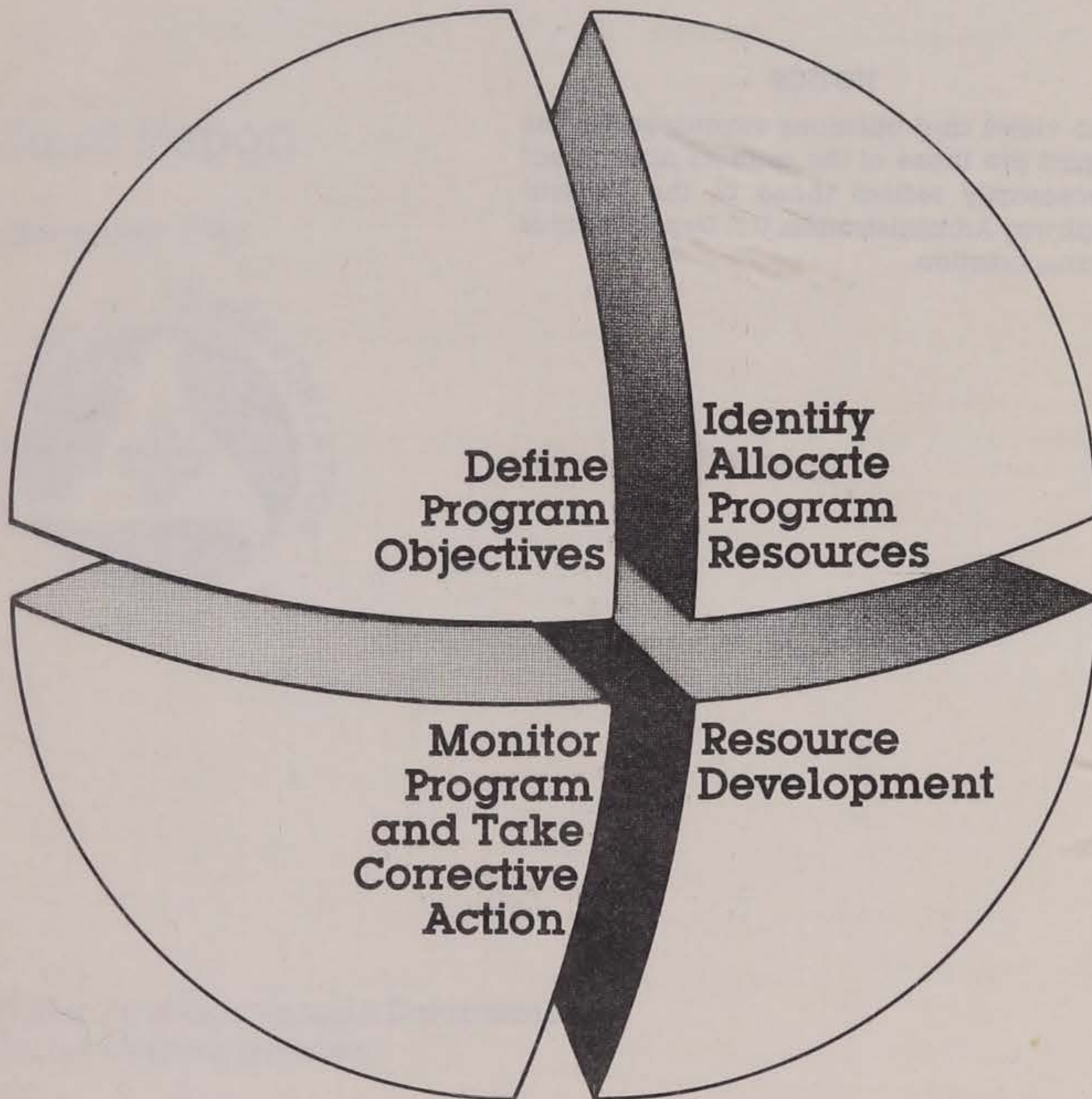


TL
285
.P63
1981

DRAFT COPY

WHITED

Planning and Monitoring the Motor Vehicle Enforcement Program



Prepared for
Office of Motor Vehicle Enforcement
Motor Vehicle Division
by
Office of Transportation Research
Planning and Research Division
Iowa Department of Transportation



November 1981

NOTICE

The views and opinions expressed in this report are those of the authors and do not necessarily reflect those of the Federal Highway Administration, U.S. Department of Transportation.

