. Sex and Total Number of Accidents (68, 69)

(Source: MDR sample)

	Mean No. per Person	% of Total Accid.	% of Regist. Drivers	% of Total Travel
Female	.100	33.6	48.7	29.5
Male	.198	64.4	51.3	70.5

B. Sex and Total Number of Convictions (68, 69)

(Source: MDR Sample)

	No. per Person	% of Conv.	% of Regist. Drivers	% of Total Travel
Female	.144	21.2	48.7	29.5
Male	.532	78.8	51.3	70.5

V. TYPE OF LICENSE

A. Type of License and Total Number of Accidents (68, 69)

(Source: MDR Sample)

	Mean No. per Driver	% of Total Accidents	% of Regist. Drivers	% of Total Travel
Operator	.144	92.5	95.5	86.5
Chauffeur	.236	7.5	4.5	13.5

B. Type of License and Total Number of Convictions (68, 69)

(Source: MDR Sample)

	Mean No. per Driver	% Conv.	% of Regist. Drivers	% of Total Travel
Operator	.330	90	95.5	86.5
Chauffeur	.691	10	4.5	13.5

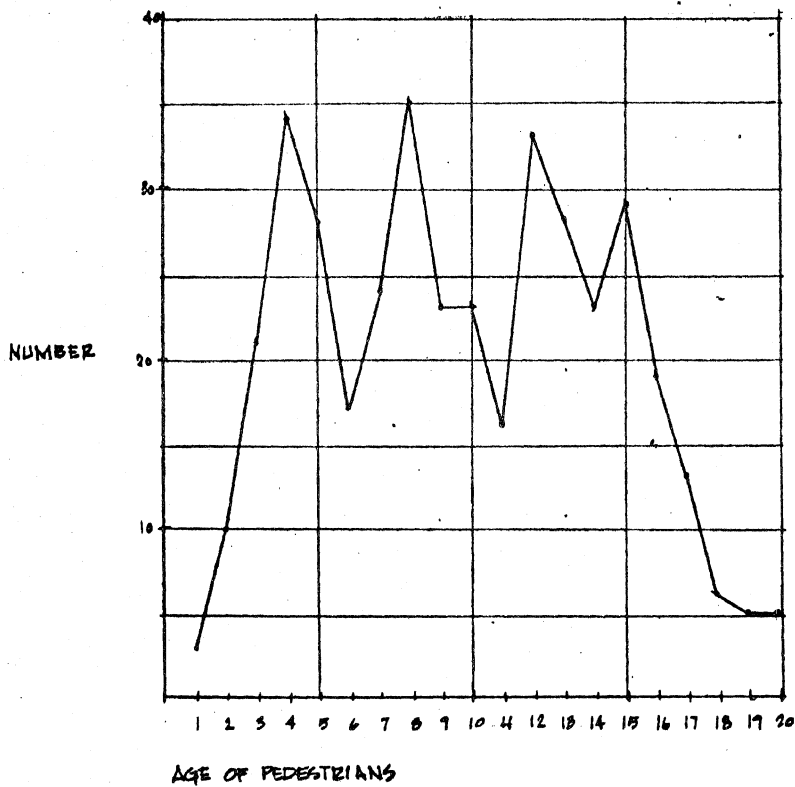
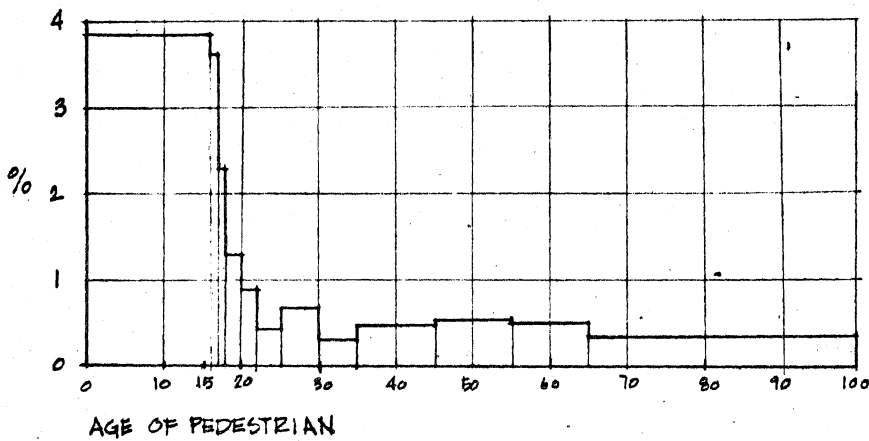
VI. THE PEDESTRIAN ACCIDENT IN OAKLAND COUNTY

A. Sex of Pedestrian

(Source: Oakland Crash File, 1969, incl. #1, #2)

sex	male	female	unknown	total
number	353	211	2	566

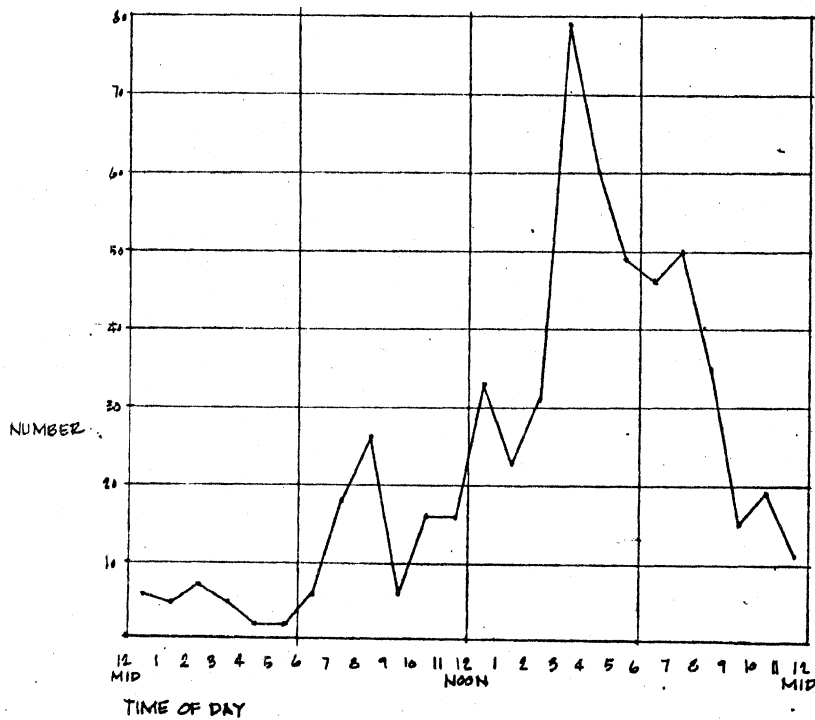
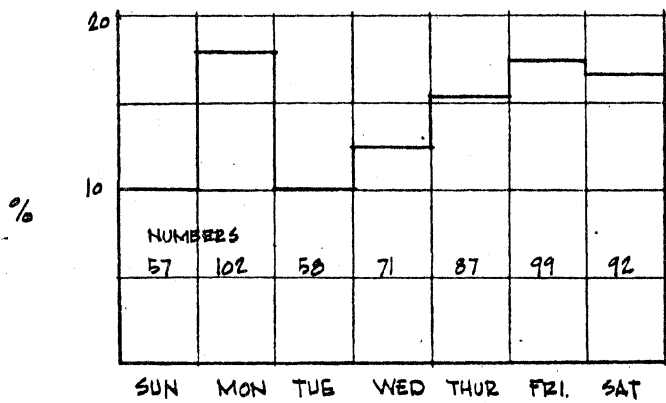
B. Age of Pedestrian



C. Injury of Pedestrian

injury	dead	visible severe	visible slight	not visible injury	not injured	total
number	34	246	174	80	22	556
%	6.2	44.3	31.2	14.3	4.0	100.0

D. Time of Pedestrian Accident



I. IMPAIRMENT

A. Drivers with "Special Restriction" Licenses

(Source: M.D.R. sample)

(original file MDR) (n=15 rest.lic.dr.)	All Drivers		Restricted Lic. Drivers	
	Mean No. per Driv.	S.D.	Mean No. per Driv.	S.D.
TOTAL NO. CONVICTIONS	.33	.62	.35	.83
TOTAL NO. ACCIDENTS	.07	.26	.15	.42
#ARRESTS 68	.20	.56	.18	.54
# ARRESTS 69	.13	.35	.15	.46
#ACCIDENTS 68	.07	.26	.08	.29
# ACCIDENTS 69	0	0	.07	.28

B. Old Age

See age distributions in sections:

1-1 Pre-conditions, Human

2-1 Pre-crash, Human

3-1 Crash, Human

C. Impairment - Contributing Circumstances and Violations

1. Contributing Circumstances, Oakland County Accidents

(Source: Oakland County Crash File, 1969)

Code		% Involvement		
No.	Name	All	Male	Female
01	DUIL or Drugs	2.6	3.4	.7
02	Reckless, careless	1.8	2.1	1.1
03	Ill, fatigued, inattention	1.4	1.6	1.1
04	Failed to comply w/lic. rest.	.1	.1	.1
05	Obscured vision	4.6	4.5	5.3
06	Defective contributing equip.	2.3	2.5	0
07	Loss of control, load shift	.1	.1	0
08	Loss of control, wind, vacuum	0	0	0
09	Skidding	3.6	3.8	3.5
10	None	83.6	81.9	86.3

2. Contributing Violations, Oakland County Accidents, Sex
 (Source: Oakland County Crash File, 1969)

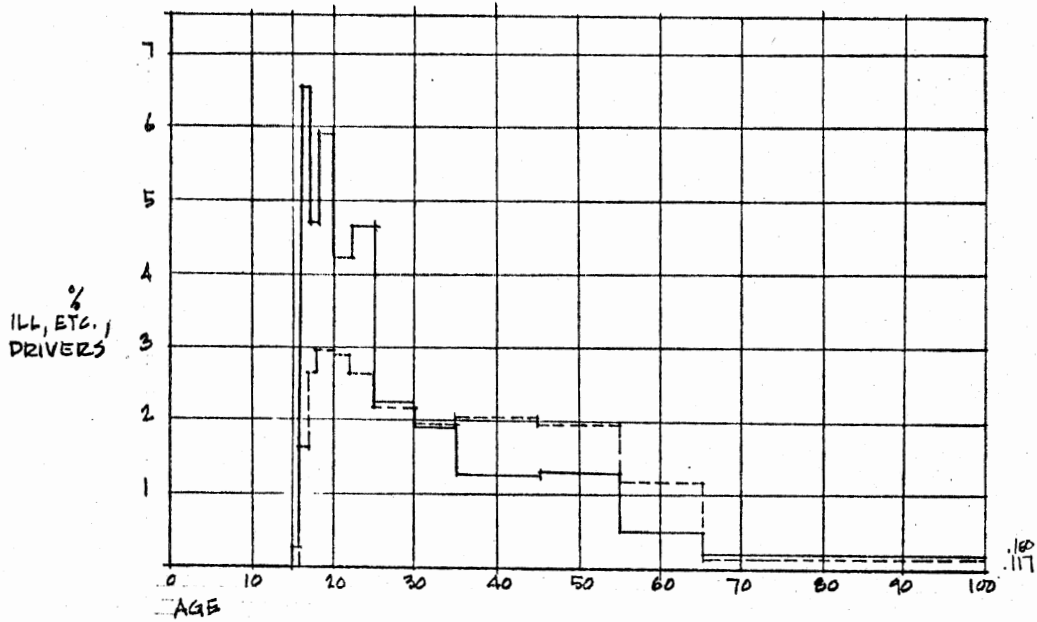
Code No.	Name	% All Drivers #1	% Male Drivers #1	% Female Drivers #1
01	No violation	38.2	38.5	41.9
02	Speed too fast	15.3	17.1	9.9
03	Speed too slow	0	0	0
04	Failed to yield row	14.8	12.9	20.0
05	Wrong way	.1	.1	0
06	Drove left of center	3.2	3.4	2.3
07	Improper passing, signal, overtaking, turning	4.4	4.5	4.1
08	Disregard traffic control	3.6	3.6	3.8
09	Followed too closely	6.8	7.2	6.2
10	Other or missing data	13.6	12.7	11.7

3. Contributing Violations, Oakland County Accidents, Age
 (Source: Oakland County Crash File, 1969)

Code	Age	% of Accidents w/no violation	% of Accidents w/violation	% Missing Data	Total %
0	0-15	20.5	53.	26.5	
1	16	28.5	56.9	14.6	100
2	17	34.4	53.6	12.0	100
3	18-19	35.6	52.2	12.2	100
4	20-21	38.0	50.1	11.9	100
5	22-24	41.6	45.9	12.5	100
6	25-29	42.5	46.3	11.2	100
7	30-34	44.1	43.9	12.0	100
8	35-44	43.1	44.5	12.4	100
9	45-54	43.0	44.6	12.4	100
10	55-64	40.3	47.7	12.0	100
11	65+	28.6	57.9	13.5	100
99	Total	38.2	48.2	13.6	100

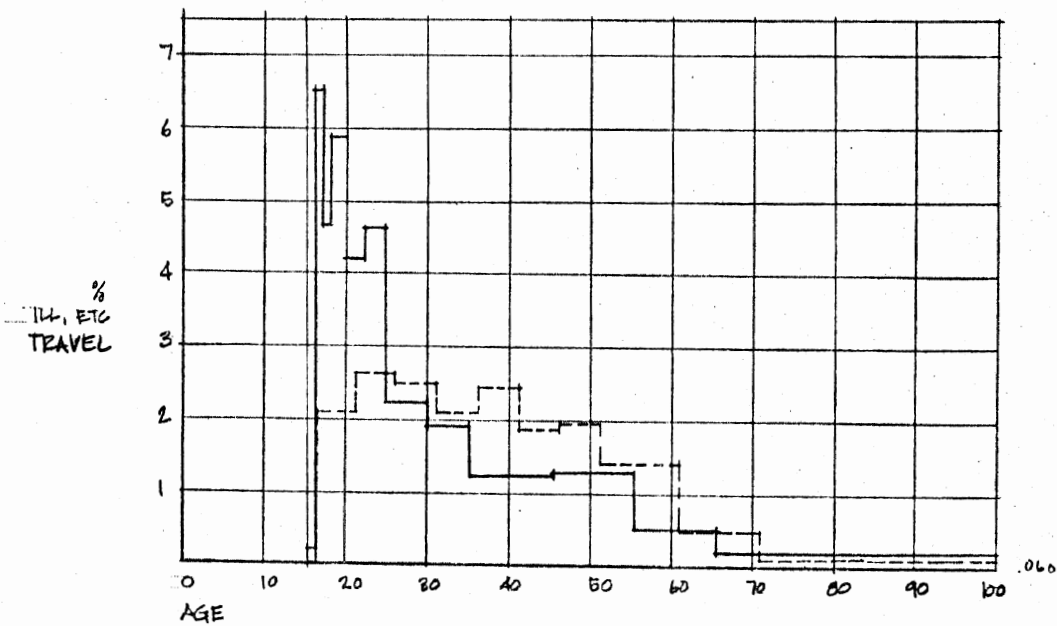
4. Ill, Fatigued and Inattention, Age, (Contributing circumstances in Accidents)

(Source: Oakland County Crash File, 1969)



---- Oakland County Drivers (MDR File)

— Ill, etc. (Oakland County Crash File, 1969)

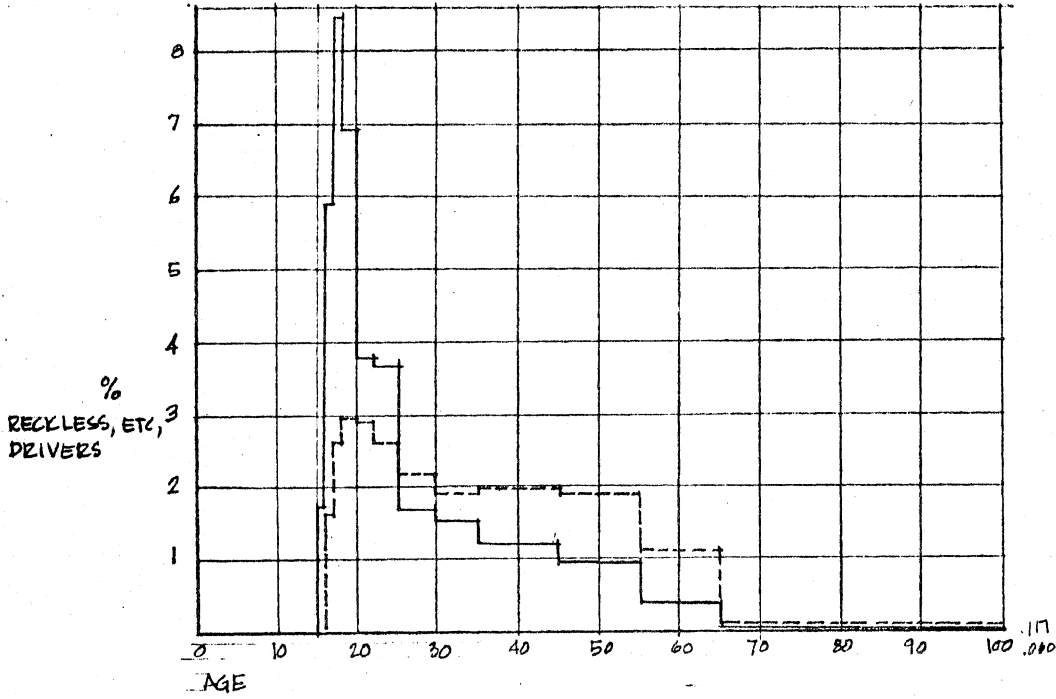


---- Miles Driven (National sample)

— Ill, etc.

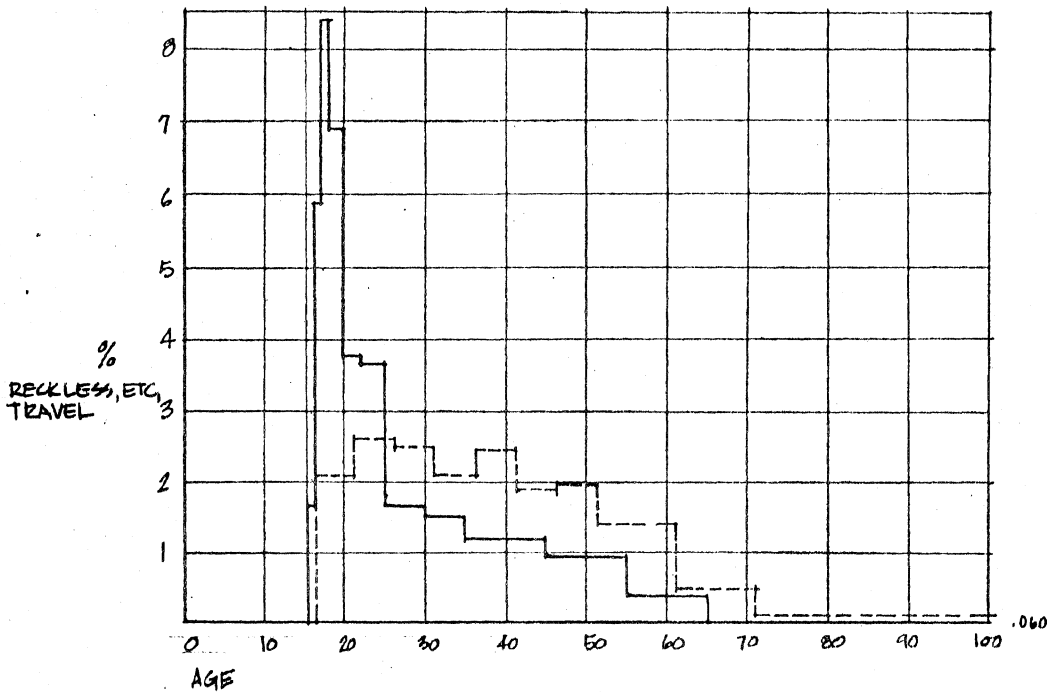
5. Reckless, Careless Driving, Age (Contributing circumstances in accidents)

(Source: Oakland County Crash File, 1969)



---- Oakland County Drivers (M.D.R. File)

— Reckless, Careless Driving (Oakland County Crash File, 1969)



---- Miles Driven (National Sample)

— Reckless, careless driving

D. Alcohol Involvement

1. Alcohol Involvement in Crashes

(Source: Oakland County Crash File, 1969)

All Drivers	Yes	No	Not Known	Total
%	15.2	79.6	5.3	100
Number	4438	23282	1545	29265

2. Drinking or Drugs, Driver #1

(Source: Oakland County Crash File, 1969)

Driver #1	Had	Had Not	Not Known	Total
%	11.4	80.5	8.2	100
Number	3328	23549	2888	29265

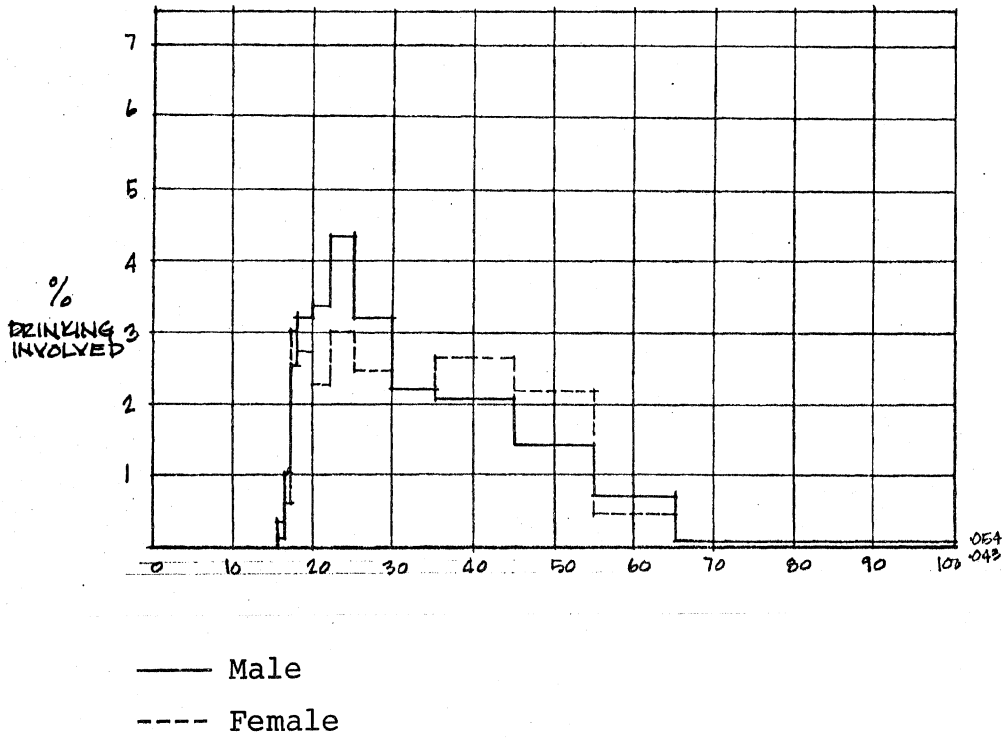
3. Drinking Involved, Sex

(Source: Oakland County Crash File)