Planning and Monitoring The Motor Vehicle Enforcement Program

Final Report

November 1981



**Office of Motor Vehicle Enforcement
Motor Vehicle Division**

By

**Office of Transportation Research
Planning and Research Division
Iowa Department of Transportation**

**In Cooperation With
Federal Highway Administration
U.S. Department of Transportation**

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY.....	v
INTRODUCTION.....	viii
CHAPTER I. EXISTING ENFORCEMENT PROGRAM.....	1
1.1 Organizational Structure.....	1
1.2 Supporting Elements.....	2
1.3 Operating Procedures.....	5
CHAPTER II. EXISTING INFORMATION SYSTEMS.....	10
2.1 Management Data Base.....	10
2.2 Operational Data Base.....	11
2.3 Other Information Data Bases.....	16
CHAPTER III. TECHNIQUES TO MONITOR ENFORCEMENT ACTIVITIES.....	18
3.1 Performance Indicators.....	18
3.2 Aid to Decision Making.....	20
CHAPTER IV. OTHER STATES'S STRATEGIES - A REVIEW OF STATE-OF-THE-ART TECHNIQUES.....	21
4.1 California.....	21
4.2 Minnesota.....	22
4.3 Idaho.....	24
4.4 Georgia.....	25
4.5 Flordia.....	25
4.6 Modifications to Weighing Procedures.....	26
CHAPTER V. OPERATIONAL PLANNING PROCESS.....	28
5.1 Components of the Planning Process.....	28
5.2 Applying the Operations Planning Process.....	30

TABLE OF CONTENTS (Continued)

	<u>Page</u>
CHAPTER VI. ANALYSIS OF MOTOR VEHICLE ENFORCEMENT PROGRAM USING PLANNING PROCESS COMPONENTS.....	33
6.1 Motor Vehicle Enforcement Program Objectives.....	33
6.2 Allocate Program Resources Based on Adopted Plan.....	33
6.3 Resource Development.....	50
6.4 Monitor Program/Take Corrective Action.....	51
CHAPTER VII. CONCLUSIONS.....	53
7.1 Future Motor Vehicle Enforcement Program.....	53
7.2 Supporting Elements.....	59
7.3 Implementation.....	64

REFERENCE MATERIAL

1. Analysis and Update of the 1975 Midwest Research Institute, "Optimum Staff Size of Traffic Weight Operations", Iowa Department of Transportation, August 1980.
2. "Criteria for Evaluation of Truck Weight Enforcement," First Draft - not for release, Hugh G. Downs, NCHRP 20-5, October 1980.
3. "Motor Vehicle Size and Weight Regulations, Enforcement and Permit Operations," NCHRP 68, April 1980.
4. "Certification of Size and Weight Enforcement", Federal Highway Administration, 23 CFR Part 657 and 658, Federal Register, Volume 45, Number 154, August 7, 1980.
5. "Iowa's Weight Enforcement Program," paper presented at FHWA Symposium on Truck Weight Enforcement, October 1980.
6. "Excessive Truck Weight: An Expensive Burden We Can No Longer Support," Questionnaire Summary, U.S. General Accounting Office, CED-79-94-A, July 16, 1979.
7. "Sophisticated Weight Station in Florida," Transportation Research News, No. 92, January - February 1981.
8. "Critical Item Truck Inspection Guide," California State Highway Patrol, AAA Foundation for Traffic Safety, 1979.
9. "Volume of Traffic on Iowa's Primary Road System," 1980, Office of Transportation Inventory, Iowa Department of Transportation.
10. "Iowa Truck Weight Study," 1977, 1979, Office of Transportation Inventory, Iowa Department of Transportation.
11. W-7 Tables, Truck Weight Surveys, Minnesota, Wisconsin, Illinois, South Dakota, Nebraska, Missouri, 1977 - 1980, Federal Highway Administration, Washington, D.C.
12. "Weigh-in-Motion Systems," Radian Corporation, Austin, Texas, 1980.
13. "Overweight Vehicle Penalty and Permits, an Inventory of State Practices," U.S. Department of Transportation Federal Highway Administration, November 1979.
14. "Federal Motor Carrier Safety Regulations and Noise Emission Requirements," U.S. Department of Transportation, Federal Highway Administration, Bureau of Motor Carrier Safety, October 31, 1980.
15. Case Studies, "Highway Performance Monitoring System (HPMS) - Truck Weights and Vehicle Classification," November 1979 to April 1981, unpublished listings, Iowa Department of Transportation, Federal Highway Administration.