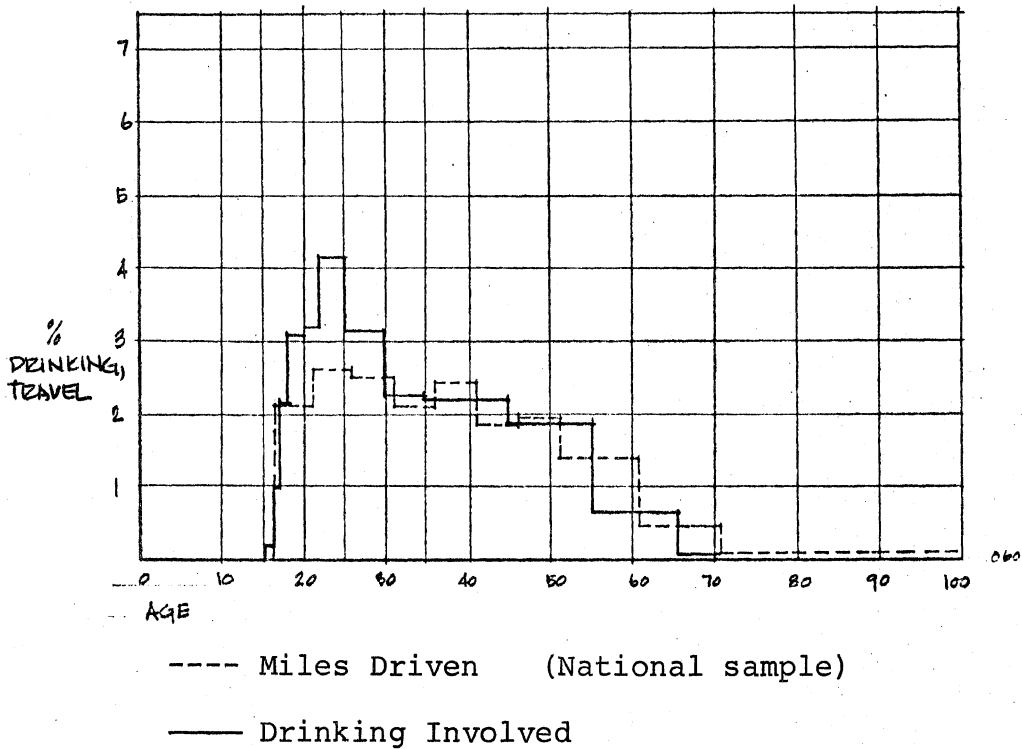
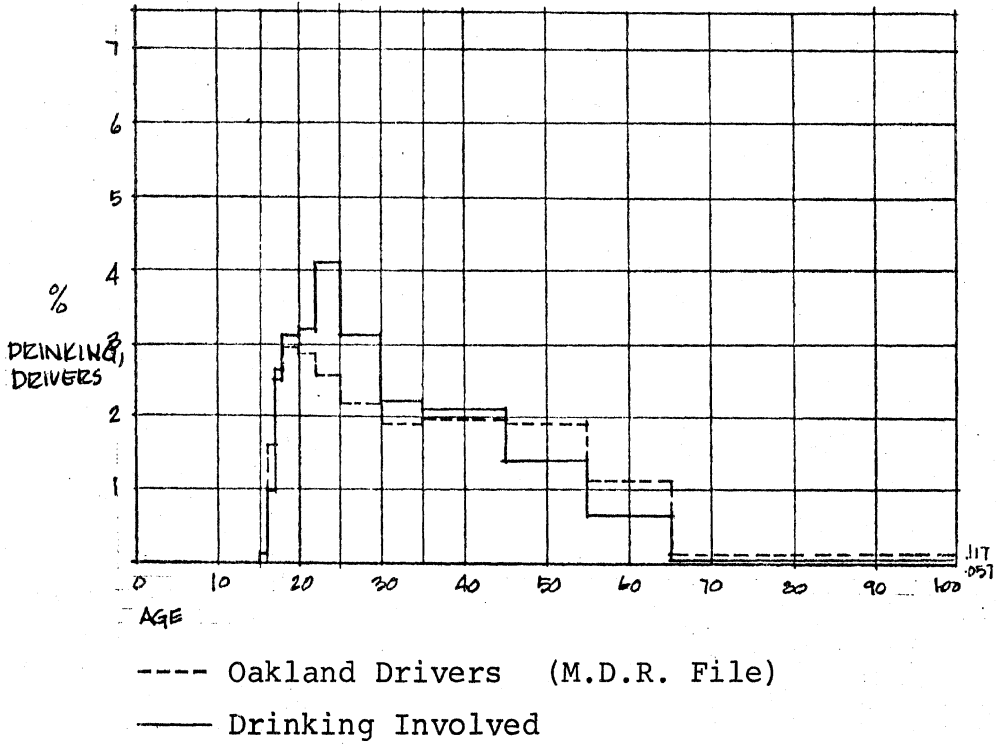
(3A)

%	Drinking Involved	Drinking Not Invol.	% of All Drivers	% of All Travel
Male	15.4	84.3	51.3	70.5
Female	4.2	95.8	48.7	29.5

(3B) Drinking Involved (in accidents)



4. Drinking Involved in Accidents, Age
 (Source: Oakland County Crash File 1969)
 Drivers #1



5. Contributing Circumstances in Accidents and Alcohol Involvement

(Source: Oakland County Crash File, 1969)

All Drivers #1

Code	Name	All Drivers #1	Had Been Drinking	Had Not Been Drinking
1	DUIL	2.6	*22.4	0
2	Reckless	1.8	* 5.3	1.3
3	Ill, fatigued	1.4	2.8	1.2
4	License	.1	.1	.1
5	Obscured vision	4.6	1.6	5.3
6	Defective Equip.	2.3	2.3	2.4
7	Lost control (Load shift)	.1	0	.1
8	Lost control (Wind)	0	0	0
9	Skidding	3.6	3.6	3.7
10	None	83.6	61.8	86.8

6. Contributing Violations in Accidents and Alcohol Involvement

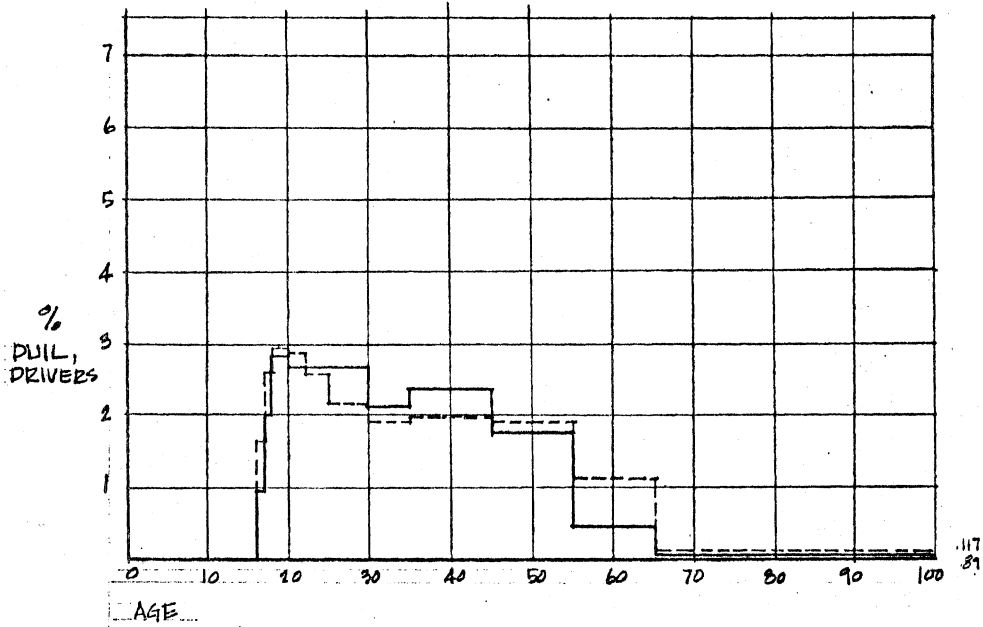
(Source: Oakland County Crash File, 1969)

All Drivers #1

Code	Name	All Drivers #1	Had Been Drinking	Had Not Been Drinking
1	No violation	16.7	*13.4	43.9
2	Speed too fast	15.3	*35.1	11.8
3	Speed too slow	0	0	0
4	Failed to yield row	14.8	8.8	16.1
5	Wrong way	.1	.3	0
6	Left of center	3.2	* 7.8	2.4
7	Improper passing, signal, overtaking, turning	4.4	4.3	4.4
8	Disregard traffic cont.	3.6	3.6	3.7
9	Followed too closely	6.8	5.6	7.1
10	Other or missing data	13.6	21.1	10.6

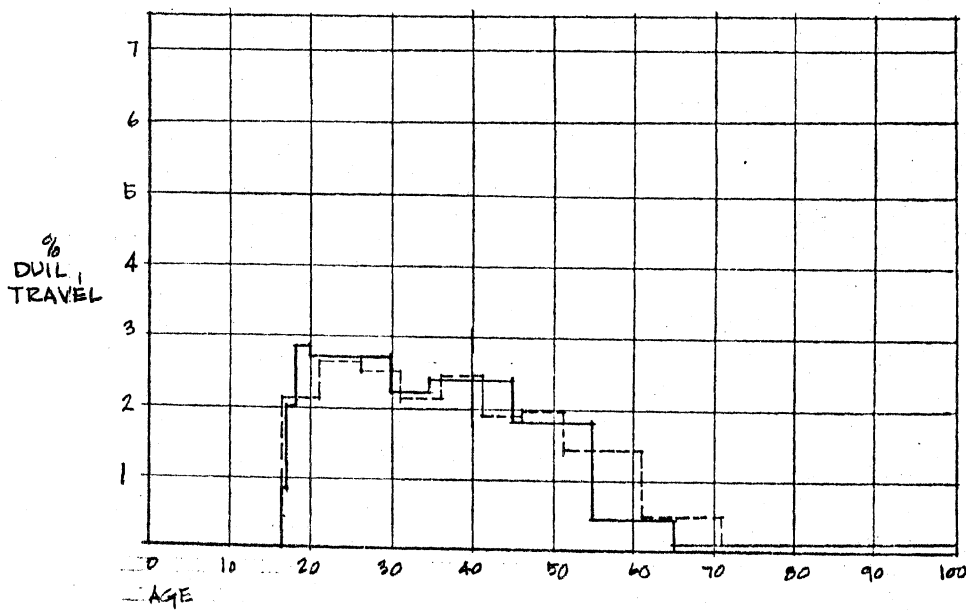
7. DUIL Involvement in Accidents and Age (contributing circumstances)

(Source: Oakland County Crash File, 1969)



--- Oakland County Drivers (M.D.R. File)

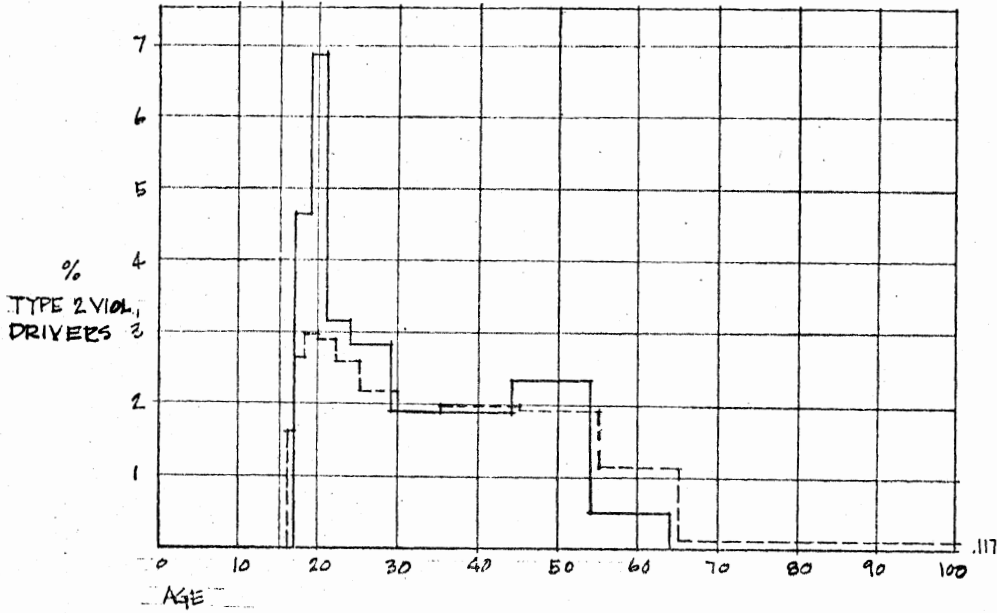
— DUIL Involvement in Accidents



--- Miles Driven (National sample)

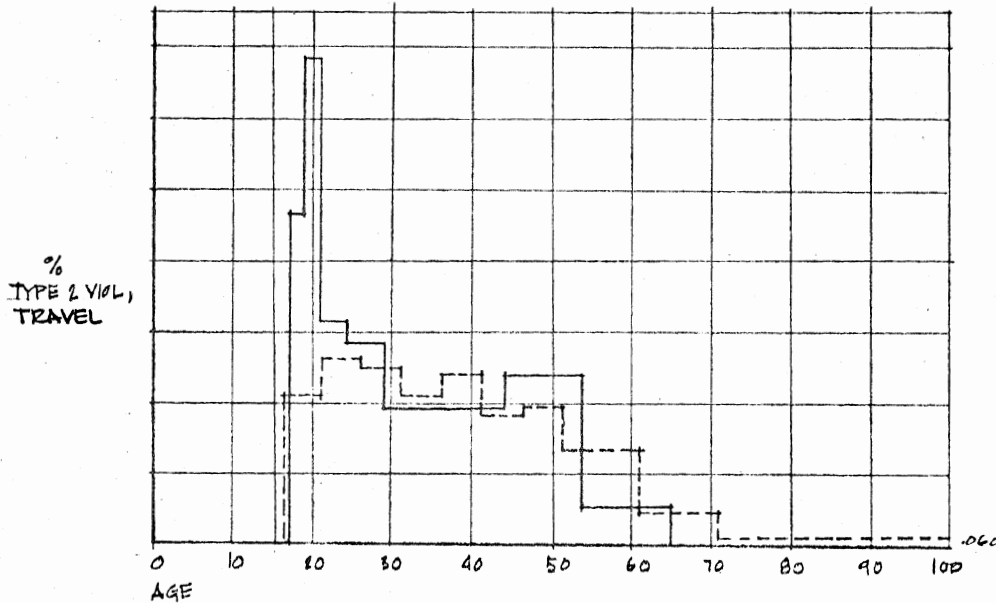
— DUIL Involvement in Accidents

8. D.U.I.L., Drunk Driving Violations and Age
 (Source: M.D.R. Sample)



----- Oakland County Drivers (M.D.R.)

—— D.U.I.L. or Drunk Driving Violations (M.D.R.)



----- Miles Driven (National sample)

—— D.U.I.L. or Drunk Driving Violations

9. Accident Severity and Alcohol Involvement

(Source: Oakland County Crash File, 1969)

	%	Fatal	Pers.Inj.	Prop. Dam.	Total
Drinking Involved		1.3	49.1	49.6	100
Drinking not Involved		.4	37.1	62.5	100
Total		.5	34.9	55.6	100

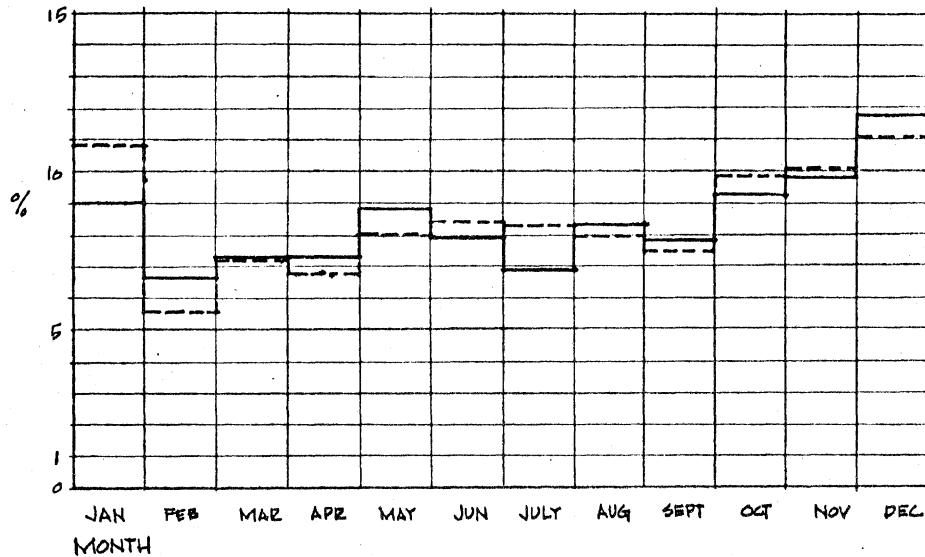
10. Accident Type and Alcohol Involvement

(Source: Oakland County Crash File 1969)

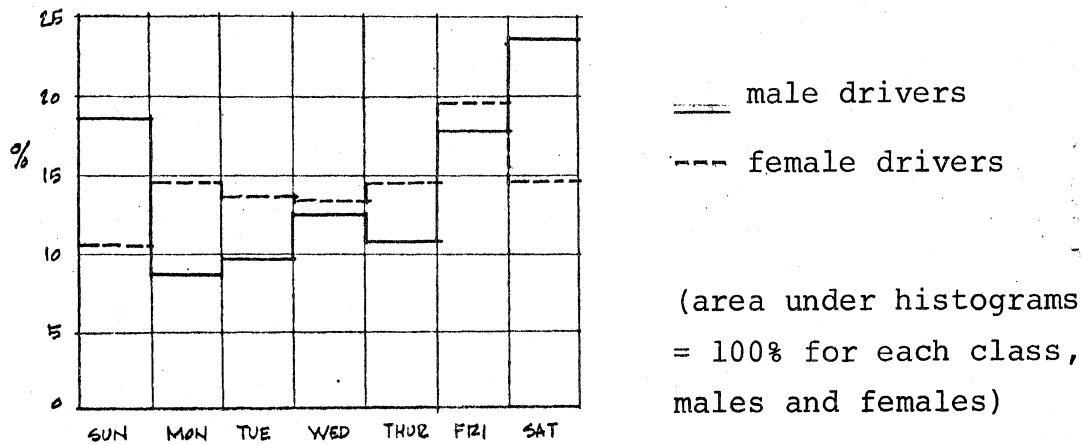
Code	Name	% Alcohol inv. accid.	% Alcohol not inv. accid.	% Total accid.
1	Motor vehicle over- turn on road or run off road	22.3	8.6	11.7
	Collision with:			
2	Train	0.1	.1	0.1
3	Motorcycle	0.9	1.4	1.3
4	Motor vehicle	66.8	82.7	79.1
5	Pedestrian	1.4	2.0	1.9
6	Fixed object	7.5	2.8	3.7
7	Other object	0.2	0.3	0.3
8	Animal	0.2	0.5	0.5
9	Bicycle	0.3	1.1	0.9
10	Other or not known	0.2	0.5	0.4
	Total	100	100	100

11. Time of Accident and Alcohol Involvement, Sex
 (Source: Oakland County Crash File, 1969)

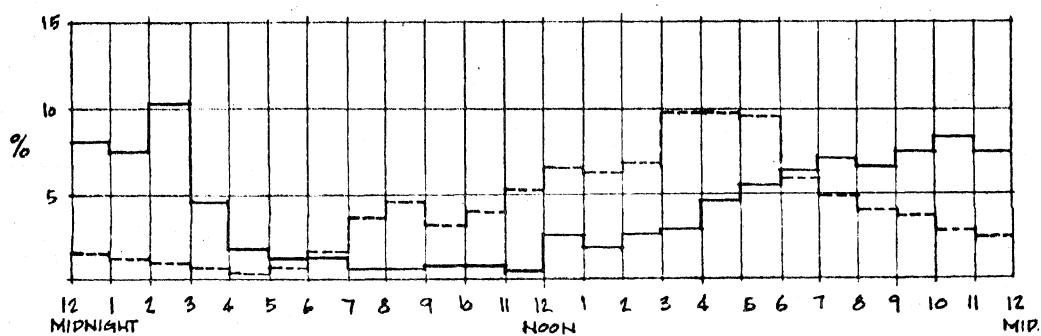
a. Month of Year



b. Day of Week



c. Hour of Day

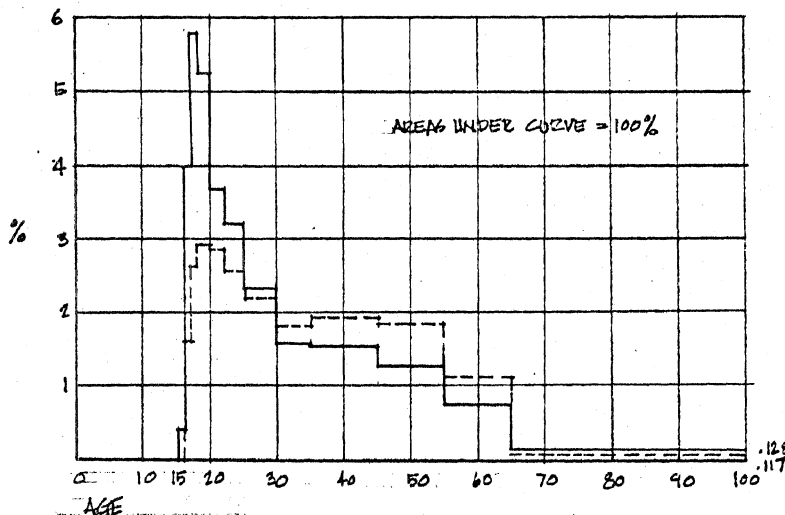


I. DRIVER PROFILE

A. Sex of Driver 1969

	Driver #1		Driver #2	
	Number	%	Number	%
No driver #2			6,732	23.0
Male	20,021	68.4	15,329	52.4
Female	8,195	28.0	6,808	23.3
Missing data	1,049	3.6	396	1.4
Total accid.	29,265	100.0	29,265	100.0

B. Age of Driver 1969



—— Drivers #1 (Oakland County Crash File, 1969) = 29265

---- Drivers in Oakland County Population (MDR Sample) = 10,000

II. ACCIDENT SEVERITY

A. Accident Severity 1969

	Number	%
Fatal injury	176	0.6
Injury	11,215	38.3
Property damage	17,874	61.1
Total	29,265	100.0

(Source: Oakland County Crash File)

B. Number killed mean number killed = .01 1969

Number killed	0	1	2	3	4	5	Total
Number of accidents	29,089	162	11	1	1	1	29,265
% of total accidents	99.4	.6	.0	.0	.0	.0	100

C. Number Injured mean number injured = .62 1969

Number injured	0	1	2	3	4	5	6	7	8
Number of accidents	17,956	7165	2601	921	365	148	66	23	10
% of total accidents	61.4	24.5	8.9	3.1	1.2	0.5	0.2	.1	.0

9	10	11	12	13	14	15	16	17	18
5	3	0	1	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0