16. "Commerical Vehicle Miles of Travel," 1980, unpublished listings, Office of Transportation Inventory, Iowa Department of Transportation.
17. Literature and brochures from manufacturers of permanent, semi-portable and portable scales for truck weight enforcement programs, 1981.
18. "Report on Problems Associated with Overweight Trucks," Georgia State Transportation Board Meeting, June 19, 1980, James P. McGee, Director of Operations.
19. 1980 Annual Commerical Activity Report for California.
20. "Motor Vehicle Enforcement Blue Book, " Fiscal Years 1976 - 1980, Office of Motor Vehicle Enforcement, Iowa Department of Transportation.
21. "Enforcement Officers' Manual," 1976, Office of Motor Vehicle Enforcement, Iowa Department of Transportation.
22. "Citation Tape Records, July 1980 - March 1981," Office of Motor Vehicle Enforcement, Iowa Department of Transportation.
23. "Iowa Feed and Grain Directory," 1980, Iowa Grain Dealers Association.
24. "Licensed Elevators in Iowa," 1980, unpublished listing, Iowa Department of Agriculture.
25. "Code of Iowa," Chapter 321, 321 E., 1980, State of Iowa.
26. "Maintenance Status Report on Scales," Office of Motor Vehicle Enforcement, Iowa Department of Transportation, July 1980.
27. "Miscellaneous Enforcement Records," District and Central Offices, Office of Motor Vehicle Enforcement, Iowa Department of Transportation, 1980, 1981.
28. "Improving Total Productivity," Paul Mali, 1978.
29. Management A Systems and Contingency Analysis of Managerial Functions, 6th Edition, Koontz and O'Donnell.
30. "ALAS Accident Files," 1977 and 1978, Iowa Department of Transportation.
31. "Vehicle Inspection," Bureau of Motor Carrier Safety, U.S. Department of Transportation, March 1979.

EXECUTIVE SUMMARY

Purpose of the Study

This study analyzed existing weight enforcement activities. Statistical and system analyses of commercial vehicle miles of travel and enforcement data were performed. Operational planning concepts were introduced to determine if performance measures can be applied.

Conclusions

1. Productivity and effectiveness ratios can be used to measure the performance of enforcement activities.
2. An enforcement operations plan does exist, but on a unstructured basis.
3. Some deficiencies occur in existing data collection, i.e., data is not retained uniformly.

Recommendations

- (1) Establish a compliance goal.
- (2) Establish an enforcement operation plan to reach objectives. The plan should:
 - a) Distribute staff/equipment.
 - b) Estimate available trucks.
 - c) Establish enforcement objectives.
 - d) Monitor operations.
 - e) Measure results.
- (3) Establish a Motor Vehicle Enforcement Information System that provides feedback on enforcement activities, meeting standards and the office reaching objectives.
- (4) After specific responsibilities have been assigned it is important to continue improvement of knowledge, attitudes and skills of enforcement personnel.

To effectively manage an MVE program managers need assistance to cope with the complexities of their jobs. A multitude of decisions go into scheduling components of enforcement activities. In addition, MVE managers are constrained by uncertainties such as seasonal changes in traffic, weather, complex shipping patterns of traffic generators, alterate traffic routes,