III. RESIDENCE OF DRIVER 1969

Code	Name	Number	%
1	in county	21920	74.9
2	in state	5805	19.8
3	bordering state	186	0.6
4	driverless moving	75	0.3
5	other, missing	1279	4.4
	Total	29265	100.0

IV. CONTRIBUTING VIOLATIONS AND CIRCUMSTANCES

A. Contributing violations, driver #1, #2 1969

Code	Name	all drivers #1		all drivers #2	
		Number	%	Number	%
01	no violation	11184	38.2	12213	41.7
02	speed too fast	4467	15.3	1400	4.8
03	speed too slow	7	0.0	4	0.0
04	failed to yield r.o.w.	4322	14.8	3341	11.4
05	wrong way	19	0.1	20	0.1
06	drove left of center	945	3.2	450	1.5
07	improper passing, signal, overtaking, turning	1302	4.4	851	2.9
08	disregard traffic control	1059	3.6	691	2.4
09	followed too closely	1981	6.8	1848	6.3
10	other or missing data	3979	13.6	1715	5.9
	no driver #2			6732	23.0
	total	29265	100.0	29265	100.0

B. Contributing Circumstances, driver #1, #2 1969

Code	Name	all drivers #1		all drivers #2	
		Number	%	Number	%
01	D.U.I.L. or drugs	747	2.6	291	1.0
02	reckless or careless	536	1.8	177	0.6
03	ill, fatigued, inattention	415	1.4	144	0.5
04	failed to comply license restrictions	24	0.1	25	0.1
05	obscured vision	1334	4.6	1057	3.6
06	defective equipment	667	2.3	250	0.9
07	lost control - shift load	15	0.1	11	0.0
08	lost control - wind	5	0.0	1	0.0
09	skidding	1057	3.6	379	1.3
10	none of the above	24465	83.6	20198	69.0
	no driver #2			6732	23.0
	Total	29265	100.0	20265	100.0

V. SEX AND AGE RELATIVE TO ACCIDENTS

A. Type of accident/sex 1969

Code	Name	% all drivers	% male	% female
1	Motor vehicle overturns or runs off road	11.7	13.3	7.8
2	coll. w/train	.1	.1	.1
3	motorcycle	1.3	1.4	1.1
4	motor vehicle	79.1	77.0	84.5
5	pedestrian	1.9	1.7	1.9
6	fixed object	3.7	4.1	2.8
7	other object	.3	.3	.3
8	animal	.5	.6	.6
9	bicycle	.9	.9	.9
10	other or n.k.	.4	.4	.4
	Total	100.0	100.0	100.0

B. Type of Accident and Age of Driver #1 1969

%

N=29265

TYPE OF ACCIDENT

AGE OF DRIVER #1

MOTOR VEHICLE OVERTURN
OR RUN OFF ROAD
R. E. TRAIN
MOTORCYCLE
ANOTHER
MOTOR VEHICLE
PEDESTRIAN
FIXED OBJECT
OTHER OBJECT
ANIMAL
BICYCLE
OTHER OR NOT KNOWN

	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	WILD	TOTAL
(0) 0-15	0.0	28.2	0.0	5.1	35.0	12.0	4.3	0.0	0.9	12.8	1.7	0.0	0.0	100.0
(1) 16	0.0	18.3	0.0	2.1	73.6	1.9	2.8	0.3	0.2	0.7	0.2	0.0	0.0	100.0
(2) 17	0.0	14.5	0.1	1.7	75.4	2.1	4.3	0.3	0.2	0.9	0.6	0.0	0.0	100.0
(3) 18-19	0.0	16.7	0.0	2.2	73.6	1.3	4.2	0.4	0.4	0.8	0.3	0.0	0.0	100.0
(4) 20-21	0.0	14.9	0.1	1.4	75.6	1.6	4.4	0.6	0.2	0.5	0.6	0.0	0.0	100.0
(5) 22-24	0.0	15.3	0.0	1.9	74.9	1.4	4.4	0.4	0.5	0.7	0.6	0.0	0.0	100.0
(6) 25-29	0.0	12.7	0.1	0.8	78.1	1.4	4.4	0.6	0.6	0.8	0.4	0.0	0.0	100.0
(7) 30-34	0.0	10.4	0.2	1.3	79.1	1.7	4.5	0.4	0.7	0.9	0.8	0.0	0.0	100.0
(8) 35-44	0.0	9.3	0.1	0.7	81.7	1.8	4.0	0.2	0.7	0.9	0.4	0.0	0.0	100.0
(9) 45-54	0.0	7.2	0.2	1.1	84.8	1.8	2.7	0.1	0.6	1.1	0.3	0.0	0.0	100.0
(10) 55-64	0.0	5.9	0.0	1.0	86.7	2.3	2.2	0.0	0.4	1.1	0.3	0.0	0.0	100.0
(11) 65+	0.0	5.5	0.3	1.3	87.5	2.3	1.9	0.0	0.1	0.9	0.3	0.0	0.0	100.0
(99) MISSING	0.0	11.7	0.2	0.6	78.0	4.3	3.4	0.2	0.2	1.3	0.3	0.0	0.0	100.0
TOTAL	0.0	11.7	0.1	1.3	79.1	1.9	3.7	0.3	0.5	0.9	0.4	0.0	0.0	100.0

C. Type of Accident and Age of Driver #2, 1969

%

N=29265

TYPE OF ACCIDENT

AGE OF DRIVER *

COLLISION WITH:
 MOTOR VEHICLE OVERTURN
 OR RUN OFF ROAD (2)
 R.V. TRAIN (3)
 MOTORCYCLE (4)
 ANOTHER
 MOTOR VEHICLE (5)
 PEDESTRIAN (6)
 FIXED OBJECT (7)
 OTHER OBJECT (8)
 ANIMAL (9)
 BICYCLE (10)
 OTHER OR NOT KNOWN (11)

	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	WILD	TOTAL
(0) 0-15	0.0	0.6	0.0	1.3	5.3	53.6	0.2	0.0	0.3	38.7	0.2	0.0	0.0	100.0
(1) 16	0.0	0.4	0.0	2.6	93.8	2.5	0.0	0.0	0.0	0.8	0.0	0.0	0.0	100.0
(2) 17	0.0	0.1	0.0	2.7	95.3	1.2	0.0	0.0	0.0	0.7	0.0	0.0	0.0	100.0
(3) 18-19	0.0	0.0	0.0	3.2	96.0	0.6	0.1	0.0	0.0	0.2	0.0	0.0	0.0	100.0
(4) 20-21	0.0	0.1	0.0	3.0	95.7	0.9	0.1	0.0	0.0	0.2	0.0	0.0	0.0	100.0
(5) 22-24	0.0	0.2	0.0	2.1	97.1	0.4	0.2	0.0	0.0	0.0	0.1	0.0	0.0	100.0
(6) 25-29	0.0	0.2	0.0	1.7	97.2	0.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	100.0
(7) 30-34	0.0	0.1	0.0	1.3	97.9	0.4	0.2	0.0	0.0	0.2	0.0	0.0	0.0	100.0
(8) 35-44	0.0	0.2	0.0	1.0	97.8	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	100.0
(9) 45-54	0.0	0.2	0.0	0.8	97.6	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	100.0
(10) 55-64	0.0	0.2	0.0	0.6	97.4	1.4	0.2	0.1	0.0	0.2	0.0	0.0	0.0	100.0
(11) 65+	0.0	0.4	0.0	0.6	95.6	3.4	0.0	0.0	0.0	0.1	3.0	0.0	0.0	100.0
(99) MISSING NO DRIVER #2	0.0	46.6	0.5	0.4	33.1	0.1	14.6	1.1	1.8	0.1	1.6	0.0	0.0	100.0
TOTAL	0.0	11.7	0.1	1.3	79.1	1.9	3.7	0.3	0.5	0.9	0.4	0.0	0.0	100.0

D. Accident Configuration and Sex 1969

Configuration	Sex			Total
	Male	Female	Missing	
	(1)	(2)	(3)	
(1) Rear-End	30.3	29.9	17.9	29.7
(2) Head-on	3.1	2.7	1.3	2.9
(3) At angle	22.6	28.8	18.1	24.1
(4) Side-swiped	3.8	3.9	4.2	3.8
(5) } Overturns,	2.1	1.4	1.1	1.9
(6) } strikes	3.7	2.1	2.2	3.2
(7) } object	4.5	2.8	3.9	4.0
(8) }	6.7	4.2	7.2	6.0
(9) None of the above, missing	23.2	24.3	43.9	24.2
Total	100.0	100.0	100.0	100.0

E. Accident Configuration and Age of Driver #1, 1969

AGE OF DRIVER #1

ACCIDENT CONFIGURATION

	0-15 (0)	16 (1)	17 (2)	18-19 (3)	20-21 (4)	22-24 (5)	25-29 (6)	30-34 (7)	35-44 (8)	45-54 (9)	55-64 (10)	65 + (11)	WILD	TOTAL
REAR-END	12.0	24.8	27.8	30.7	28.7	28.7	30.2	29.7	32.3	32.3	31.8	27.3	21.5	29.7
HEAD-ON	1.7	1.8	3.2	2.9	3.0	2.8	3.0	3.5	3.2	3.4	2.9	2.0	1.3	2.9
AT ANGLE	12.0	24.7	23.5	21.4	22.3	22.7	23.0	22.6	24.0	26.8	28.8	36.0	18.3	24.1
SIDE SWIPE	0.0	2.8	3.5	3.4	4.3	4.1	3.7	4.5	4.2	3.4	3.8	4.0	4.5	3.6
OVERTURNS	2.6	2.1	1.9	2.7	2.2	2.5	2.5	2.2	1.6	1.2	1.1	0.6	1.3	1.9
OR STRIKES	2.6	3.1	3.9	4.1	4.4	3.8	3.7	3.5	3.3	1.9	1.4	1.6	2.2	3.2
OBJECT	14.5	6.1	5.0	6.1	4.7	5.5	4.4	3.4	2.9	2.5	2.1	2.1	3.9	4.0
MISSING	12.0	9.5	7.6	7.6	7.9	7.4	6.3	5.3	5.3	3.9	3.4	3.1	6.7	6.0
TOTAL	42.7	25.2	23.6	21.2	22.7	22.5	23.2	25.2	23.2	24.5	24.7	23.2	40.3	24.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

F. Accident Configuration and Age of Driver #2, 1969

AGE OF DRIVER #2

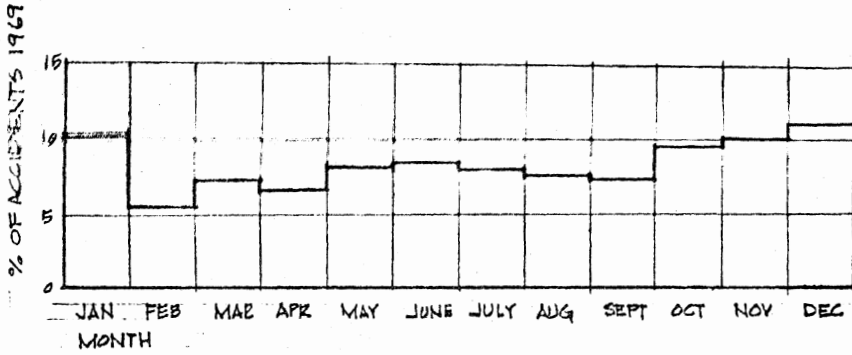
ACCIDENT CONFIGURATION

	0-15	16	17	18-19	20-21	22-24	25-29	30-34	35-44	45-54	55-64	65 +		
REAR-END	0.1	2.9	5.4	9.9	7.0	9.6	12.1	8.4	17.2	14.1	7.4	3.3	2.6	100.0
HEAD-ON	0.1	3.3	5.4	9.2	6.7	8.7	12.7	7.6	18.7	13.6	6.9	4.2	2.9	100.0
AT ANGLE	0.2	3.7	5.3	9.4	6.0	8.3	10.5	7.6	14.9	12.3	8.2	5.9	7.7	100.0
SIDE SWIPE	0.3	3.3	5.0	8.9	5.4	10.3	11.0	7.4	15.4	14.1	7.3	4.5	7.1	100.0
OVERTAKENS OR STRIKES OBJECT	0.2	0.0	0.0	0.2	0.2	0.2	0.2	0.4	1.3	0.2	0.2	0.0	97.1	100.0
	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.9	0.3	0.0	97.8	100.0
	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.3	0.1	0.1	0.2	98.8	100.0
	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	99.0	100.0
MISSING	0.2	2.7	3.8	6.6	4.9	5.2	7.0	5.5	9.8	8.9	5.2	3.4	26.7	100.0
TOTAL	2.1	2.6	4.1	7.4	5.1	6.8	8.7	6.2	12.3	10.3	6.0	3.6	24.9	100.0

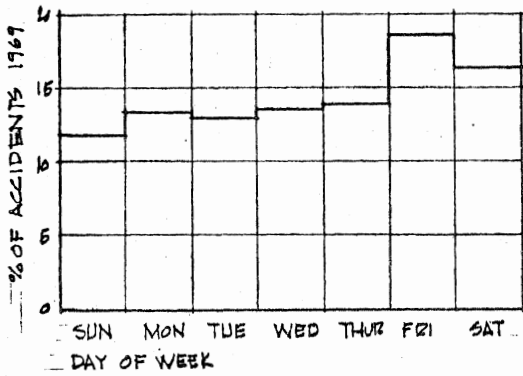
VI. TIME OF ACCIDENT AND DRIVER CHARACTERISTICS

A. All drivers. 1969

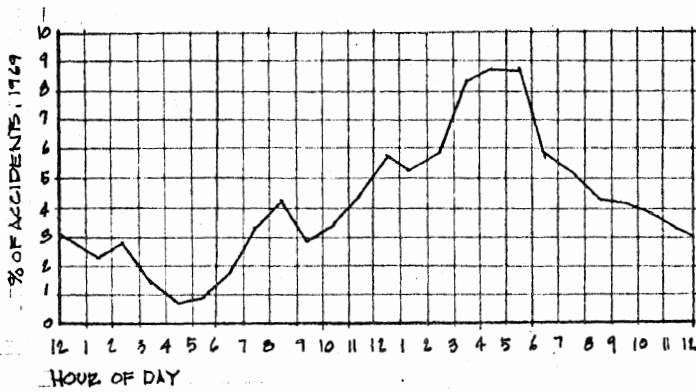
Month of Year



Day of Week



Hour of Day

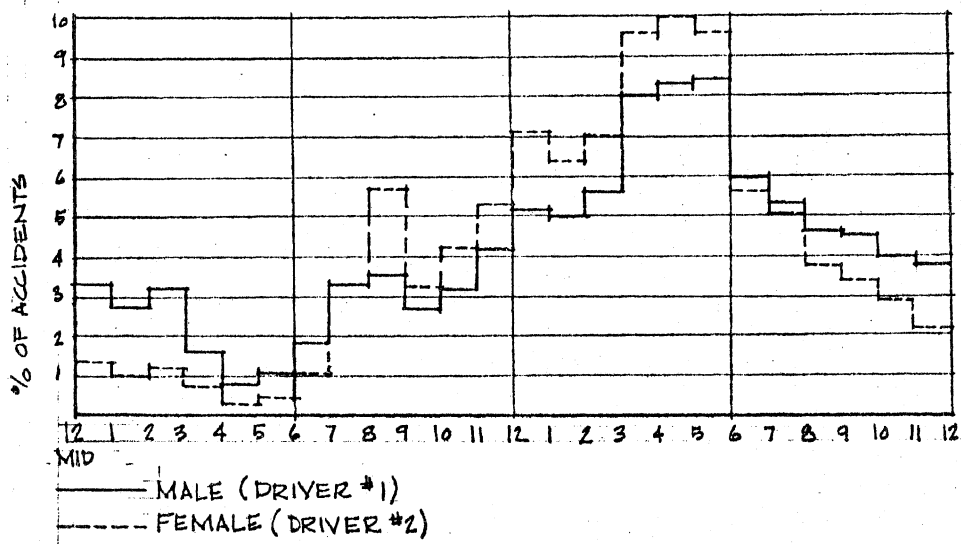


B. Time of Accident and Sex 1969

Day of Week

	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Total
Male	12.8	12.6	12.5	13.1	13.3	18.7	16.9	100
Female	9.0	14.9	14.4	14.5	14.4	18.9	14.0	100
Total	11.9	13.2	13.0	13.5	13.6	18.7	16.2	100

Time of Day



C. Time of Accident and Age of Driver

Age breakouts not significantly different from totals.

I. VEHICLE DESIGN

A. Subscript of Vehicle #1 (V-56) Involved in 1969 Crashes
 (Source: Oakland County Crash File, 1969)

Code	Name	Number	%
01	passenger car	25465	87.0
02	truck	2433	8.3
03	motorcycles	433	1.5
04	school bus	58	0.2
05	commercial bus	44	0.2
06	farm equipment	7	0.0
07	construction equip.	33	0.1
08	ambulance, police equip, go-carts, snowmobiles or not known	731	2.5
09	pedestrian	34	0.1
10	bicycle	16	0.1
11	horseback rider	1	0.0
	Total	29265	100.0

B. Type of Vehicle #1 (V-58) Involved in 1969 Crashes
 (Source: Oakland County Crash File, 1969)

Code	Name	Number	%
01	full size pass. car	3846	13.1
02	intermediate pass. car	336	1.1
03	compact size pass. car	3535	12.1
04	sports car	0	0.0
05	station bus, carryall	8	0.0
06	jeep type	21	0.1
07	pick-up or panel truck	1117	3.8
08	straight truck	869	3.0
09	truck tractor (semi)	344	1.2
10	other or missing data	19186	65.6

C. Style of Vehicle #1 (V-59) Involved in 1969 Crashes
(Source: Oakland County Crash File, 1969)

Code	Name	Number	%
01	2 door	13039	44.6
02	4 door	5424	18.5
03	convertible	1791	6.1
04	station wagon	2097	7.2
05	box, flat bed truck	1219	4.2
06	flammable tank truck	15	0.1
07	non-flam. tank truck	5	0.0
08	other or missing data	5675	19.4
	total	27265	100.0

II. VEHICLE DESIGN AND ACCIDENT SEVERITY

A. Subscript of Vehicle #1 (V-56) and Accident Severity (V-43) of 1969 Crashes

(Source: Oakland County Crash File, 1969)

SEVERITY	FATAL	PERS INJURY	PROP. DAMAGE	
SUBSCRIPT				
(1) PASSENGER CAR	150 .6	9817 38.6	15498 60.9	25465 100
(2) TRUCK	19 .8	790 32.5	1624 66.7	2433 100
(3) MOTORCYCLE	4 .9	398 89.8	41 9.3	443 100
(4) SCHOOL BUS	0	15	43	58
(5) COMMERCIAL BUS	0	11	33	44
(6) FORM EQ.	0	3	4	7
(7) CONSTRUCTION EQUIPMENT	1	10	22	33
(8) AMBL, POLICE, SNOWMOBILE	0	124	607	731
(9) PEDESTRIAN	2	32	0	34
(10) BICYCLE	0	14	2	16
(11) HORSEBOGE	0	1	0	1
TOTAL	No. % 176 .6	11215 38.8	17874 60.6	29265 100

B. Type of Vehicle #1 (V-58) and Accident Severity (V-43) of 1969 Crashes

(Source: Oakland County Crash File, 1969)

	FATAL	PERS. INJURY	PROP. DAMAGE	TOTAL
	(1)	(2)	(3)	
(1) FULL SIZE PASS CAR	0.2 7	39.6 1522	60.2 2317	100.0 3246
(2) INTERMEDIATE PASS CAR	0.3 1	42.0 141	57.7 194	100.0 336
(3) COMPACT PASS CAR	0.4 15	39.9 1410	59.7 2113	100.0 3538
(5) STATION BUS, CARRYALL	0.0 0	50.0 4	50.0 4	100.0 8
(6) JEEP TYPE	4.8 1	33.3 7	61.9 13	100.0 21
(7) PICKUP OR PANEL TRUCK	0.5 6	35.9 401	63.6 710	100.0 1117
(8) STRAIGHT TRUCK	0.8 7	28.9 251	70.3 611	100.0 869
(9) TRUCK TRACTOR (SEMI)	1.2 4	29.4 101	69.5 239	100.0 344
(10) OTHER OR MISSING DATA	0.7 135	38.5 7378	60.8 11673	100.0 19186
TOTAL	0.6 176	38.3 11,215	61.1 17,074	100.0 29265

B-64

C. Style of Vehicle #1 (V-59) and Accident Severity (V-43)
of 1969 Crashes

(Source: Oakland County Crash File, 1969)

	FATAL	PEES INJURY	PROP. DAMAGE	
	(1)	(2)	(3)	TOTAL
(1) 2 DOOR	% 0.6 No 21	39.4 5141	60.0 7817	100.0 13039
(2) 4 DOOR	0.5 27	38.8 2102	60.7 3295	100.0 5424
(3) CONVERTIBLE	0.8 14	38.1 683	61.1 1094	100.0 1791
(4) STATION WAG	0.5 11	39.2 822	60.3 1264	100.0 2097
(5) BOX OR FLAT BED TRUCK	0.6 7	35.8 437	63.6 775	100.0 1219
(6) FLAM. TANK TRUCK	0.0 0	60.0 9	40.0 6	100.0 15
(7) NON-FLAME TANK TRUCK	0.0 0	0.0 0	100.0 5	100.0 5
(8) OTHER OR MISSING	0.6 36	35.6 2021	63.8 3618	100.0 5675
TOTAL	0.6 176	38.3 11215	61.1 17874	100.0 29265

III, VEHICLE DESIGN AND DRIVER INJURY

A. Subscript Vehicle #1 (V-56) and Driver #1 Injury (V-54) in 1969 Crashes

(Source: Oakland County Crash File, 1969)

	DEAD	VISIBLE SEVERE INJURY	VISIBLE SLIGHT INJURY	NON VISIBLE INJURY	NO INJURY	TOTAL
	(1)	(2)	(3)	(4)	(5)	
(1) PASSENGER CAR	0.2 59	6.7 1700	4.7 1191	9.0 2297	79.4 20218	100.0 25465
(2) TRUCK	0.2 6	4.5 109	3.7 89	4.9 120	86.7 2109	100.0 2433
(3) MOTOR-CYCLE	0.9 4	43.3 192	27.1 120	14.0 62	14.7 65	100.0 433
(4) SCHOOL BUS	0.0	1.7 1	1.7 1	1.7 1	94.8 55	100.0 58
(5) COMMERCIAL BUS	0.0	0.0	2.3 1	4.5 2	93.2 41	100.0 44
(6) FARM EQUIP.	0.0	0.0	0.0	14.3 1	85.7 6	100.0 7
(7) CONST. EQUIP	0.0	0.0	0.0	6.1 2	93.9 31	100.0 33
(8) AMBL, POLICE SNOWMOBILES	0.0	1.2 9	0.5 4	1.4 10	96.9 708	100.0 731
(9) PEDESTRIAN	5.9 2	29.4 10	38.2 13	23.5 8	2.9 1	100.0 34
(10) BICYCLE	0.0	18.8 3	50.0	6.2	25.0 1	100.0 16
(11) HORSEBACK RIDER	0.0	0.0	0.0	6.0	100.0 1	100.0 1
TOTAL	0.2 71	6.9 2024	4.9 1427	8.6 2504	79.4 23239	100.0 29265

B. Type of Vehicle #1 (V-58) and Driver #1 Injury (V-54) in 1969 Crashes

(Source: Oakland County Crash File, 1969)

	DEAD	VISIBLE SEVERE INJURY	VISIBLE SLIGHT INJURY	NON VISIBLE INJURY	NOT INJURED	TOTAL
	(1)	(2)	(3)	(4)	(5)	
(1) FULL SIZE PASS. CAR	0.1 2	4.7 179	4.0 153	9.0 348	82.3 3164	100.0 3846
(2) INTERMEDIATE PASS CAR	0.0 0	8.6 29	4.8 16	8.3 28	78.3 263	100.0 329
(3) COMPACT SIZE PASS. CAR	0.2 8	9.9 351	6.4 228	9.6 339	73.9 2613	100.0 3538
(5) STATION BUS, CARRYALL	0.0	0.0	12.5 1	0.0	87.5 7	100.0 8
(6) JEEP TYPE	0.0	0.0	0.0	19.0 4	81.0 17	100.0 21
(7) PICKUP, PANEL TRUCK	0.3 3	5.6 62	4.4 49	6.3 70	83.5 933	100.0 1117
(8) STRAIGHT TRUCK	0.2 2	3.8 83	2.6 23	4.5 37	88.8 772	100.0 869
(9) TRUCK TRACTOR (SEMI)	0.3 1	2.3 8	3.5 12	2.3 8	91.6 315	100.0 344
(10) OTHER OR MISSING	0.3 55	7.1 1362	4.9 945	8.7 1669	79.0 15155	100.0 19186
TOTAL	0.2 71	6.9 2024	4.9 1427	8.6 2504	79.4 23239	100.0 29265

C. Style of Vehicle #1 (V-59) and Driver #1 Injury (V-54)
in 1969 Crashes

(Source: Oakland County Crash File, 1969)

	DEAD	VISIBLE SEVERE INJURY	VISIBLE SLIGHT INJURY	NON VISIBLE INJURY	NO INJURY	TOTAL
	(1)	(2)	(3)	(4)	(5)	
(1) 2 DOOR	0.2	7.6	5.0	9.7	77.4	100.0
%	32	997	655	1264	10091	13039
No						
(2) 4 DOOR	0.2	5.2	4.2	9.3	81.1	100.0
	10	282	226	506	4400	5424
(3) CONVERTIBLES	0.4	7.3	5.1	9.0	78.2	100.0
	7	130	91	162	1401	1791
(4) STATION WAGEN	0.1	5.6	3.9	7.8	82.6	100.0
	3	117	82	163	1732	2097
(5) BOX, FLAT BED TRUCK	0.2	5.3	4.4	5.9	84.1	100.0
	3	65	54	72	1025	1219
(6) FLAME TANK TR.	0.0	13.3	0.0	0.0	86.7	100.0
		2			13	15
(7) NON-FLAME TANK TRUCK	0.0	0.0	0.0	0.0	100.0	100.0
					5	5
(8) OTHER OR MISSING	0.3	7.6	5.6	5.9	80.6	100.0
	16	431	319	337	4572	5675
TOTAL	0.2	6.9	4.9	8.6	79.4	100.0
%	71	2024	1427	2504	23239	29265
No						

I. VEHICLE CONDITION

A. Vehicle Condition (V-65) in 1969 Oakland County Crashes

(Source: Oakland County Crash File, 1969)

Code	Name	Vehicle #1		Vehicle #2	
		Number	%	Number	%
01	disabled vehicle	36	0.1	43	.1
02	puncture or blowout	73	0.2	7	0.0
03	other defective equipment (brakes, lights, steering)	781	2.7	297	1.0
04	no defect	17328	59.2	13845	47.3
05	missing data	11047	37.7	8341	28.5
	no vehicle #2			6732	23.0
	total	29265	100.0	29265	100.0

B. Vehicle #1 Condition (V-65) and Type of Accident (V-38) in 1969
 (Source: Oakland County Crash File, 1969)

	COLLISION WITH:										TOTAL
	MOTOR VEHICLE OVERTURN OR RUN OFF ROAD (1)	TRAIL (2)	MOTORCYCLE (3)	ANOTHER VEHICLE (4)	PEDESTRIAN (5)	FIXED OBJECT (6)	OTHER OBJECT (7)	ANIMAL (8)	BICYCLE (9)	OTHER OR NOT KNOWN (10)	
DISABLED VEHICLE (1)	0	1	1	34	0	0	0	0	0	0	36
PUNCTURE, BLOWOUT (2)	46	0	1	12	0	14	0	0	0	0	73
OTHER DEFECTIVE EQUIPMENT (3)	262	0	8	434	12	52	2	0	2	9	781
NO DEFECT (4)	1582	22	216	14180	328	609	59	95	159	78	17328
MISSING (5)	1538	13	159	8487	210	422	22	42	116	38	11047
TOTAL	3428	36	385	23147	550	1097	83	137	277	125	29265

C. Vehicle #1 Condition (V-65) and Accident Configuration (V-14) in 1969
 (Source: Oakland County Crash File, 1969)

	REAR END (1)	HEAD ON (2)	AT ANGLE (3)	SIDE- SWIPE (4)	OVERTURNS OR STRIKES OBJECT ON				TOTAL	
					LEFT ON ROAD (5)	RIGHT ON ROAD (6)	LEFT OFF ROAD (7)	RIGHT OFF ROAD (8)		
(1) VEHICLE	30	0	3	0	0	0	0	0	(9)	36
(2) PUNCTURE, BLOWOUT	4	5	0	1	10	10	18	21	4	73
(3) OTHER DEFECTIVE EQUIPMENT	222	27	94	12	40	50	76	144	116	791
(4) NO DEFECT	5429	508	4376	683	296	508	561	810	4157	17328
(5) MISSING	3019	315	2591	425	209	360	526	790	2812	11047
TOTAL	8704	855	7064	1121	555	928	1181	1765	7092	29265

A. Year of Vehicle #1 and Vehicle Condition #1 in 1969 Crashes

II. VEHICLE AGE AND VEHICLE DEFECTS

Vehicle Year	Number of Vehicles	Dis-abled	Blow-out	Other Defective Eqipt.	No Defect	Missing Data	Total
1960	594	.2	.3	7.7	54.2	37.5	100
1961	750	.1	.1	4.9	54.0	40.8	100
1962	1432	.2	.3	6.4	56.9	36.2	100
1963	2026	.1	.3	4.3	57.7	37.5	100
1964	2429	.2	.1	3.5	57.7	38.5	100
1965	3404	.3	.4	3.1	60.1	36.2	100
1966	3499	.1	.4	2.4	62.0	35.1	100
1967	3600	.1	.2	1.6	63.6	35.6	100
1968	4842	.1	.2	1.3	63.8	34.6	100
1969	4571	.1	.2	.9	64.4	34.5	100
Total		.1	.2	2.7	59.2	37.7	100

8

I. VEHICLE DYNAMICS

A. Accident Type (V-38) in 1969

(Source: Oakland County Crash File, 1969)

Code	Name	Number	%
01	motor vehicle overturn on road or run off road	3428	11.7
02	collision with: train	36	0.1
03	motorcycle	385	1.3
04	another motor vehicle	23147	79.1
05	pedestrian	550	1.9
06	fixed object	1097	3.7
07	other object	83	0.3
08	animal	137	0.5
09	bicycle	277	0.9
10	other or not known	125	0.4
	Total	29265	100.0

B. Accident Configuration (V-114) in 1969

(Source: Oakland County Crash File, 1969)

Code	Name	Number	%
01	rear end	8704	29.7
02	head-on	855	2.9
03	at angle	7064	24.1
04	side-swipe	1121	3.8
05	overturns, or strikes object on left side of road	555	1.9
06	overturns, or strikes ob- ject on right side of road	928	3.2
07	overturns, or strikes ob- ject off left side of rd.	1181	4.0
08	overturns, or strikes object off right side of road	1765	6.0
09	missing data or none of the above	7092	24.2
	total	29265	100.0

II. NUMBER OF VEHICLES

A. Number of Moving Vehicles (V-44) Involved in 1969 Crashes

(Source: Oakland County Crash File, 1969)

mean number of vehicles involved = 1.82

No. of Vehicles	1	2	3	4	5	6	7	Total
Number	7565	19776	1656	225	36	6	1	29265
%	25.8	67.6	5.7	0.8	0.1	0.0	0.0	100.0

B. Number of Moving Vehicles (V-44) and Accident Severity (V-43) in 1969 Crashes

(Source: Oakland County Crash File)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTAL
(1) FATAL	1.2	0.3	0.6	1.8	0.0	0.0	0.0	0.6
%	93	69	10	4				176
(2) PERSONAL INJURY	41.6	34.7	61.4	69.3	69.4	83.3	100.0	38.3
No	3147	6864	1017	156	25	5	1	11215
(3) PROPERTY DAMAGE	57.2	64.9	38.0	28.9	30.6	16.7	0.0	61.1
No	4325	12843	629	65	11	1		17874
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
%	7565	19776	1656	225	36	6	1	29265
No								

III. THE SINGLE VEHICLE CRASH

A. Accident Type (V-38) and Accident Configuration (V-114) for Single Vehicle Crashes in 1969

(Source: Oakland County Crash File, 1969)

RCH (CONTROL) VARIABLE NO. ACCIDENT TYPE	SELECTING ONLY THOSE CASES CODED (1- 1) ON VARIABLE NO. 44: NUM. MOVING VEHICLES										COLUMN (SPREAD) VARIABLE NO. 114			
	REAR END (1)	HEAD ON (2)	AT ANGLE (3)	SIDE-SWIPE (4)	ON LEFT SIDE (5)	ON RIGHT SIDE (6)	OFF LEFT (7)	OFF RIGHT (8)	MISSING OR NONE (9)	(10)	(11)	WILD	TOTAL No.	TOTAL
(1) MOTOR VEH. OVERTURN RUN OFF ROAD No. %	0.0	0.0	0.0	0.0	1.8	3.1	15.4	23.1	1.6	0.0	0.0	0.0	0.0	396
(2) TRAIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	36
(3) MOTORCYCLES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	14
(4) MOTOR VEH.	0.1	0.0	5.8 437	0.1	0.0	0.0	0.0	0.0	19.2	0.0	0.0	0.0	0.0	1903
(5) PEDESTRIAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	538
(6) FIXED OBJ.	0.0	0.0	0.0	0.0	5.2 345	8.2 618	0.0	0.1	0.6	0.0	0.0	0.0	0.0	1064
(7) OTHER OBJ.	0.0	0.0	0.0	0.0	0.1	0.7 56	0.0	0.0	0.1	0.0	0.0	0.0	0.0	81
(8) ANIMAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	137
(9) BICYCLE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	276
(10) OTHER OR MISSING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	120
TOTAL	0.1	0.0	5.8	0.1	7.1	12.0	15.4	23.1	36.4	0.0	0.0	0.0	0.0	100.0
TOTAL NUMBERS	5	2	437	4	539	909	1168	1750	2751	0.0	0.0	0.0	0.0	7565

B. Action of Driver #1 (V-60) and Accident Type (V-38) in Single-Vehicle Crashes in 1969

(Source: Oakland County Crash File, 1969)

SELECTING ONLY THOSE CASES CODED (1- 1) ON VARIABLE NO. 44: NUM. MOVING VEHICLES															
RCW (CONTROL) VARIABLE NO. 60 ACTION DRIVER #1	MOTOR VEH. OVERTURN, RUN OFF (1)	TRAIN (2)	MOTORCY. (3)	MOTOR VEH. (4)	PED. (5)	FIXED OBJECT (6)	OTHER OBJECT (7)	ANIMAL (8)	BICYCLE (9)	COLUMN (SPREAD) VARIABLE NO. 38 ACCIDENT TYPE					
										OTHER, NOT KNOWN (10)	WILD (11)	TOTAL			
(1) STRAIGHT	33.8	0.4	0.1	14.7	5.8	11.2	0.9	1.7	2.7	1.0	0.0	0.0	0.0	6474	72.4
(2) PASSING	25.9	2.9	0.0	11.9	4.4	8.4	7.1	13.1	2.0	7.4	0.0	0.0	0.0	126	1.7
(3) CHANGING LANES	6.5	1	0.0	2.9	1.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9	0.1
(4) RIGHT TURN	1.8	0.0	0.0	0.6	0.2	0.5	0.0	0.0	0.3	0.2	0.0	0.0	0.0	273	3.6
(5) LEFT TURN	13.9	0.0	0.0	4.5	1.5	3.9	3	0.0	1.9	12	0.0	0.0	0.0	305	4.0
(6) U TURN	17.1	0.0	0.0	4.5	2.4	3.1	2	0.0	2.2	1.0	0.0	0.0	0.0	12	0.2
(7) SLOWING/ STOPPING	8	0.0	0.0	2	1	1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	80	1.1
(8) STARTING	3.9	2	0.0	1.9	2	1.7	0.0	0.0	4	6	0.0	0.0	0.0	38	0.5
(9) ENTERING PARKING	4	2	0.0	1.9	1.2	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28	0.4
(10) EXITING PARKING	2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20	0.3
(11) BACKING	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	548	7.2
(12) STOPPED	0.5	0.0	0.0	6.2	0.3	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	9	0.1
(13) AVOID VEHICLE OBJECT	3.4	0.0	0.0	0.4	0.0	1.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	375	5.0
(14) AVOID ANIMAL	2.57	0.0	0.0	2.9	0.0	7.9	1	0.0	0.0	9	0.0	0.0	0.0	9	0.1
(15) AVOID PEDESTRIAN	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68	0.9
(16) OTHER	0.6	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	24	0.3
(17) MISSING DATA	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3	0.0
TOTAL	44.9	0.5	0.2	25.2	7.1	14.1	1.1	1.8	3.6	1.6	0.0	0.0	0.0	100.0	
	3396	36	14	1903	538	1064	81	137	276	126				7565	

C. Accident Analysis, Where (V-39) and How (V-40) for Single-Vehicle Overturn or Run Off Road Crashes in 1969

(Source: Oakland County Crash File, 1969)

	LEFT SIDE OF ROAD	RIGHT SIDE OF ROAD	
	(1)	(2)	TOTAL
OVERTURN No	13	53	74
(1) AT INTER. %	0.4	1.6	2.2
OVERTURN	120	182	316
(2) NOT AT X	3.5	5.4	9.3
LEFT ROAD	186	390	608
(3) AT X	5.5	11.5	17.9
LEFT ROAD	978	1354	2398
(4) NOT AT X	28.8	39.9	70.6
	1297	1979	3396
TOTAL	38.2	58.3	100.0

IV. THE MULTIPLE VEHICLE CRASH

A. Accident Type (V-38) and Accident Configuration (V-114) for Multiple Vehicle Crashes in 1969

(Source: Oakland County Crash File, 1969)

	REAR END	HEAD ON	AT ANGLE	SIDE- SWIPE	OVERTURNS OR STRIKES OBJECT:					TOTAL
					(1) ON LEFT SIDE	(2) ON RIGHT SIDE	(3) OFF LEFT	(4) OFF RIGHT	(5) NONE OR MISSING	
(1) MOTOR VEH OVERTURN	0.0	0.0	0.0	0.0	1	1	13	15	2	32
(2) OR RUN OFF ROAD	122	9	108	6	0.0	0.0	0.1	0.1	0.0	0.1
(3) COLLISION WITH:	0.6	0.0	0.5	0.0	0.0	0.0	0.0	0.0	126	371
(4) MOTORCYCLE	8577	844	6519	1111	0.0	0.0	0.0	0.0	4193	21244
(5) MOTOR VEHICLE	39.5	3.9	30.0	5.1	0.0	0.0	0.0	0.0	19.3	97.9
(6) PEDESTRIAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	12
(7) FIX. OBJECT	0.0	0.0	0.0	0.0	15	16	0.0	0.0	2	33
(8) OTHER	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.2
(9) OTHER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2
(10) BICYCLE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	1
(11) OTHER OR MISSING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	8699	853	6627	1117	16	19	13	15	4341	21700
	40.1	3.9	30.5	5.1	0.1	0.1	0.1	0.1	20.0	100.0

B. Accident Analysis, Where (V-39) and How (V-40) for Multiple-Vehicle Crashes in 1969

(Source: Oakland County Crash File, 1969)

	ONE VEHICLE STRAIGHT, OTHER VEHICLE:											TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
	FEET STRAIGHT FEET ON RAMP FEET ON CURVE	BOOTH STRAIGHT BOOTH STRAIGHT BOOTH STRAIGHT	FEET STRAIGHT FEET ON RAMP FEET ON CURVE	FEET STRAIGHT FEET ON RAMP FEET ON CURVE	FEET STRAIGHT FEET ON RAMP FEET ON CURVE	FEET STRAIGHT FEET ON RAMP FEET ON CURVE	BACKS	FEET STRAIGHT FEET ON RAMP FEET ON CURVE	DRIVING DRIVING DRIVING	OTHER OTHER OTHER	(11)	TOTAL
(1) SAME DIRECTION	492	256	984	373	2337	3	54	18	300	244	0.0	5081
(2) AT INTERSECTION	2.3	1.2	4.6	1.8	11.0	0.0	0.3	0.1	1.4	1.1	0.0	23.9
(3) AT INTERSECTION	12.49	6.07	7.1	3.87	20.18	8	6.3	8.4	50.6	13.9	0.0	578.0
(4) AT INTERSECTION	5.9	2.9	3.4	1.8	9.5	0.0	0.3	0.4	2.4	0.7	0.0	27.2
(5) AT INTERSECTION	14.7	3.0	16.88	15	33	0	4.5	0	9	6.3	0.0	20.92
(6) AT INTERSECTION	0.7	0.1	7.9	0.1	0.2	0.0	0.2	0.0	0.0	0.3	0.0	9.6
(7) AT INTERSECTION	6.95	2.8	3.76	13	6.6	1	6.7	5	5	3.7	0.0	15.03
(8) AT INTERSECTION	3.3	1.0	1.9	0.1	0.3	0.0	0.3	0.0	0.0	0.2	0.0	7.1
(9) AT INTERSECTION	26.32	3	15.17	5.07	7.0	0	3.5	2	1.8	2.4	0.0	51.58
(10) AT INTERSECTION	12.4	0.0	7.1	2.4	0.3	0.0	0.2	0.0	0.8	1.1	0.0	24.3
(11) AT INTERSECTION	13.5	3	7.20	2.10	7.0	0	3.6	2.3	2.6	1.5	0.0	16.90
(12) AT INTERSECTION	0.6	0.0	3.4	1.0	0.3	0.0	1.9	0.1	0.1	0.5	0.0	8.0
TOTAL	5352	1117	6022	1525	4594	14	660	134	1014	812	0.0	41244
%	0.0	5.3	28.3	7.2	21.6	0.1	3.1	0.6	4.8	3.8	0.0	100.0

C. Action of Driver #1 (V-60) and Action of Driver #2 (V-79) in Two-Vehicle Crashes in 1969

(Source: Oakland County Crash File, 1969)

SELECTING ONLY THOSE CASES CODED (2- 2) ON VARIABLE NO. 44: NUM. MOVING VEHICLES AND ONLY THOSE CASES CODED (1- 10) ON VARIABLE NO. 79: ACTION DRIVER #2													
ROW (CONTROL) VARIABLE NO. 60 ACTION DRIVER #1	COLUMN (SPREAD) VARIABLE NO. 79 ACTION DRIVER #2												
	SAME AS VERTICAL ENTRIES											(BACKING)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	WILD	TOTAL
1) GO STRAIGHT AHEAD	4630	178	213	594	2408	45	404	124	4	43	0	0	8643
2) OVERTAKING OR PASSING	187	14	4	40	159	1	19	11	2	0	0	0	437
3) CHANGE LANES	314	7	3	2	3	0	9	2	0	2	0	0	342
4) MAKE RIGHT TURN	694	38	4	189	62	0	26	4	1	3	0	0	1021
5) MAKE LEFT TURN	2977	150	4	76	275	0	33	6	1	1	0	0	3523
6) U TURN	55	2	0	1	0	1	0	2	0	0	0	0	61
7) SLOWING OR STOPPING	348	5	6	14	16	0	120	18	0	0	0	0	527
8) STARTING UP ON ROAD	213	2	0	10	11	0	22	17	0	0	0	0	275
9) ENTERING " PARKING	4	1	0	1	0	0	0	0	0	1	0	0	7
10) LEAVING " PARKING	47	0	1	5	0	0	0	0	1	0	0	0	54
11) BACKING	255	1	0	16	18	2	14	2	0	1	0	0	309
12) STOPPED ON ROAD	1125	30	9	48	45	4	226	56	0	0	0	0	1543
13) AVOID VEHICLE	56	2	1	1	10	0	3	1	0	0	0	0	74
14) AVOID OBJECT	4	0	0	0	0	0	0	0	0	0	0	0	4
15) AVOID ANIMAL	8	0	0	0	0	0	1	0	0	0	0	0	9
16) AVOID PEDESTRIAN	6	0	0	0	1	0	0	0	0	0	0	0	7
17) OTHER OR MISSING DATA	8	0	0	0	0	0	0	0	0	0	0	0	8
18)	22	0	0	1	3	0	1	0	0	0	0	0	27
TOTAL	10953	430	245	998	3011	53	878	243	9	51	0	0	16871

B-79

V. SPECIAL ACCIDENTS

A. Special Accident Tags (V-42) in 1969

(Source: Oakland County Crash File, 1969)

Code	Name	Number	%
01	School bus involved - an accident in which a school bus is physically involved	106	0.4
02	School bus associated - an accident in which another vehicle causes injury to persons before boarding (or after alighting from) a school bus	1	0.0
03	School bus other associated - an accident directly or indirectly influenced by the stopping of a school bus although the school bus was not physically involved	53	0.2
04	Deer involved - an accident in which a deer is physically involved with a motor vehicle	73	0.2
05	Deer associated - an accident directly or indirectly influenced by the presence of a deer although the deer was not physically involved	1	0.0
06	Emergency or pursuit - an accident in which any authorized emergency vehicle (ambulance, fire equipment or police car) is involved or associated while operating with audible and visual warning devices	148	0.5
07	Previous accident - any accident involving a vehicle noted as being in the road due to a prior accident or any accident in which one or more vehicles were stopping or avoiding a previous accident	121	0.4
08	Construction zone - any accident making note of a construction zone or area (detour, run-around, temporary ending, widening, patching or resurfacing, lane or ramp closure, new construction) also any accident involving barricades	186	0.6
09	Funeral procession - an accident in which one or more vehicles proceeding in a funeral procession are involved or associated	17	0.1
10	None of the preceding	28559	97.6
	total	29265	100.0

VI. MOTORCYCLE DYNAMICS

A. Accident Analysis, Where (V-39) and How (V-40) for Motorcycle Accidents in 1969 (Collision of Motor Vehicle with Motorcycle)

(Source: Oakland County Crash File, 1969)