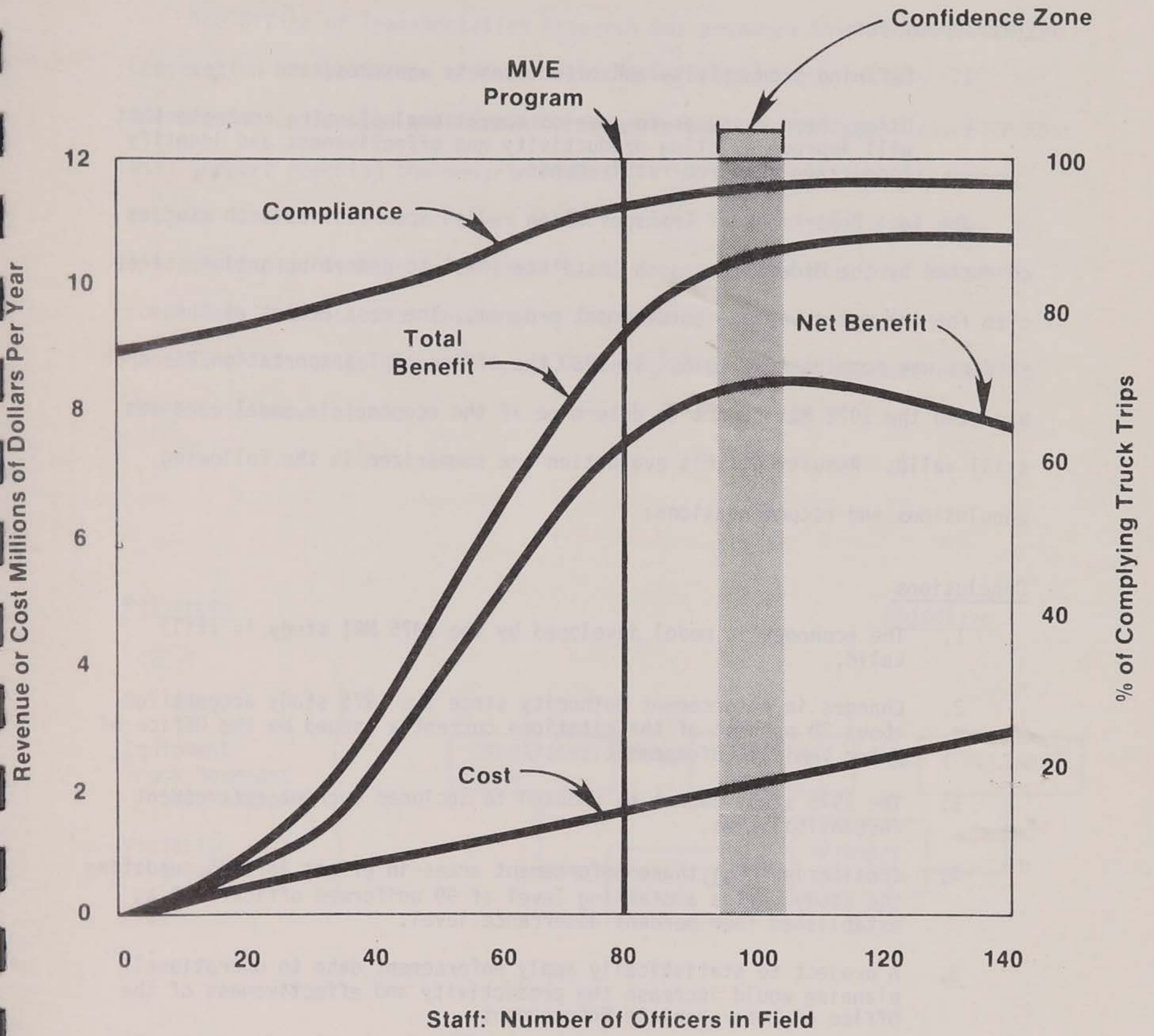
etc. All too often management must act largely on hunches and intuition. Operational planning techniques can be used to improve the quality of management decisions.

In February 1980 the Office of Motor Vehicle Enforcement requested the Office of Transportation Research to analyze the 1975 MRI report and determine if the econometric model was still valid and to update the study to reflect current motor vehicle enforcement responsibilities. The model employed a series of regression equations that relate the enforcement budget to preventive benefits. From these relationships a series of mathematical equations were used to arrive at a required staff size range. Required staff size is determined by identifying where the incremental budget cost increase is not offset by a comparable change in net benefits from prevention. Figure A is used to demonstrate this concept. The current enforcement staff level (79) is illustrated by the narrow vertical line. Data from the MRI model (shaded area) indicated 15-20 additional enforcement staff could be justified. While increasing staff is one option to improve compliance, another possibility maybe to improve the productivity and effectiveness of current enforcement personnel. Consideration should be given to applying performance measures as well as modernizing weighing equipment prior to increasing the enforcement staff level beyond 79.

This study analyzed existing weight enforcement activities. Statistical and system analyses of commercial vehicle miles of travel and enforcement data were performed. Operational planning concepts were introduced to assist the Office of Motor Vehicle Enforcement in defining productivity and effectiveness measures.