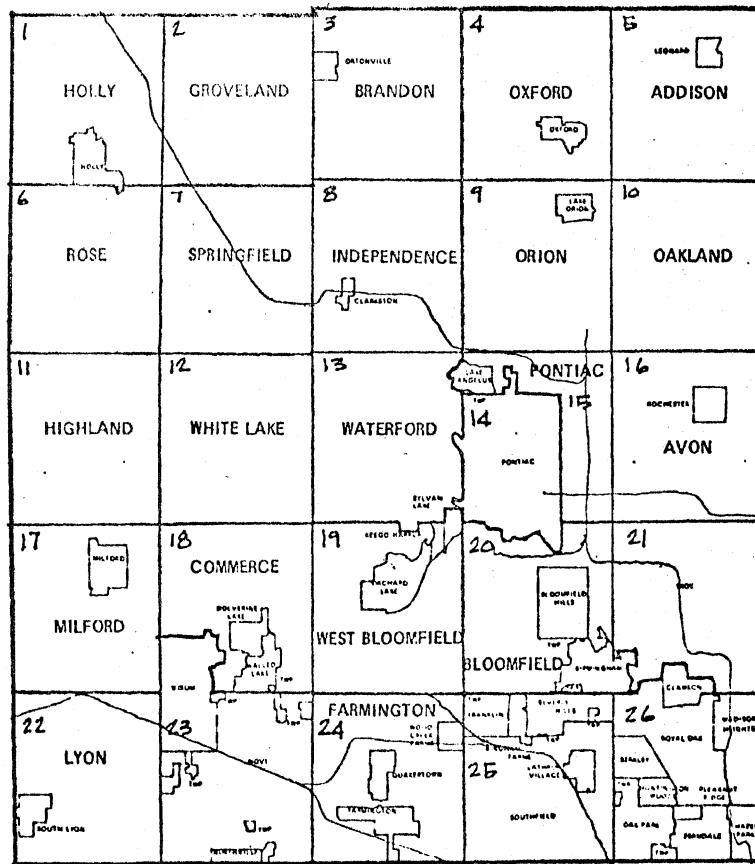
ROW (CONTROL) ACC. ANALYSIS-	3-9 = ONE STRAIGHT AND ONE:											TOTAL	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		WILD
	LEFT SIDEWALK	W/STRAIGHT	LEFT	RIGHT	STOPPED	STOPPED	BRKING	STOPPING	STOPPING	OTHER OR NOT KNOWN			
(1) SAME DIRECTION AT INTERSECTION	3.4	0.5	4.9	1.8	4.2	0.0	0.0	0.0	1.3	0.3	0.0	0.0	16.4
(2) SAME DIRECTION NOT AT INTERSECTION	13	2	14	7	12	2.3	0.3	0.0	5	1	0.0	0.0	63
(3) OPPOSITE DIRECTION AT INTERSECTION	6.0	0.8	4.4	2.9	4.4	9	1	0.0	1.0	0.5	0.0	0.0	22.6
(4) OPPOSITE DIRECTION NOT AT INTERSECTION	23	3	17	11	17	4	0.0	0.0	4	2	0.0	0.0	87
(5) ANGLE AT INTERSECTION	0.5	0.0	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.8
(6) ANGLE NOT AT INTERSECTION	2	0	78	0.0	0.3	1.0	0.0	0.0	0.0	0.3	0.0	0.0	82
TOTAL	21.3	1.6	50.4	7.5	9.1	3.4	1.3	0.3	2.9	2.3	0.0	0.0	100.0
	82	6	144	29	35	13	5	1	11	9			385

VII PEDESTRIAN ACCIDENTS

A. Accident Analysis, Where (V-39) and How (V-40) for Pedestrian Accidents in 1969 (Collision of Motor Vehicle and Pedestrian)
 (Source: Oakland County Crash File, 1969)

ROW (CONTROL) VARIABLE NO. ACC. ANALYSIS-WHERE	COLUMN (SPREAD) VARIABLE NO.										40 TOTAL		
	MOTORVEHICLE					ACC. ANALYSIS-HOW							
	STRAIGHT (1)	LEFT TURN (2)	RIGHT TURN (3)	BACKING (4)	STARTING UP (5)	ENTERING, EXITING, BACKING (6)	(7)	(8)	(9)	MISSING (10)	(11)	WILD NO (12)	
(1) AT INTER-SECTION	20.7 114	3.3 18	2.9 16	0.7 4	0.4 2	0.0 0	0.0	0.0	0.0	0.0	0.0	0.0	154
(2) NOT AT INTER-SECTION	64.7 356	2.2 12	0.5 3	3.1 17	0.9 5	0.2 1	0.0	0.0	0.0	0.4 2	0.0	0.0	396
TOTAL	85.5 470	5.5 30	3.5 19	3.8 21	1.3 7	0.2 1	0.0	0.0	0.0	0.4 2	0.0	0.0	100.0 550

I. Geographic Analysis




 SCALES IN MILES
 1 0 1 2 3 4

The County, as shown above, was divided into 26 areas, 24 of township size plus Pontiac City and Pontiac township which together form a township size area. The analysis involves observing various aggregate accident statistics across the cells, across the urban-rural gradient. Results are presented in map, table, and note form on the following pages.

A. POPULATION, 1969

50 MI.

1	2	3	4	5
7600	1750	4520	4850	2200
6	7	8	9	10
2150	3600	16,160	12,990	3850
11	12	13	14	15, 16, 300
6700	11,900	58,800	87,000	30,400
17	18	19	20	21
7120	21,520	31,660	72,510	57,900
22	23	24	25	26
6800	11,750	56,500	90,940	320,010

GRADIENT FROM HIGH IN S.E TO LOW IN N.W., WITH PEAK AT PONTIAC

OAKLAND COUNTY DETROIT

B. POPULATION DENSITY

1	2	3	4	5
				0.
6	7	8	9	10
	0.		1	
11	12	13	14	15
	1.	3		2.
17	18	19	20	21
0.		2.	4	3.
22	23	24	25	26
	1.	3.		5.

PERSONS PER SQ. MILE

0. - 0 - 249.

1. - 250 - 499

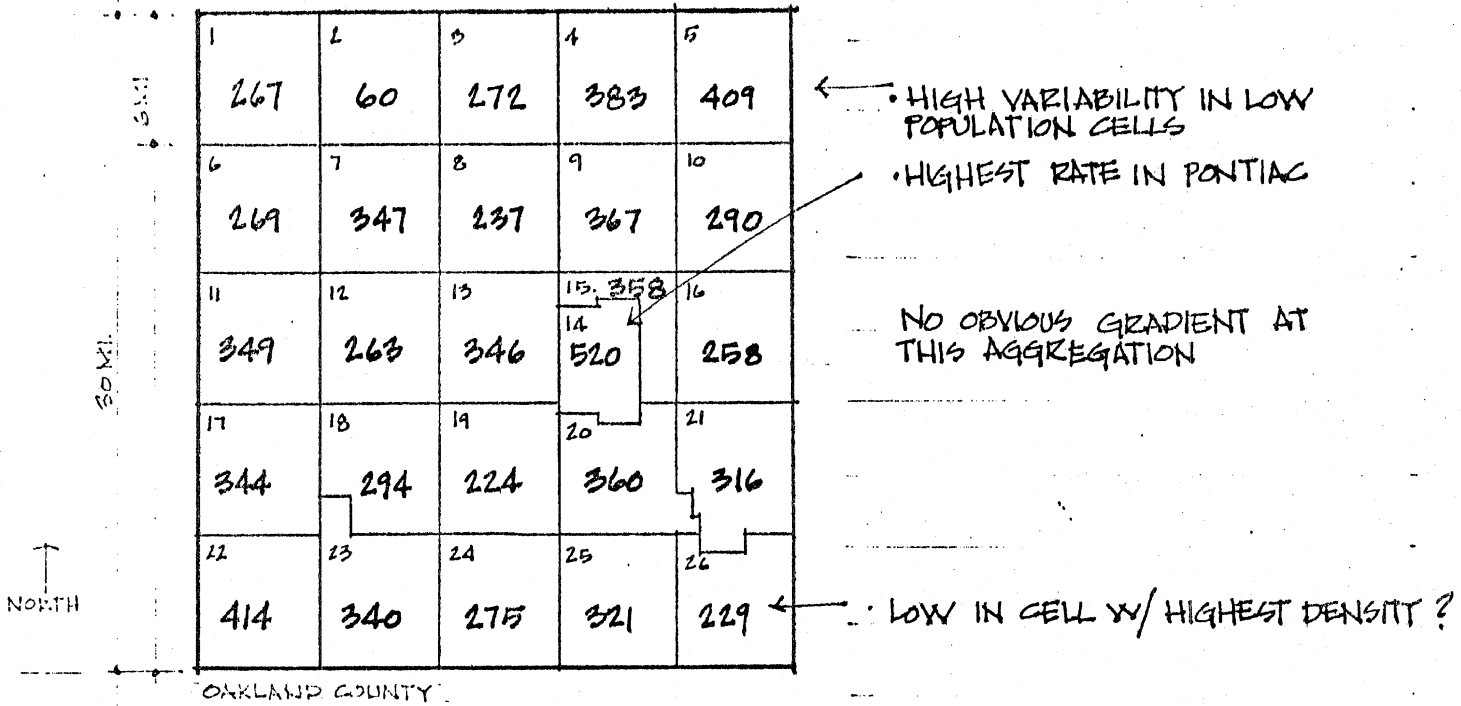
2. - 500 - 999

3. - 1000 - 1999

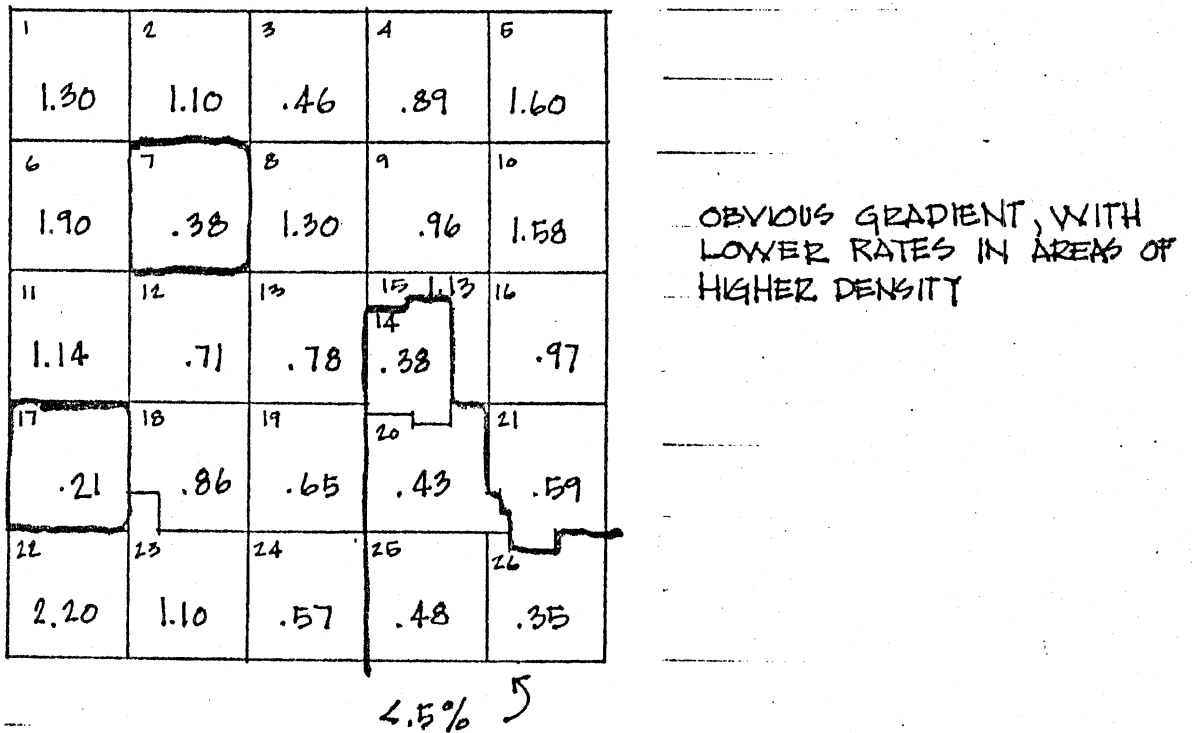
4. - 2000 - 2999

5. - 3000

c. ACCIDENT RATE 1968, 1969 ACCIDENTS PER 1000 PERSONS PER YEAR



d. FATAL ACCIDENT RATE % OF ACCIDENTS INVOLVING FATALITY



E. ALCOHOL INVOLVEMENT ^{68, 69} % OF ACCID. INV. DRINKING

1 16.6	2 18.9	3 22.1	4 17.6	5 24.0
6 17.0	7 25.5	8 20.0	9 16.2	10 17.5
11 16.7	12 23.8	13 21.6	14 17.5	15 24.1
17 17.2	18 21.5	19 23.6	20 10.2	21 13.7
22 18.5	23 17.6	24 15.3	25 12.0	26 13.0

% ALL ACCIDENTS = 15.3

← < 15.3 %

INVOLVEMENT RATE LOWER IN DENSE CELLS, EX. PONTIAC



OAKLAND COUNTY

% DRINKING INVOLVED BY POP. OF AREA, 69	AREA	RURAL
		< 25,000
		> 25,000

DRINKING INVOLVED			T
YES	NO	?	
18.6	75.7	5.7	100
13.3	79.0	7.7	100
13.3	82.4	4.3	100

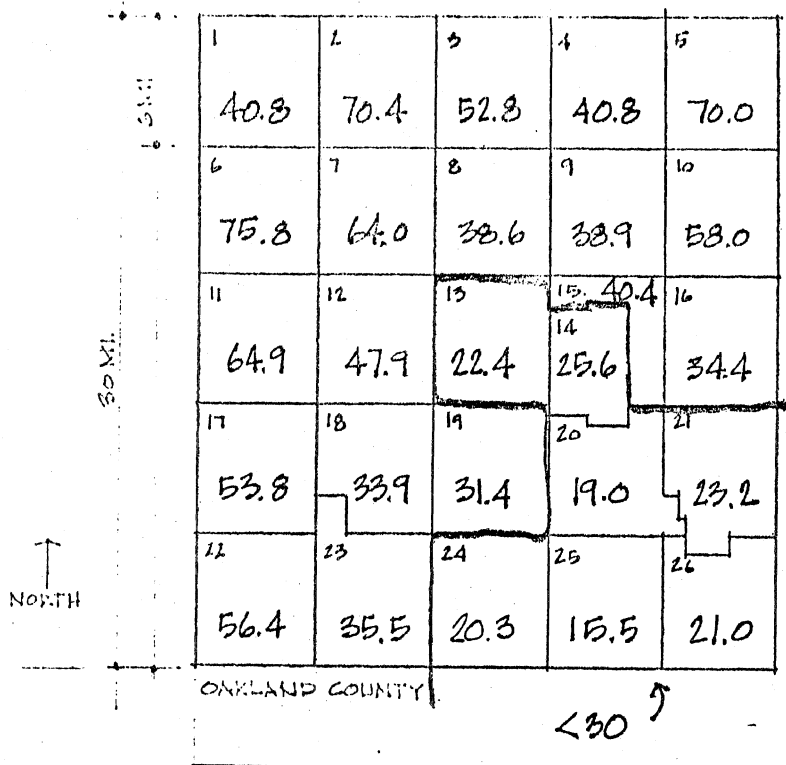
F. DAY-NIGHT ACCIDENTS ⁶⁹ RATIO OF DAY TO NIGHT

1 1.17	2 1.13	3 1.38	4 1.85	5 1.15
6 1.29	7 1.14	8 1.97	9 1.69	10 1.18
11 1.71	12 1.14	13 1.54	14 1.82	15 1.38
17 1.57	18 1.41	19 1.74	20 2.26	21 1.87
22 1.53	23 1.38	24 1.82	25 2.32	26 1.82

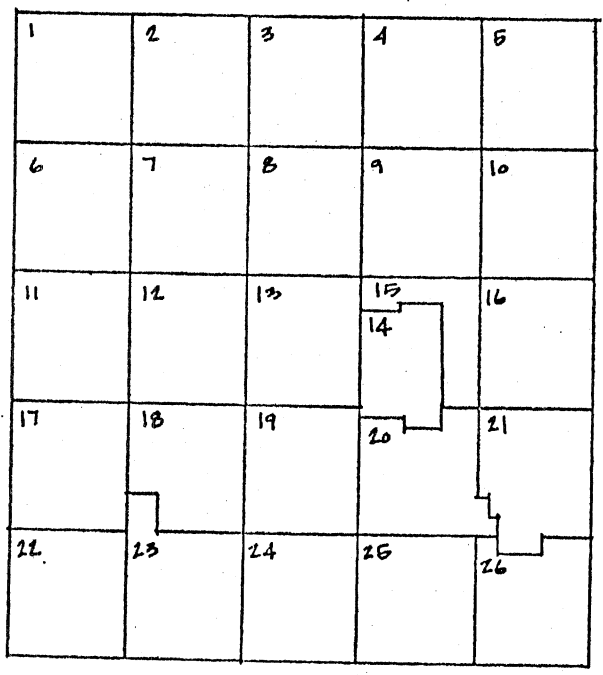
HIGHER RATIO, MORE DAYTIME ACCIDENTS IN URBAN AREAS

> 1.8 ↗

G. No. OF VEHICLES INVOLVED ⁶⁹ % OF ACCIDENTS W/ SINGLE VEH.



RURAL AREAS HAVE MORE SINGLE VEHICLE CRASHES, URBAN, MORE MULTIPLE VEHICLE CRASHES.



H. WEEKEND - WEEKDAY % OF ACCIDENTS, N=29,265

POPULATION	DAYS		TOTAL
	S-S	M-F	
RURAL	31.4	68.6	100
< 25,000	26.4	73.6	100
> 25,000	26.2	73.8	100
TOTAL	28.0	72.0	100

I. ACCIDENT CONFIGURATION % OF ACCIDENTS, N=22,173

CONFIGURATION POPULATION	REAR- END	HEAD- ON	ANGLE OR SIDE-SWIPE	OVERTURN OR STRIKE OBJECT	UNK	TOTAL
< 25,000	31.9	2.8	27.6	12.9	24.7	100
> 25,000	30.3	2.1	31.3	9.1	27.2	100
TOTAL	29.7	2.9	27.9	15.1	24.2	100

J. ACCIDENT RELATED VIOLATIONS %

VIOL POPULATION	NO VIOL	SPEED	DISREGARD FAILED TO YIELD	TRAFFIC CONTROL	FOLLOW TOO CLOSE	OTHER	UNK	TOTAL
RURAL	45.9↑	17.6↑	9.9	2.1	5.9		11.4	100
<25,000	44.4	7.3	14.5	2.2	7.6		16.5	100
>25,000	31.1	15.9	18.3↓	5.1↓	7.1↓		14.3	100
TOTAL	34.8	13.9	13.5	3.3	6.2		12.4	100

These notes serve to show that the dependent accident statistics vary in some gross way with geographic areas or with the urban-rural gradient. Though far from definitive, they should serve to give some insight into the relative magnitudes and directions of the relationships.

II. Externalities

In the course of this exploratory study another geographic aspect was observed. It involves the existence and quantification of "economic externalities." It is worth reviewing here because of its general "insight" value.

Oakland County has X number of accidents per year, involving both drivers who have residence inside, and outside the county. In addition, Oakland County resident drivers have Y number of accidents, which take place both inside and outside of Oakland County. So there is some spillover into and out of the County. If one looks at the costs of accidents, they can be divided into costs to the persons involved (injury, auto damage, etc.) and costs accruing to "society at large." The costs to "society at large" include the costs of traffic accident and safety services (police, emergency medical, driver education, courts, etc.) supplied in this case by Oakland County. Benefits then (the services) accrue to persons resident both inside and outside the County. So there exists "spillovers" or externalities" of costs and benefits in both directions. Conventional "public finance"

wisdom maintains that the existence of such externalities leads to an under-supply of the public good in question; in this case, traffic accident services. At the risk of being too brief, the argument states that where externalities exist, marginal and total social benefits from production are underestimated because only direct beneficiaries (accident victims) enter the market as buyers. The service is then undervalued and therefore underproduced. If the above is true, and if there are significant externalities between Oakland and other counties, traffic accident and safety services may indeed be undersupplied. The same analysis applies equally to the multiple (62) governmental units within the County.

Now, considering Oakland County and its geographic situation north of and adjacent to Detroit, one might expect that vehicular flow into Detroit (job locations) from Oakland County would be heavier than flow from Detroit to Oakland. That is, more Oakland residents would be driving in Detroit than Detroit residents in Oakland. One might then expect that Oakland residents would have more accidents outside of the County than outside residents would have in the County, so that Oakland residents would be placing a net burden on Detroit. (This is the popular "suburban exploit central city" argument.)

However, a look at the resident-non-resident accident data shows that the above is not the case. Although the magnitude of the externalities is large indeed, the net burden appears to fall to Oakland rather than to other units. Results are presented here in map and note form.

A. RESIDENCE OF DRIVERS

% OF DRIVERS #1, #2 WITH RESIDENCE OUTSIDE OAKLAND COUNTY

*EXCLUDING ACCIDENTS ON INTERSTATE ROUTES

1 31%	2 39	3 21	4 19	5 10
6 20	7 26	8 12	9 15	10 19
11 26	12 16	13 5	14 6	16 21
17 26	18 10	19 14	20 18	21 27
22 37	23 37	24 25	25 36	26 25

OAKLAND COUNTY



B. INTERSTATE ROUTES.

% OF DRIVERS #1, #2 WITH RESIDENCE OUTSIDE OAKLAND COUNTY

*INCLUDES ONLY INTERSTATE ROUTE ACCIDENTS

1 60	2 68	3	4	5
6	7 46	8 48	9 0	10
11	12	13	14 42	16 44
17	18	19	20	21 42
22 73	23 69	24 30	25 45	26 54

c. NOTES - EXTERNALITIES

	1968		1969	
1. DRIVERS OF VEHICLES IN OAKLAND COUNTY CRASHES (OAKLAND CRASH FILE)	46,086		54,998	
2. COUNTY RES.	36,086	79%	43,448	79%
3. NON RESIDENTS	9,700	21%	11,549	21%
4. OAKLAND COUNTY DRIVERS ACCIDENTS (MICHIGAN DRIVER RECORD SAMPLE OF 10,000, ESTIMATED)	40,200		48,900	
5. NO. OF ACCIDENTS, OAKLAND RESIDENTS, OUTSIDE OAKLAND #4 - #2 = 5	4,114	[% OF OAK. RES. DRIVERS ACCID.] 10%	5,452	11.1%
6. NET ACCIDENT BURDEN TO OAKLAND COUNTY	5,586	[% OF TOTAL OAK. ACCID.] 12.1%	6,097	11.1%

These maps and notes show that externalities do indeed exist, with a net burden on Oakland County from outside residents of 11.1% of the accidents within the County. The significance of this will be more fully explored, but initially one would tend to suspect that safety services are being undersupplied in Oakland County, and that Oakland County is shouldering more than its share of the burden.

III. Roadway

Turning to the general roadway, we have two primary variables #32 - road design, and #25 highway class. In the tables below we show these variables relative to #38 accident severity and #38 accident type. Relationships are self-explanatory with arrows showing the direction of the relationship in some cases.

A. Type of Accident #38 and Road Design #32

	%	2 Lane	4 Lane	Divided	Limited Access
Overturn or run off roadway		16.2	4.5	7.3	17.5
Collision with:					
Motorcycle		1.4	1.5	1.1	.7
Motor vehicle		73.5	90.0	86.3	59.8
Pedestrian		2.4	1.4	.9	.6
Fixed Obj.		3.7	1.5	3.7	18.3
Other					
	%	100.0	100.0	100.0	100.0

B. Type of Accident #38 and Highway Class #25

	%	Inter- state	Mich.	County, City
Overturn or run off roadway		17.7	7.8	13.2
Collision with:				
Motorcycle		.5	1.6	1.4
Motor vehicle		59.6	83.2	78.0
Pedestrian		.5	1.4	2.3
Fixed Obj.		18.2	4.3	2.6
Other				
		100.0	100.0	100.0

C. Accident Severity #43 and Road Design #32 1969
 (Source: Oakland County Crash File, 1969)

	2 Lane	4 Lane	Divided	Limited Access
Death	.5	.6	.7	1.3
Pers. Injury	37.2	40.1	39.3	40.5
Prop. Damage	62.2	59.4	60.0	58.2
%	100.0	100.0	100.0	100.0

D. Accident Severity #43 and Highway Class #25 1969

	Inter- state	Mich.	County, city
Death	1.2	.8	.5
Pers. Injury	40.7	40.1	38.4
Prop. Damage	58.1	59.1	61.1
	100.0	100.0	100.0

I. ROAD GEOMETRY

A. Road Alignment and Accident Type

(Source: Oakland County Crash File, 1969)

	%	Straight	Curve	Other	Total
01	Motor vehicle overturn or run off road	70.4	28.4	1.2	100
	Collision with:				
03	Motorcycle	89.6	9.9	.5	100
04	Another motor vehicle	92.8	6.2	1.0	100
05	Pedestrian	94.2	5.3	.5	100
06	Fixed object	62.8	35.3	1.9	100

B. Road Alignment and Accident Severity

	%	Straight	Curve
01	Fatal	.5	1.2
02	Pers. Injury	38.1	40.4
03	Prop. Damage	61.3	58.5
	Total	100	100

C. Road Gradient and Accident Type

(Source: Oakland County Crash File, 1969)

	%	Level	Grade	Crest of Dip	Not Known	Total
01	Motor vehicle overturn or run off road	62.3	29.3	2.7	5.8	100
	Collision with:					
03	Motorcycle	79.6	17.9	2.1	3.4	100
04	Another motor vehicle	76.6	16.9	1.7	4.8	100
05	Pedestrian	79.5	14.2	1.5	4.9	100
06	Fixed object	56.6	33.1	3.7	6.6	100

D. Road Gradient and Accident Severity

(Source: Oakland County Crash File, 1969)

	%	Level	Grade	Crest or Dip
01	Fatal	0.5	1.0	1.1
02	Pers. Injury	38.0	39.3	46.4
03	Prop. Damage	61.5	59.6	52.5
	Total	100	100	100

II. THE ROAD

A. Road Surface and Accident Type

(Source: Oakland County Crash File, 1969)

		Dry	Wet	Snow	Other	Total
01	Motor vehicle overturn or run off road	59.3	25.6	14.1	1.0	100
	Collision with:					
03	Motorcycle	91.4	7.8	0.3	0.5	100
04	Another motor vehicle	65.1	26.2	8.2	0.5	100
05	Pedestrian	79.1	15.5	4.9	0.5	100
06	Fixed object	56.4	27.9	14.9	1.0	100

B. Road Surface and Accident Severity

(Source: Oakland County Crash File, 1969)

		Dry	Wet	Snow
01	Fatal	0.7	0.4	0.3
02	Pers. Injury	39.4	39.3	27.7
03	Property Damage	59.9	60.3	72.0
	Total	100	100	100

C. Road Defects

(Source: Oakland County Crash File, 1969)

1207 or 4.2% of 1969 Crashes involved some road defect

Defect	Number	%
No defect	26964	92.1
Obstruction	65	.2
Loose surface	123	.4
Holes	98	.3
Low, soft shoulder	37	.1
Snow	67	.2
Frost bridge	7	0
Slippery when wet	810	2.8
Other or not known	1094	3.7
Total	29265	100

D. Slippery When Wet

The 810 "slippery when wet" crashes involved 401 (or 24.9%) a single vehicle running off the road or collision with a fixed object, and 587 (or 72.5%) involved a collision of two other vehicles, 250 (or 42.5%) of which were rear-end collisions.

III. CONSTRUCTION SITES

186 or .6% of the 1969 Oakland Crashes occurred in a "construction zone. 114 of these involved a collision of 2 or more motor vehicles while 31 involved the collision of a motor vehicle with a fixed object.

IV. HIGHWAY AREA TYPE

(Source: Oakland County Crash File)

		Number	%
01	Interchange area (within ramps)	1031	3.5
02	Intersection area (within 100 ft.)	5885	20.1
03	Non-intersection area	22340	76.4
	Total	29265	100

V. TRAFFIC CONTROL

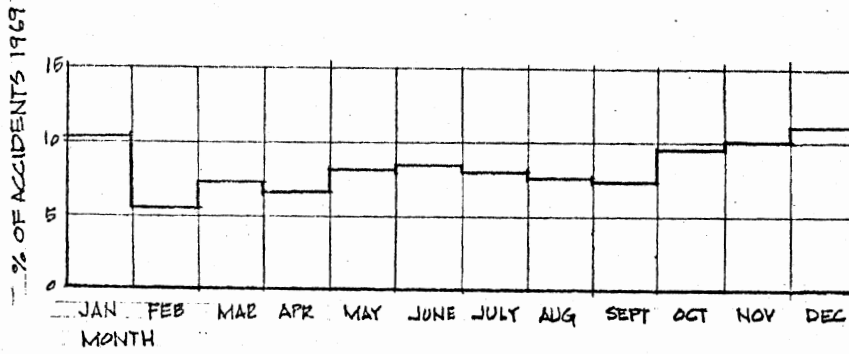
(Source: Oakland County Crash File, 1969)

	Traffic Control	Number	%
01	None	13390	45.8
02	Stop sign	3716	12.7
03	Stop and go signal	6770	23.1
04	Flagman, watchman, policeman	77	0.3
05	Flasher	337	1.2
06	Yield sign	139	0.5
07	School speed zone	3	0.0
08	No passing sign	111	0.4
09	Other warning	4348	14.9
10	Other or not known	374	1.3
	Total	29,265	100

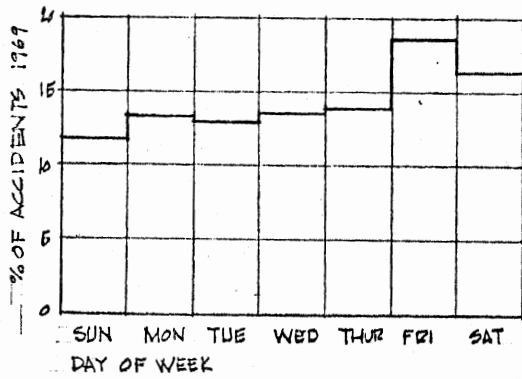
I. TIME, OAKLAND COUNTY ACCIDENTS IN 1969

(Source: Oakland County Crash File, 1969)

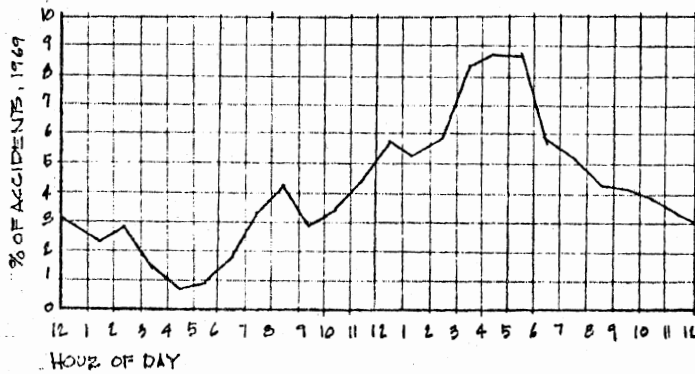
A. Month



B. Day of Week



C. Hour of Day



D. Time and Type of Accident
 (Source: Oakland County Crash File, 1969)

HOUE OF DAY (C)	(1) VEHICLE OVERTURN OR ROLLOVER	(2) COLLISION WITH TRAIN	(3) MOTORCYCLE	(4) ANOTHER MOTOR VEHICLE	(5) PEDESTRIAN	(6) FIXED OBJECT	(7) OTHER OBJECT	(8) ANIMAL	(9) BICYCLE	(10) OTHER OR UNKNOWN	(11) WILD	TOTAL
(1) MIDNIGHT TO 1	6.2	2.8	1.6	2.3	1.1	5.1	9.8	2.9	0.0	0.0	0.0	2.8
(2) 1-2	6.1	5.6	1.6	1.6	1.1	5.6	3.7	4.4	0.0	1.6	0.0	2.3
(3) 2-3	7.4	2.8	2.1	1.8	1.3	7.6	7.3	2.9	0.0	2.4	0.0	2.7
(4) 3-4	3.8	2.8	0.3	0.8	0.5	5.5	2.4	5.1	0.0	1.6	0.0	1.3
(5) 4-5	2.6	0.0	0.0	0.2	0.2	2.4	1.2	5.1	0.0	0.8	0.0	0.7
(6) 5-6	2.1	2.8	0.5	0.6	0.0	2.3	1.2	1.5	0.7	3.2	0.0	0.8
(7) 6-7	2.2	5.6	0.8	1.5	1.1	2.0	2.4	7.3	0.4	4.0	0.0	1.6
(8) 7-8	2.3	0.0	1.8	3.5	2.9	2.8	2.4	2.2	0.4	0.0	0.0	3.3
(9) 8-9	2.9	5.6	1.3	4.4	4.4	3.8	1.2	2.2	1.5	1.6	0.0	4.1
(10) 9-10	2.4	2.8	1.0	3.0	1.1	2.6	2.4	1.5	2.2	1.6	0.0	2.8
(11) 10-11	2.4	16.7	1.8	3.6	2.7	2.5	3.7	2.2	2.2	8.1	0.0	3.4
(12) 11-12	2.6	5.6	2.3	4.8	2.9	2.7	4.9	1.5	2.9	8.1	0.0	4.4
(13) 12 NOON TO 1	4.0	2.8	4.5	6.1	5.5	3.9	2.4	2.2	6.6	8.1	0.0	5.7
(14) 1-2	5.7	0.0	6.8	5.7	4.2	3.8	8.5	2.9	7.7	5.6	0.0	5.4
(15) 2-3	4.7	5.6	8.1	6.2	5.5	5.7	2.4	1.5	5.1	4.8	0.0	6.0
(16) 3-4	4.5	5.6	11.7	8.5	14.1	4.1	1.2	1.5	12.8	1.6	0.0	8.4
(17) 4-5	5.2	5.6	10.5	9.4	10.8	4.3	8.5	3.6	11.7	8.9	0.0	8.7
(18) 5-6	4.5	13.5	7.8	9.4	9.5	5.1	9.8	5.1	17.9	11.3	0.0	8.7
(19) 6-7	4.6	0.0	7.3	5.5	8.8	5.6	0.0	4.4	14.2	4.0	0.0	5.9
(20) 7-8	4.4	2.8	8.6	5.3	9.1	3.0	2.4	10.2	6.2	6.5	0.0	5.3
(21) 8-9	4.9	2.8	6.8	4.3	6.2	4.6	7.3	5.1	2.9	4.8	0.0	4.4
(22) 9-10	4.4	5.6	5.5	4.2	2.2	4.1	6.1	10.9	3.3	4.0	0.0	4.2
(23) 10-11	5.4	2.8	3.4	3.5	2.9	5.9	0.0	8.8	0.0	3.2	0.0	3.8
(24) 11-12 MIDNIGHT	6.5	0.0	2.4	3.0	2.0	5.1	8.5	5.1	1.5	4.0	0.0	3.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0

II. LIGHT

A. Accident Severity and Light

(Source: Oakland County Crash File, 1969)

%	day	dawn dusk	dark
fatal	.4	.4	1.0
injury	36.5	39.4	41.4
prop.dam.	63.1	60.2	57.6
	100.0	100.0	100.0

B. Accident Type and Light

(Source: Oakland County Crash File, 1969)

%	day	dawn dusk	dark
(1) overturn, run off road	7.9	11.2	18.7
Collision with			
(2) train	0.1	0.0	0.1
(3) motorcycle	1.4	1.6	1.1
(4) motor vehicle	83.7	79.8	70.7
(5) pedestrian	2.1	1.8	1.6
(6) fixed object	2.7	3.2	5.8
(7) other objects	0.2	0.1	0.4
(8) animal	0.2	0.9	0.9
(9) bicycle	1.3	0.8	0.2
Total	100.0	100.0	100.0

Cell 4-3 Post-Crash, Road-Environment

This section includes material on cases involving a previous accident.

One hundred twenty one or .4% of the 1969 accidents involved a previous accident--any accident involving a vehicle noted as being in the road due to a prior accident or any accident in which one or more vehicles were stopping or avoiding a previous accident. Of the 121, some 112 involved a collision of two or more motor vehicles, six involved collision with some non-vehicle object, and three involved overturning or running off the road.

APPENDIX C. TASK FORCE SUMMARY

Contents:	Page
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1. TASK FORCES: PURPOSES AND ORGANIZATION

This statement of "purposes and organization" was sent to all members of the various task forces--serving as an introduction and orientation to their roles in the project.

I. OBJECTIVES OF THE DEMONSTRATION PROJECT:

A broad description of the program is presented in the T.I.A. brochure, "A Traffic Safety Demonstration Program for Oakland County, Michigan." It is recommended that this brochure be used, since only a brief summary of the overall program is offered herein -- as background orientation.

Oakland County has been designated as one of two counties in the nation to participate in a management and planning demonstration project sponsored by the U.S. Department of Transportation. The fundamental goal of this effort is to demonstrate that techniques of modern management and advanced countermeasure planning can be used to significantly improve the efficiency and effectiveness of local traffic safety programs.

This three- to five-year project is designed in two phases: the first phase concentrates on a planning effort to identify the specific and unique highway safety problems within the County and then to develop a County-wide management system and countermeasure program plan aimed at remedying those problems; the second phase will entail the actual implementation of the management system and countermeasure programs, accompanied by an intensive evaluation to ascertain if, indeed, any beneficial change results.

II. THE ROLE OF THE TASK FORCES WITHIN THE PROJECT:

Quite frankly, the purpose of the task forces is to insure that this project deals with reality -- that it is directed toward "real" problems of the County, and that it produces an action plan that not only offers some promise for solving these problems, but also is feasible in the perspective of those many officials and citizens who must ultimately implement it.

Admittedly, as the project technical staff members, we are somewhat removed from daily contact with highway safety problems as they exist across the County, as well as from the very real and practical constraints operating upon those currently responding to traffic safety problems. Any bias or near-sightedness on our part must be effectively countered by information and enlightened opinion from those intimately familiar with the problems in the field. This is especially crucial in that the product of the first phase will be a comprehensive plan which will need the enthusiastic cooperation and support of a vast number of agencies and individuals. Therefore, that plan must be valid, credible, feasible -- and most importantly -- of meaningful use to many. Hopefully, together we can devise such a plan.

Basically, then, our motives in convening these task forces are four-fold:

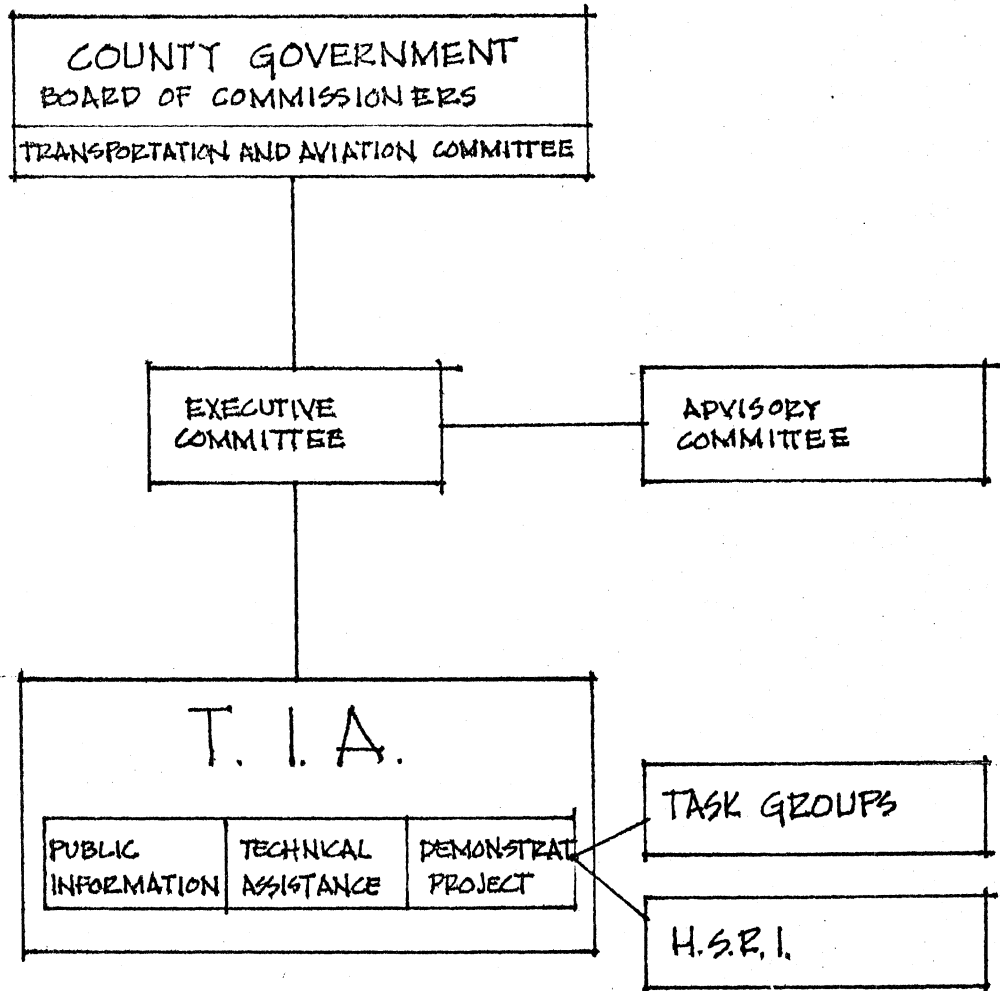
1. To stimulate broader involvement and interest in the safety demonstration project and in highway safety generally;
2. To begin building support for the implementation phase of the project by expanding awareness and sensitivity to County needs, and by providing a meaningful participation in the planning stages;
3. More specifically, in the initial stages of task force operation, to supplement the technical analysis of the various computerized data banks and the project's survey questionnaire with practical insight into problem identification by relevant highway safety practitioners; and
4. In later stages, to obtain advice relative to the feasibility of the recommended management system, countermeasure, and evaluation designs.

Be assured that task force involvement is not just "window-dressing" for the project, but is a very sincere attempt to develop two-way communications between the project managers and those who represent a wide variety of community and professional attitudes, responsibilities, and perspectives. Attached within is a schematic representation of the "interim" management system recommended by the staff of the Highway Safety Research Institute, The University of Michigan. As this indicates, the task forces are conceived as an integral, working mechanism -- vitally important to the conduct of the project. The system is designed so that your investment of time and energy in the task force activities can make a substantial contribution to the project's success and the welfare of Oakland County citizenry.

III. PROBLEM ORIENTATION:

This project 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 countermeasure programs or management system will be to remedy these problems. The success or failure of the project will be evaluated solely in terms of the extent to which those problems are measurably reduced.

Hence, a major portion of this effort is devoted toward a more precise identification and characterization of the County's highway safety problems. The way in which these problems are defined becomes highly critical, because the problem definition will determine the nature and direction of remedial programs. Obviously, if the problems are not clearly understood, then the specific countermeasure programs will not be directed toward the true problem -- resulting in the waste of invaluable money, manpower, and public confidence.

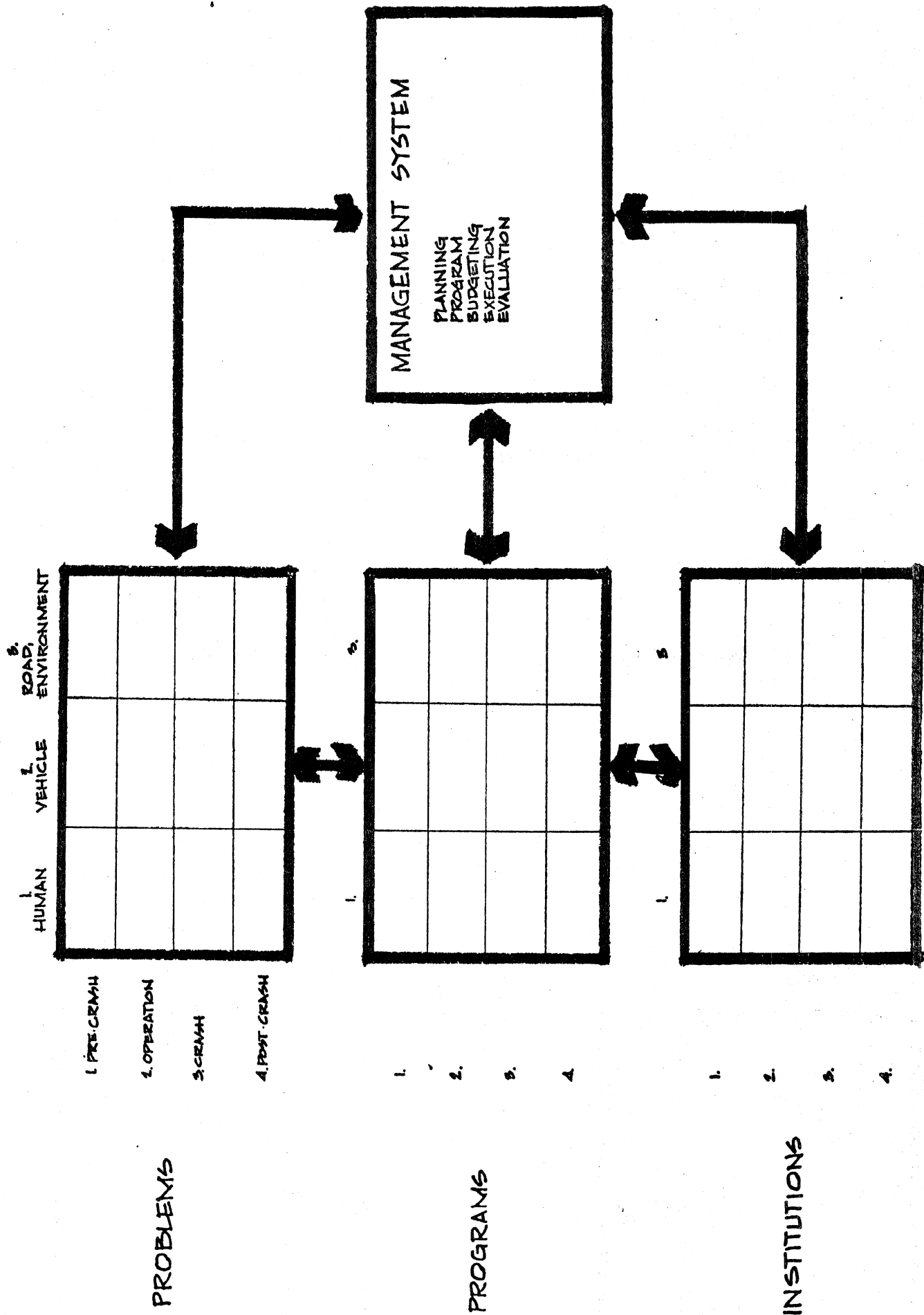


MANAGEMENT SYSTEM.

Therefore, the project is problem-oriented and any proposed countermeasures will be aimed at specific and well-defined problems. In our search to learn more about these problems and their relative priority, an analytical framework has been 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 inter-relationships, 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 -- can be traced back into a failure in one or more of the system's elements.

The attached chart depicts this analytical framework. In the upper-most 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."

(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 problem orientation? Such an 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 related only to single programs or agency purviews.

For example, this more traditional approach usually results in defining an accident according to the bias 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 organization as reflected in the chart. Our current task is to examine each of the problem areas -- attempting to determine what problems actually exist within the County, and to what extent. To achieve this, three major efforts are underway: (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 or six task forces, composed of selected individuals knowledgeable about aspects of the problem. Thus, all the analysis -- including that of the task forces -- is oriented toward this problem framework.

IV. FOCUS OF THE TASK FORCES:

Consistent with the problem orientation, the task force organization is derived directly from the problem matrix. Participants in each specific task force will be asked to focus exclusively upon problems related to the specified problem area and, later, upon possible countermeasure programs pertinent to those problems. Task force membership is determined by the mix of disciplines and professions deemed most intimately familiar with a specific problem area.

The problem matrix, reproduced from the previous figure, is organized into task forces as follows:

	Human	Vehicle	Road- Environment
Pre- Condition	T.F. I	T.F. IV	T.F. V
Pre- Crash	T.F. II	T.F. IV	T.F. V
Crash	T.F. I	T.F. IV	T.F. V
Post- Crash	T.F. III	T.F. III & IV	T.F. III & V

The following describes each task force according to its location in the matrix and gives a list of problems to be considered:

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

- A. Problem Matrix Cells: Human, Pre-Condition and Human, Crash
- B. Problem Areas of Concern:
 - 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

- A. Problem Matrix Cell: Human, Pre-Crash
- B. Problem Areas of Concern:
 - 1. Physical disabilities
 - 2. Impairment in aged
 - 3. Alcohol-induced impairment
 - 4. Drug-induced impairment
 - 5. Immaturity of young
 - 6. Emotional stress -- grief, anger, etc.

TASK FORCE III: HIGHWAY CRASH EMERGENCIES

- A. Problem Matrix Cells: Human, Post-Crash; Vehicle, Post-Crash; and Road/Environment, Post-Crash
- B. Problem Areas of Concern:
 - 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

- A. Problem Matrix Cells: Vehicle, Pre-Condition; Vehicle, Pre-Crash; Vehicle, Crash; and Vehicle, Post-Crash
- B. Problem Areas of Concern:
 - 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

- A. Problem Matrix Cells: Road-Environment, Pre-Condition; Road-Environment, Pre-Crash; Road-Environment, Crash; and Road-Environment, Post-Crash
- B. Problem Areas of Concern:
 - 1. Road utilization -- traffic flow, density, and composition
 - 2. Road condition:
 - a. degradation through wear
 - b. temporary and permanent obstacles
 - c. lighting and visibility
 - 3. Roadside furniture:
 - a. need for additional driver information and assistance
 - b. obstacles and protection
 - c. performance degradation through wear and use
 - 4. Other environmental factors:
 - a. wild or domestic animals
 - b. inclement weather
 - c. pedestrians

V. TASK FORCE SCHEDULE AND AGENDA

Below are described a number of items for task force consideration. The items are listed in desired sequence; however, it is hoped that several items can be covered within a single session. Progress will depend upon the rate established by the individual task force and its membership. We do not want to over-burden you; on the other hand, we would like the benefit of as much of your knowledge and experience as you are able to give us.

Thus, we seek a minimum of two meetings, lasting for about 2 to 3 hours each -- to occur between now and Mid-March. Additional meetings will be at the convenience of the task force members and according to the progress of the overall project.

Agenda Items:

1. First session:

- a. Further orientation to the project, a more detailed explanation of the task force role, and some sensitization to the problem areas through group discussion
- b. Preliminary problem identification and recommended problem priorities
- c. Identification of additional data and information sources

2. Second session:

- a. Consideration of and reaction to the technical conclusions resulting from the analysis of the computer data and the survey questionnaire
- b. Re-assessment of problem identification and problem priorities

3. Third session:

- a. Review draft of report on problems and their priority

4. Later sessions:

- a. Reaction to recommended countermeasure and evaluation designs
- b. Further -- and currently undefined -- involvement in preparation of project continuation proposals.

2. RECOMMENDATIONS FOR TASK FORCE MEMBERSHIP

The following lists potential candidates for participation in the task forces. The list encompassed the variety of professional roles pertinent to the various problem facets under consideration by the specific task force. Those denoted by an asterisk were recommended as prime candidates.

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

A. Problem Areas of Concern to Task Force:

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

B. Suggested Task Force Composition

1. Driver training:

- *a. Driver Education Supervisor, Public High School
(possible representative of county association)
- b. Owner/operator, commercial driving school
(possible representative of their association)
- *c. Administrator, Driver Improvement Program
(as administered by court, county, etc.)
- d. Trainer of school bus operators

2. Pedestrian training:

- *a. Pedestrian Safety Administrator - elementary school system (public or parochial school)
- *b. Safety Administrator, Senior Citizens Programs
- c. AAA Pedestrian Safety Program Administrator

3. Public Information:

- a. Representative of communication media
- *b. Traffic safety public information professional

4. Driver Licensing:

- *a. License examiner, Michigan Department of State
(based in Oakland County)
- b. Administrator, Michigan Public Service Commission
(one charged with truck driver regulation)

5. Enforcement:

- *a. Local police traffic commander
- *b. Appropriate representative of Sheriff's Office
- c. Local District Representative, Michigan
Department of State Police

6. Adjudication:

- *a. Traffic Court Judge
- b. Juvenile Court Judge
- c. License Revocation Officer, Michigan
Department of State
- *d. County Prosecutor
- e. Local Prosecutor

7. Miscellaneous:

- a. Owner/operator of a commercial fleet
- *b. Safety administrator of commercial fleet insurer
- *c. Automobile casualty insurer
- d. Highway Department Safety Engineer
(concerned with signing and signals)

C. Potential Technical Consultants:

- 1. Representative of Driver Education Program, Michigan
Department of Education
- 2. Representative of Pedestrian Safety Programs,
Michigan Department of Education
- 3. Office of Safety and Traffic, Michigan Department
of State Police
- 4. Driver Licensing Division, Michigan Department
of State
- *5. Working Committee on Public Information, Michigan
Safety Commission
- 6. Representative of Driver Education Instructor
Training Program; Michigan State University,
Oakland University, or Oakland Community College

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

A. Problem Areas of Concern to Task Force:

1. Physical disabilities
2. General deterioration in aged
3. Alcohol-induced impairment
4. Drug-related impairment
5. Emotional immaturity of young
6. Emotional stress - grief, anger, etc.

B. Suggested Task Force Composition:

1. Driver training:

- *a. Driver education supervisor, public high school
(possible representative of county association)
- b. Administrator, Driver Improvement Program
(as administered by court, Secretary of
State, county, etc.)

2. Pedestrian training:

- *a. Administrator, pedestrian safety programs,
elementary school system
- *b. Safety administrator, Senior Citizens program

3. Public information:

- a. Representative of communication media
- b. Traffic safety public information professional
- *c. Public information officer, Oakland County
Public Health Department
- d. Oakland County Council on Alcoholism
- e. Educational programs, Regional Office,
Food and Drug Administration, HEW

4. Driver licensing:

- *a. Area supervisor of license examiners or license revocators, Michigan Department of State
- b. Administrator of truck operator regulation, Michigan Public Service Commission
- c. Administrator of truck operator regulation, Interstate Commerce Commission
- d. Medical advisor to Michigan Department of State

5. Law enforcement:

- *a. Local police traffic commander
- b. Appropriate representative of Sheriff's Department
- *c. Local district representative, Michigan Department of State Police

6. Adjudication:

- *a. Traffic court judge
- b. Juvenile court judge
- *c. Local prosecutor
- d. County prosecutor
- e. Court probation officer - Friend of the Court
- f. Defense attorney - public defender, legal aid, etc.

7. Prevention and rehabilitation programs:

- *a. County administrator of alcohol programs - Oakland County Public Health Department
- *b. Administrator of local drug programs
- *c. Practicing physician - (representing Oakland County Medical Society)

8. Miscellaneous:

- a. Drug/alcohol program administrator, local school district
- *b. County Medical Examiner
- c. Automobile casualty insurers
- d. Fleet insurers
- *e. Highway Department Traffic Engineer
(concerned with pedestrian crossing problems)

C. Potential Technical Consultants:

- 1. Representative of alcohol program, Michigan Department of Public Health
- *2. Oakland County Council on Alcoholism
- 3. Representative of Breathalyzer Program, Michigan Department of State Police
- 4. Alcohol and drug program, Michigan Department of Education
- 5. Researcher, Alcohol Programs, Highway Safety Research Institute, The University of Michigan
- 6. Researcher - Young Driver Program, Highway Safety Research Institute, The University of Michigan

TASK FORCE III: HIGHWAY CRASH EMERGENCIES

A. Problem Areas of Concern to the Task Force:

- 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

B. Suggested Task Force Composition:

- *1. Local police traffic commander
- *2. Appropriate representative of Sheriff's Office
- *3. District representative, Michigan State Police
- *4. Oakland County Road Commission
- *5. Local road commissioner or Department of Public Works
- *6. Michigan Emergency Patrol
7. Representative of radio-equipped fleet
- *8. Michigan Bell Telephone
9. Detroit Edison
- *10. Consumers Power
11. Michigan Consolidated Gas Company
- *12. Private ambulance company
13. Governmental-operated ambulance unit
- *14. Representative of Oakland County Medical Society
- *15. Representative of Oakland County Osteopathic Society
- *16. Representative of a hospital emergency room administration
17. American Red Cross
- *18. Fire Department from major city
- *19. Commercial wrecker service
20. Representative of electronic news media
21. Private road contractor

C. Potential Technical Consultants:

- *1. Office of Emergency Medical Service Programs,
Michigan Department of Public Health
2. Local or state civil defense
- *3. Chairman, Michigan Emergency Services
Health Council
4. Detroit Area Industrial Mutual Assistance
- *5. JayCees
6. Council of Emergency Room Surgeons

TASK FORCE IV: MALFUNCTION OF MOTOR VEHICLES

A. Problem Areas of Concern to Task Force:

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

B. Suggested Task Force Composition:

- *1. Executive responsible for defect recall
campaign
2. Administrator responsible for defect recall
campaigns, National Highway Safety Bureau
- *3. Dealer of new cars
(representative of local dealer association)
- *4. Dealer of used cars
(representative of local association)
- *5. Owner of repair garage (member of Independent
Garage Owners Association)
- *6. Garage mechanic or union representative

- *7. Representative of consumers' group
- *8. Administrator, Motor Vehicle Inspection Program,
Michigan State Police
- 9. Appropriate representative of Sheriff's Office
- *10. Local police traffic commander
- 11. Administrator, Commercial Vehicle Inspection
Program, Michigan Public Service Commission
- *12. Owner/operator of fleets
- 13. Fleet insurer
- *14. Automobile casualty insurer
- *15. Administrator, Automobile Dealer Licensing
Program, Michigan Department of State
- 16. Driver education program supervisor
- *17. Representative of communication media

TASK FORCE V: DEFICIENT ROADS AND ROADSIDE FURNITURE

A. Problem Areas of Concern to the Task Force:

- 1. Road utilization - flow, density, and
composition
- 2. Road condition:
 - a. Degradation through wear
 - b. Temporary and permanent obstacles
 - c. Lighting and visibility
- 3. Roadside furniture:
 - a. Need for additional driver information
and assistance
 - b. Obstacles and protection
 - c. Performance degradation through wear
and use

4. Other environmental factors:

- a. Wild or domestic animals
- b. Inclement weather
- c. Pedestrians

B. Suggested Task Force Composition:

- 1. Transportation planner, Southeastern Michigan Council of Governments
- *2. Planner, Southeastern Michigan Transportation Authority
- *3. Transportation planner, Oakland County Planning Commission
- 4. Transportation planner, local governmental planning commission
- *5. Planning Department, Oakland County Road Commission
- 6. Construction and Inspection Department, Oakland County Road Commission
- *7. Maintenance and Repair Department, Oakland County Road Commission
- *8. Traffic engineer, Oakland County Road Commission
- 9. District planning representative, Bureau of Public Roads, U.S. DOT
- *10. Administrator, District T.O.P.I.C.S. Program, Bureau of Public Roads, U.S. DOT
- *11. Traffic engineer, Michigan Department of Highways
- 12. Private consulting planners and traffic engineers
- *13. Local police traffic commander
- 14. Representative of Sheriff's Office

- *15. Representative of local district, Michigan State Police
- 16. Highway construction contractor
- *17. Safety supervisor of a fleet which operates primarily in Oakland County
- *18. Michigan Automobile Club
- *19. Oakland County Traffic Data Center

3. SUMMARIES OF TASK FORCE DISCUSSION AND CONCLUSIONS

TASK FORCE PROBLEM PRIORITIES AND CHARACTERIZATION

Problem Area: Human--Pre-condition, Pre-crash,
and Crash

Observations from the Deliberations of
Task Forces I and II

Problems Considered:

- a. Induced Impairment
- b. Mental Set: Attitude and Alertness
- c. Inadequate Skill for Varying Conditions
- d. Lack of Knowledge of Hazard, Risk, and Regulation
- e. General Physical and Mental Impairment

INTRODUCTION

Herein is contained a brief summary of the meetings of Task Forces One and Two, which focused on the human role in highway crash causation and severity. This summary is a synthesis of two meetings per task force: the first, an unstructured discussion of the problems; the second, a reaction to HSRI findings from the mass data and survey questionnaire analyses.

Both groups were very sensitive to the fact that a number of inter-related factors had to be present for a crash to occur and that it was difficult to divorce them from each other and single out individual causal factors. Nonetheless, the task forces felt that the human element was the most critical factor in highway crashes -- that this element ought to be given substantial priority in crash contribution over and above the post-crash problems and the deficiencies in the vehicle and roadway elements.

Within the general, human problem area, there was strong feeling that three identifiable groups were the major source of crashes: the "young" driver, the "drunk" driver, and the "bad" driver who generates a long history of violation and crash involvement. Of secondary concern were the child and teenage pedestrian, as well as the operators of snowmobiles, motorcycles, and bicycles. Senior citizen pedestrians or motorists and the operators of school buses, commercial vehicles, and emergency vehicles were depicted as insignificant contributors to the crash experience.

Although much attention concentrated on the target groups cited above, an attempt was made to describe the human conditions which caused the various over-involvements in highway crashes. The two task forces unanimously singled out the mental state of the individual just prior to crash involvement. This condition

was further defined as attitude, alertness to the driving task and the attendant risks, induced impairment due to consumption of alcohol and/or drugs, and insufficient driver skill in crisis situations. Other conditions were considered -- all of which were important in certain aspects but yet, on the average, were less prevalent in accident causation than mental "set" and induced impairment. These minor problem areas encompassed inadequate skill for varying conditions; lack of knowledge of hazard, risk, and regulation; and general physical and mental impairment.

The following will describe each of these general problem conditions and the specific task force concern expressed within each area.

TASK FORCE PROBLEM OUTLINE AND CHARACTERIZATION

INDUCED IMPAIRMENT

General Problem Description:

Consistent with the growing awareness across the nation, concern is evident in Oakland County about the traffic toll involving the driver or pedestrian who is under the influence of alcohol and/or drugs.

Admittedly, there is an absence of clinical evidence about the nature and extent to which mental and physical performance related to the driving task is degraded through use of drugs and alcohol. Also, Oakland County has not yet established the practice of post-mortems on all accident crash victims to determine the presence of alcohol or drugs.

However, there was a strong expression from those who deal with highway crashes, their victims, and the at-fault driver that, to a large degree, alcohol and, to a lesser degree, drugs contribute significantly to highway crashes and their severity.

Specific Problem Concerns:

- a. Alcohol is a factor in a large portion of the accidents-- but especially over-represented in the fatal or severe injury crashes; most often the single-car, ran off the road type. These accidents occur heavily around recreation activities, peaking during weekend evenings and early morning hours. It is believed that alcohol involvement is significantly under-reported and therefore the actual involvement is probably somewhat higher than statistics suggest.

- b. The alcohol-involved crash stems from both the "problem" drinker and the "social" drinker. An estimated 25,000 persons constitute the alcoholic population of the County, with an additional 25,000 problem drinkers or near alcoholics. The assumption is that these people must drive and have driving-drinking problems.
- c. Alcohol is seen as a primary factor in crashes in all age groups, but especially the "young" drivers where the problem is somewhat different in that their inexperience with alcohol is doubly dangerous due to their driving inexperience.
- d. Drugs are a serious social problem, but yet to be manifested in large numbers in the highway crash scene. This is suspected to result, in part, from the inability to detect the presence of drugs within the human body. Nonetheless, drugs were considered a problem meriting attention in two specific areas:
 - 1. The young driver and pedestrian--ages 14-20. It is in these age groups that use of, and possibly addiction to, the illegal narcotics and hallucinogenic drugs occur. These drugs are sometimes found in cars, but it is difficult to determine driver or pedestrian usage.
 - 2. Perhaps the most serious problem in induced impairment may be the adult use -- or abuse -- of prescription and over-the-counter drugs -- especially when the synergistic effect appears through the combined use of some drugs and alcohol. It was felt that this problem greatly exceeded popular notions and warranted extensive study and action.

MENTAL "SET": IMPROPER EMOTIONAL CONDITION OR MENTAL ATTITUDE

General Problem Description:

This problem area was felt to be an extremely important factor in the causation of Oakland County crashes. It is generally defined as the mental state of the driver or pedestrian just prior to crash involvement -- as opposed to any chronic or continuing mental or emotional condition.

As discussed later, it seems that the Oakland County driver and pedestrian -- on the average -- are relatively knowledgeable, skillful, and physically and mentally capable. However, it was strongly indicated that the knowledge was ignored and that the skill and capabilities were severely taxed because individuals permitted emotional and attitudinal factors to become paramount; thus blurring rational decision-making and impeding safe driving performance. 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 or pedestrian may fail to assess accurately a potentially dangerous situation as it evolves. The individual then finds himself in a near-crash situation from which he must attempt to extricate himself immediately -- relying on accident avoidance skills and knowledge which are described as his weakest (see later discussion).

Therefore, emotional condition, alertness, and attitude become critical components in the crash causation chain. With a proper mental "set," the motorist and pedestrian will not often become trapped in urgent situations which carry him up to and possibly beyond his limits of knowledge and skill.

Specific Problem Concerns:

- 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.

Also, this attitude toward the highway situation is part of the current trend of lawlessness and disrespect for safety and welfare of others. This attitude problem is especially prevalent in two driver categories:

1. Young driver--the mental outlook associated with youth, reinforced and pushed by peer pressures, produces a young male who is handicapped as a driver because of his attitude.
 2. The "bad" driver--certain members of our society chronically exhibit anti-social behavior which is often manifested in the highway environment.
- b. Many users of the highway transportation system lack sufficient emotional maturity to respond to the urgent demands for reasoned decision-making. This is true of the child pedestrian and often the case with the young driver. Symptomatic of this problem is an inalertness coupled with an inability to think quickly and rationally where serious risks are involved.
- c. Inattention and distraction are frequent contributing factors to highway crashes. The dynamic and complex nature of the traffic environment require concentration and attention to the driving and pedestrian tasks. Many factors operate to dilute or distract this concentration:
- 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
another crash, etc.

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

- d. Fatigue greatly diminishes one's ability to remain alert and perform complicated traffic tasks. Nonetheless, 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 and mental set. The weekend traffic toll again may stem from long periods of driving immediately after a full day of work or an exhausting day of recreation.
- e. Often temporary conditions of emotional upset will surface in the traffic environment in such a way as to play a role in causing a crash. Conflict, aggression, etc., many times is released through driving -- over-riding normal precautions.
- f. A highly specific but critically important problem relating to "mental set" is that of utilization of existing safety equipment. Most popular of these is the neglect and refusal to use seat belts in cars. Equally serious is the failure to use various pedestrian safety provisions -- such as crosswalks, sidewalks, etc.

INADEQUATE SKILL FOR VARYING CONDITIONS

General Problem Description:

It seems that Oakland County residents are adequately skilled to operate in normal or optimal driving or pedestrian conditions. Therefore, problems generally associated with skill are not thought to be of major importance.

However, serious problems arise when new or unfamiliar conditions are encountered -- for which skills have not been previously developed. The demands of daily and routine driving tasks seem not to be beyond the average motorist. Yet, the range of roads and vehicles experienced in Oakland County, when coupled with the problems of induced impairment, attitude, and alertness, overtax these minimal skills and lead toward crashes.

Specific Problem Concern:

a. Driver Characteristics:

1. Young Driver - The young driver can gain skill only through actual driving experience. Until extensive experience has been developed in normal driving conditions, as well as in a variety of unusual situations, then this young driver is insufficiently equipped for the rigors of the driving tasks.

This problem is further compounded by his inexperience with the consumption of alcoholic beverages. His inexperience with driving and with alcohol combine to cause him to be highly over-involved in crashes.

2. Physically Handicapped, Chronically Ill, or Senior Citizen Drivers and Pedestrians -
These individuals are not considered to be a major problem in crash causation. They seem to have acquired compensating skills on recognition of their physical limitations, such that they do not exhibit higher than normal ratios of violations or accidents.

b. Environmental Characteristics:

1. Hazardous Weather Conditions - Michigan suffers extreme road conditions due to inclement weather and most motorists are not adequately trained to handle these conditions -- such as rain, snow, ice, etc.
2. Varying Road Conditions - Oakland County offers the gamut of roads, traffic densities, and speeds -- from beautiful expressways, to choked urban arteries, to unpaved rural roads. Motorists develop fine skills for use in their normal travel routes, but do not have a range of skills sufficient to meet the spectrum of conditions and rapid changes in traffic composition.

c. Vehicle Characteristics:

With its diversity in recreation and employment, plus its affluence, Oakland County offers a great variety of transportation needs. Most driving skills are acquired in the operation of passenger cars. However, this provides little in the development of skill for the operation of other vehicles such as:

1. Motorcycles considered major problems (occur in small numbers, but
2. Snowmobiles usually involve more serious injuries)
3. Bicycles
4. Heavy trucks and commercial vehicles - considered minor problem

d. Panic Conditions:

The task forces were unanimous in their concern for this problem -- the inability of most drivers to react to panic, near crash situations in a manner that will avoid or minimize crash consequences. Recognizing that a mix of human, vehicle, and roadway elements will cause individuals to enter situations with a high probability of a crash occurring, it was felt that few had any skill in extricating themselves from such situations. Critical reactions in the moments immediately prior to a potential crash may substantially determine whether or not the crash results and, if so, the degree of severity. Yet, skills in these conditions are inadequate -- either because of infrequent exposure to the situation or neglect in training.

LACK OF KNOWLEDGE ABOUT HAZARDS, RISKS, AND REGULATIONS

General Problem Area:

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 causation or disciplinary sanction. Most problems involving the human element are due to the lack of application of the knowledge -- rather than ignorance itself.

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.

Specific Problem Concerns:

- a. 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.
- b. Certain concepts in traffic regulation, such as right-of-way, are not understood nor properly practiced.
- c. Too much ignorance exists about the risks accompanying the use of alcohol and prescribed drugs in a traffic context -- with even less known about the potential synergistic effects between alcohol and drugs.
- d. The transportation of children to and from school seems to occur amid some confusion and ignorance. Parents and motorists generally are unaware of the safety concerns related either to the pedestrian child or the child driven to school. Furthermore, regulations are not understood which pertain to other motorists near a school bus which is depositing children.

- e. Although the knowledge relating to mechanical and other compensations for the driving and pedestrian needs of the physically handicapped is well established, there seems to be a problem in creating an individual awareness or recognition of one's physical limitations. Either these individuals are not apprised by others of their limitations or they personally refuse to accept the problem. This is especially true of senior citizens.

GENERAL PHYSICAL OR MENTAL IMPAIRMENT

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. These impairments could impede significantly an individual's driving or pedestrian performance.

However, except for the specific areas discussed below and the chronic user of drugs or alcohol discussed under "Induced Impairment," the broad problems 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 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.

Specific Problem Concerns:

- a. 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. Although a frequent casualty in pedestrian accidents, 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.

Nonetheless, it is felt that the driver or pedestrian who is sixty years old or older does suffer from slower reactions, greater mental confusion, degraded senses and motor skills, and an increased susceptibility to the effects of drugs and alcohol -- all of which hamper his traffic performance.

- b. 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 insidiously and temporarily cause disfunction in the driver or pedestrian.

- c. Even less is known, but much is suspected, in the human degradation due to oxygen deprivation resulting from smoking or carbon monoxide poisoning within the car's passenger compartment.

TASK FORCE PROBLEM PRIORITIES AND CHARACTERIZATION

Problem Area: Highway Crash Emergencies (Post-Crash:
Human, Vehicle, and Roadway Environment)

Observations from the Deliberations of Task Force III

Problems Considered:

1. Undetected Crash Requiring Emergency Attention
2. Injured Persons In Need of Extrication and
Emergency Medical Services
3. Traffic Control Around Crash Site
4. Crash Fire
5. Crash Debris Hazardous to Traffic
6. Critical Disrepair of Road, Roadside Furniture,
or Utilities

INTRODUCTION

This is a summary of the meetings of Task Force III, which concentrated on the problems generally classified as "Highway Crash Emergencies." The Task Force was asked to describe and establish priorities for problems related to the post-crash phase -- involving the human, vehicular, and roadway elements -- which might contribute further to the severity of the immediate crash and/or lead to the causation of additional crashes. As did the other task forces, this group met twice: first, to examine the problems in an unstructured discussion; secondly, to react to the results of the analyses of mass data and the survey questionnaire. It must be mentioned that there exists little data relevant to this problem area, so that conclusions herein are based on discussants' interaction -- without benefit of insight from crash or other data.

The Task Force generally agreed that the entire problem focus on highway crash emergencies ought to be subordinated in priority to problem areas directly contributing to crash causation. In terms of fundamental highway safety needs, the emphasis should be on the prevention of crashes, rather than caring for the results of a crash once it has happened. However, the post-crash contribution to the severity of the accident and the potential for causing further accidents was well recognized. Yet, but for an important exception, there was general agreement that most of the specific potential problems occurred infrequently and were under satisfactory control in Oakland County.

That major exception was vigorously expressed as a critically important problem -- that of quality emergency medical care for the seriously injured crash victims. This was described as consisting of two vital components:

1. Immediate and effective care at the site of the crash; and
2. Quality, competent repair and treatment in an appropriate hospital emergency facility.

Currently, the citizen volunteer and professional emergency care at the accident scene is often found to be inadequate -- or even worse -- seriously aggravates the injury. Furthermore, although appropriately equipped and staffed hospital facilities are available within the County, the present procedures operate in a fashion which does not ensure that the severely injured are delivered to competent facilities.

Of lesser concern were several specific problems in Oakland County which hinder the efficiency of emergency medical and repair services. 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 are: the absence of a designated and qualified person in charge of coordinating the multitude of activities and service operations at the crash scene; 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 finally the existence of a communications network that can rapidly command into action and coordinate the battery of services that are required.

A third level of problems were considered to be always potentially dangerous, but currently rather insignificant relative to those discussed above. These are: rapid detection of crashes, fire at the crash scene, the lack of traffic control around the crash site, and the removal of crash debris and the repair of the road, appurtenances, and utilities so as not to precipitate additional accidents.

GENERAL PROBLEM OUTLINE AND CHARACTERIZATION

UNDETECTED CRASH REQUIRING EMERGENCY ATTENTION

General Problem Description:

There was a consensus that undetected crashes were not a significant problem in Oakland County. As a highly-populated region with heavy use of its roads, few automobile accidents occur unnoticed. A report by either a volunteer citizen or law enforcement official soon has the emergency services responding. The situation is improving in efficiency as citizens with two-way radios in their cars are being organized and trained into a reporting network, plus official communication systems are being developed between jurisdictions and departments.

Specific Problem Concerns:

- a. 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.
- b. The large volume of reports which do not provide full and accurate information leave to the report recipient the burden of determining the emergency status and establishing the urgency and priority. Often a crash is detected, but the various emergency services are not involved until the report is confirmed and the needs properly ascertained.
- c. Although a relatively minor problem, the reluctance of citizens to "become involved" can be critical. When time is so important, the fear or neglect by citizenry to report problems only delays delivery of vital services.

INJURED PERSONS IN NEED OF EXTRICATION AND EMERGENCY MEDICAL SERVICES

General Problem Description:

Of the various problems within the highway crash emergency area, it is this group that received the most concern and thought to be the most serious in Oakland County. 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. Therefore, 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.

This problem area consists of four critical phases:

- a. The possible need to extricate the injured from the wrecked vehicle or move the injured from hazardous location. This involves an important evaluation of the injured's exposure to further hazards versus the relatively high probability that moving the injured might aggravate the injury. Thus, two factors are critical in this phase of movement: (1) timeliness in terms of reducing further risk, and (2) skill in moving injured so as to not compound the injury.
- b. The urgent need for first aid at the accident scene. The seriously injured must have initial treatment immediately and appropriately to the injury. Again, the critical factors here are twofold: (1) the period of time from when the injury occurred to initial treatment, and (2) the quality of that treatment.

- c. The next step is to transport the seriously injured from the accident scene to a qualified hospital emergency facility. Three important 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 (3) most important, the transportation should deliver the injured to a competent and capable hospital emergency facility.
- d. The trauma treatment and repair available to the injured is not only a primary determinant in survival, but also in the degree to which repair will permit return to full health. The critical factors are the continual availability of qualified personnel and appropriate facilities and equipment.

Specific Problem Concerns:

- a. Most severe 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.
- b. The quality of initial treatment at the accident scene is often inadequate for the following reasons:
 - 1. Citizens are usually the first to be involved at the scene and are poorly trained or equipped to administer first aid.
 - 2. Professional assistance may arrive too late. Although not considered a major problem in urban and suburban areas, accidents in remote rural regions may mean some delay before police and/or ambulances are on the scene.

3. The first aid and medical training of police and ambulance personnel is inadequate for the seriousness of the injury.
4. The economics of the ambulance business impedes the delivery of quality care. The ambulance companies are not used efficiently, as they are called to most injury accidents -- many of which are not sufficiently severe to merit highly skilled and expensive treatment or transportation. Furthermore, there seems to be no other method of transportation available to those with relatively minor injury, but requiring further medical attention. The frequency of automobile accidents and other events requiring emergency medical services varies with population density, resulting in a heavy orientation of emergency services in the urban and suburban areas. However, it appears that many of the serious crash injuries occur in the less populated, rural areas in which ambulance companies are economically inhibited from operating. Finally, and most important, 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.
5. The multitude of urgent needs at the accident scene often result in confusion. The absence of a single authority in charge of the emergency scene often produces an uncoordinated and inefficient response to needs for medical care, as well as traffic control, debris removal, and road repairs.

c. In Oakland County, there are several important problems relative to the emergency treatment of injured traffic victims within hospital facilities:

1. There are not enough emergency hospital facilities available with the needed qualified staff and equipment. Actually, the problem is almost the reverse -- there are too many ill-equipped and poorly staffed emergency facilities. State licensing requirements for a hospital emergency room do not even necessitate a doctor available around the clock. Yet, seriously injured traffic victims often require intensive care treatment, with an associated team of specialists and sophisticated facilities.

Thus, the problem is an under-supply of competent hospital services -- distributed throughout the County so as to be readily accessible to most highway crash needs. Furthermore, within those facilities currently offering a higher quality of care for injured, there are still problems of inadequate design and maintenance of services. Unfortunately, processes of building and operating of a hospital do not consider traffic accident victims as high priority needs.

2. Serving to exacerbate the problem of quality hospital 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 leading to 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 discretionary decision is based on confusion or ignorance of his injury or 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, facility. Both the police and ambulance personnel are reluctant to risk individual or collective criticism in this regard -- especially when they lack the confidence in evaluating either the injury or the available facilities.
 - d. Apparently, the emergency room business is quite competitive. It was alleged that hospitals recruit business by providing various incentives to those who transport the injured.
3. Another problem -- considered to be relatively minor -- is that of alerting the hospital to the forthcoming delivery of an injured victim. There seems to be a general lack of communication between the transportation of the injured and the intended

destination facility. This is primarily due to the lack of radio communications in the emergency vehicle and the hospital emergency room. Such a communication capability can also serve to permit hospital medical staff to advise treatment and care during the initial treatment on the scene and while in transit.

Unfortunately, even where the radio communications equipment exists, they are not utilized. Additionally, 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 when so advised by ambulance personnel.

- d. In general, the entire field of emergency medical services is an area of public ignorance and apathy. A basic cause of the problem 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.

TRAFFIC CONTROL AROUND THE CRASH SITE

General Problem Description:

This is an area which is considered important as it is potentially dangerous; however, it was agreed that most jurisdictions within Oakland County had this potential 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 then detoured around the accident site. To the extent to which this is a problem, it usually involved 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 and should be a low priority problem.

CRASH FIRE

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 and therefore should be given minor priority.

It is fortunate that fire is infrequent, for few emergency vehicles responding to highway crashes are equipped with fire-fighting gear.

Specific Problem Concern:

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 flammable liquid follows curbs and flows into storm sewage systems. In a densely-populated area of residential or commercial development, a resulting fire could be a holocaust. The problem has been further compounded when such accidents occur in the expressways below the ground level. Escape there is difficult -- especially when traffic is heavy as in the commuter rush hours.

CRASH DEBRIS HAZARDOUS TO TRAFFIC

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

CRITICAL DISREPAIR OF ROAD, ROADSIDE APPURTENANCES, OR UTILITIES

Again, a prospective 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. Often, a service

crew must confirm the report before extensive preparations and arrangements are undertaken. Yet, if the roadway environment is unsafe, the police will exercise their authority to close that portion of the road.

TASK FORCE PROBLEM PRIORITIES AND CHARACTERIZATION

Problem Area: Malfunction of Motor Vehicles (Vehicle-
Pre-Condition, Pre-Crash, Crash, and
Post-Crash)

Observations from the Deliberations of
Task Force IV

Problems Considered:

1. Vehicle Defects Through Manufacturing Process
2. Vehicle Performance Degradation Due to Normal Wear,
Abuse, and Deterioration
3. Vehicle Performance Degradation Due to Crash Involvement
4. Inadequate Vehicle Repair Practices

INTRODUCTION

The following is a summary of the meetings of Task Force IV, which concentrated on highway safety problems relative to the "Malfunction of Motor Vehicles." This problem focus was further defined as the vehicular factors which contributed to crash causation or injury severity -- in the pre-condition, pre-crash, crash, and post-crash phases.

The group met twice: first to participate in an unstructured discussion of the problem components, and secondly to react to the HSRI analyses of crash data and a survey questionnaire.

The Task Force generally felt that little was known definitively about the vehicle role in crash causation, although the vehicle contributions to injury severity were established. Police-reported accident data and in-depth, "clinical" accident investigations provide inadequate documentation of the causal vehicle factors in highway crashes. Thus, much of the conclusions were drawn from practical experience within the County and native intuition.

In light of the research evidence, the group fundamentally agreed that the vehicle plays a relatively minor role in crash causation and a relatively major role in injury causation and severity. Because injury causation factors are related principally to vehicle design which is immediately beyond the purview of a County-wide effort, the Task Force then concluded that the vehicle-related problems should be of low priority in the County's overall highway safety problems. They also felt that the problems of alcohol and drugs, attitude, emergency medical services, and the roadway environment should be considered as more critical factors in highway crashes. There was agreement that national attention on the vehicle factors -- especially the injury reduction programs -- had caused a popular misconception about the vehicular role in crash causation.

It must be mentioned, however, that -- as examination of the prospective vehicular problems progressed -- there was increasing mention of problems that could or should lead to trouble on the highway. There seems to be a significant feeling -- almost intuitive or "visceral" -- that many automobiles are in conditions which should or could critically degrade their performance so as to serve as a contributing cause of a crash. Those with experience in motor vehicle inspection programs and those associated with the repair business especially indicated that the vehicle population contains many which are in serious states of disrepair -- with crash causation potential.

Within the area of vehicle malfunction, most concern centered on vehicle performance degradation due to normal wear and deterioration, previous crash involvement, or possibly inadequate repair practices. The Task Force also agreed that problems related to suspected defects in the manufacturing process were not an obvious contributor to highway crashes -- in that the recall campaigns seemed to be effective and that cars with those defects were not over-represented in crash statistics. Finally, there was concern expressed over increasing problems related to snowmobile and motorcycle crashes, but it was felt that the vehicle-related factors in crash and injury causation were primarily inherent to the nature of the vehicle itself and not related to any malfunction problem.

GENERAL PROBLEM OUTLINE AND CHARACTERIZATION

VEHICLE DEFECTS THROUGH MANUFACTURING PROCESS

This problem was felt to be of lowest priority of all the vehicle-related factors. The group was aware of the dangerous potential of vehicles which were improperly fabricated and had serious deficiencies in critical parts. In addition, there was recognition of the fact that defects do occur. Yet, there was no evidence that automobiles with these defects were disproportionately over-represented in highway crash statistics. To the contrary, a representative of an automobile manufacturer indicated that their studies show no distinctly different accident experience for vehicles with suspected defects.

There was discussion about the effectiveness of the defect recall campaigns. It was felt that the suspected defect was corrected before a failure occurred -- either by the dealer before the vehicle was sold or by the subsequent owner. There was some concern that difficulties in notification and owner neglect were causing a minority of these automobiles to go without appropriate repair of the defect.

VEHICLE PERFORMANCE DEGRADATION DUE TO NORMAL WEAR, ABUSE, AND DETERIORATION

This problem was of major concern to the Task Force -- even though such degradation could not be directly traced to crash causation.

The prospective problem is predicted upon the concept that the vehicle is not built to last forever, that normal wear and abuse of the car will cause gradual deterioration in the overall machine and its components. Climatic and driving conditions in Michigan could accelerate this deterioration. When this deterioration reaches a critical point, it could effectively reduce the

performance of the vehicle and perhaps substantial performance degradation could have some contributory role in crash causation.

This problem of deterioration or malfunction of the car and its parts is further compounded by the ignorance and neglect of the vehicle's owners or operators. In normal use and operation, most owners are unaware of their vehicle's general condition and potential deficiencies. Furthermore, when aware of seemingly less-than-critical or inconvenient deficiencies, owners fail to have repairs made.

The above is supported by the fact that a high rate of vehicles fail to pass Michigan's random spot check, motor vehicle inspection. Also, the crash data indicates that some three percent of the vehicles involved in highway crashes in Oakland County were reported by police to be defective. The rate for ten-year-old cars was almost eight percent. Plus, most feel that this problem is under-reported due to the difficulties in detecting such a defect after a crash.

Nonetheless, no one was willing to leap from the above kinds of information to any conclusions other than vehicle condition plays a minor role in crash involvement.

VEHICLE PERFORMANCE DEGRADATION DUE TO CRASH INVOLVEMENT

This problem was also considered to be potentially important because of the significant damage possible to the vehicle -- yet the Task Force was reluctant to attribute this problem to crash causation.

Vehicle performance degradation due to crash involvement is very similar to the problem previously described, except that the critical damage to the car can be much more severe, difficult to diagnose or detect, and more complex and expensive to repair. Therefore, it is suspected that many automobiles previously

involved in a crash are not adequately repaired and thus may produce serious deficiencies in performance. This problem is even more important when repair of direct, safety-related components are neglected -- such as steering, brakes, the energy-absorbing steering column, etc.

Here again, problems of owner ignorance, unawareness, neglect, or finances will result in no -- or inadequate -- repair of the crash-damaged vehicles. Insurance company experience indicates that owners will often recognize the damage, collect insurance proceeds, and still fail to have the car repaired.

INADEQUATE VEHICLE REPAIR PRACTICES

The problem of faulty and inadequate vehicle repair services was felt to exist and to threaten potentially serious consequences. But, it was also thought to be a problem which is difficult to evaluate, and about which little is known. Although most Task Force members could recall individual problems of this nature, they were reluctant to characterize the general quality of repair services offered throughout the County, much less attempt to link faulty repairs to crash causation.

The potential problem 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 exacerbated 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.

Complaints experienced by automobile manufacturers and governmental agencies are vociferous, but interpreted to be isolated cases and thus not indicative of serious trends. However, it was suggested that the small complaint experience may only reflect the owners' inability to detect or evaluate faulty repair service or the owners' lack of motivation to file a formal complaint with an ill-defined source.

To the extent to which the problem may exist, the following were offered as possible reasons:

- 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 advertized low cost.

TASK FORCE PROBLEM PRIORITIES AND CHARACTERIZATION

Problem Area: Roads and Roadway Environment (Pre-Condition, Pre-Crash, Crash, and Post-Crash Phases)

Observations from the Deliberations of
Task Force V

Problems Considered:

1. Road Use: Traffic Density and Composition
2. Road and Environmental Dynamics
3. Road Condition
4. Roadside Furniture and Accessories
5. Miscellaneous Environmental Factors

INTRODUCTION

This is a summary of the meetings of Task Force V, which focused on the role of the road and its related environment in the causation of crashes and in crash severity. This role was examined in the pre-condition, pre-crash, crash, and post-crash phases.

As with all task forces, this group met twice: first to participate in an unstructured discussion of the various problems; secondly, to react to the HSRI analyses of the Oakland County crash data and the survey questionnaire.

The individuals comprising this Task Force were familiar with a number of studies attempting to identify deficiencies in the roadway and surrounding environment, and they were quick to admit that a number and variety of problems existed. The group did agree that problems in this area often were important factors in determining the severity of the crash; but they initially were reluctant to attribute the recognized deficiencies to highway crash causation. In addition, the enormity of the road-related problems seemed to so overwhelm the group that they appeared to retreat to an approach which emphasized the priority of problems that they felt might be easier and less costly to remedy.

The group concluded that many problems encompassed within the road and roadway environment often served as important contributors to both crash causation and crash severity, and therefore should be considered of priority in the County's overall highway safety needs. They further agreed that the driver/pedestrian-related problems of induced impairment and attitude ought to be of higher priority.

In examining problems within this roadway area, the Task Force found it difficult to specify the extent to which specific road deficiencies contributed to crashes and their severity. It is evident, however, that there are a multitude of deficiencies -- many

of which stem from the rapid pace of urbanization within the County and the lagging rate in the development, expansion, and maintenance of its transportation system. This transportation system is heavily taxed by transport needs relative to rapid population growth in urban/suburban areas, an immense commuter traffic traveling relatively long distances for recreation and occupation, and a large amount of transit traffic going through the County in route between the metropolitan Detroit area and outstate Michigan.

The rapid growth and continuing change in Oakland County has created some severe problems in highway transportation. Highway planners are over-burdened with needs to improve existing roadways and to design new roads. Furthermore, highway plans are often prematurely obsolete because of changes in land use adjacent to the roadway. On the other hand, it seems that land use planning and development has not given 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 maintenance problems, which then have to compete for attention among the other roadway problems. Constant growth and change -- with heavy traffic demands on roads often inadequate to the high demand and type of traffic -- have seriously saturated the ability of the County's highway network to safely transport people and goods.

In Oakland County, the accident rate increases and the severity rate decreases as the population density increases. Principal road factors in crash causation might be:

1. road use: defined as traffic density, congestion, over-capacity, and major traffic spillover on to secondary routes;
2. road dynamics: in terms of poor traffic flow due to road design, abutting land use, and road use; and

3. condition of the roadway: in surface traction and state of repair, obstacles, lighting and visibility, shoulders, lane markings, inclement weather, etc.

Accident severity, which increases as population density decreases, is related to road factors such as: speed, geometrics, inclement weather, road surface condition, obstacles, visibility and lighting, etc.

There seemed to be general agreement that the following potential problems were minor in County experience: wild or domestic animals, railroad crossings, roadway debris, construction zones, previous crash sites, and disregard for traffic control devices and signs.

PROBLEM OUTLINE AND CHARACTERIZATION

- A. Road Use
 - 1. Traffic Density and Capacity
 - 2. Traffic Composition
 - 3. Purpose of Travel

- B. Road Dynamics
 - 1. Land Use--Abutting Land, Right-of-Way
 - 2. Traffic Flow
 - 3. Speed
 - 4. Various Road Types--Freeways, One-Way Streets
 - 5. Intersections

- C. Road Condition
 - 1. Road Traction
 - 2. Surface Degradation Due To Wear
 - 3. Temporary and Permanent Obstacles
 - 4. Lighting and Visibility
 - 5. Medians, Shoulders, Lane Markings

- D. Roadside Furniture and Accessories
 - 1. Performance Degradation Through Wear and Use
 - 2. Obstacles, Barriers, and Their Protection
 - 3. Driver Communications, Control, and Guidance

- E. Miscellaneous Environmental Factors
 - 1. Wild or Domestic Animals
 - 2. Inclement Weather--Snow and Fog
 - 3. Pedestrians
 - 4. Railroad Crossings
 - 5. Highway Debris