Figure A

MOTOR VEHICLE ENFORCEMENT (MVE) STAFF SIZE



INTRODUCTION

The objectives for this project are to assist the Office of Motor Vehicle Enforcement in:

1. Defining productivity and effectiveness measures; and
2. Using these measures to develop operational planning concepts that will improve existing productivity and effectiveness and identify long-range resource requirements.

The Iowa Department of Transportation relied upon two research studies conducted by the Midwest Research Institute (MRI) to determine optimum staff size for the motor vehicle enforcement program. The most recent of these studies was completed in 1975. In 1980 the Office of Transportation Research analyzed the 1975 MRI report to determine if the econometric model used was still valid. Results of this evaluation are summarized in the following conclusions and recommendations:

Conclusions

1. The econometric model developed by the 1975 MRI study is still valid.
2. Changes in enforcement authority since the 1975 study account for about 30 percent of the citations currently issued by the Office of Motor Vehicle Enforcement.
3. The 1975 study cannot be updated to include current enforcement responsibilities.
4. Considering ONLY those enforcement areas in effect in 1975, updating the study yields a staffing level of 99 uniformed officers at an established four percent deterrence level.
5. A project to statistically apply enforcement data to operational planning would increase the productivity and effectiveness of the Office of Motor Vehicle Enforcement.

Recommendations

1. A minimum staffing level of 99 uniformed officers should be established for the Office of Motor Vehicle Enforcement subject to completion of Recommendation 2.

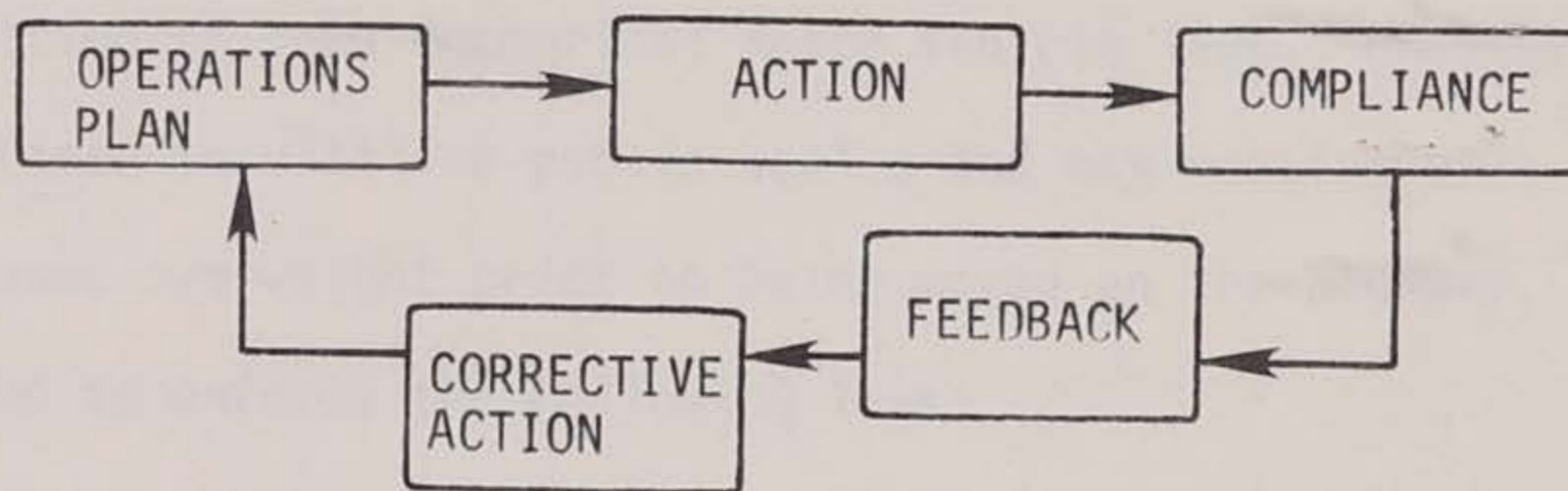
2. The Offices of Motor Vehicle Enforcement and Transportation Research should establish a project to increase the productivity and effectiveness of the Office of Motor Vehicle Enforcement based on statistical and systems analyses of enforcement program.

The Office of Transportation Research has prepared this report, with the cooperation of the Office of Motor Vehicle Enforcement, to satisfy Recommendation 2. The enforcement program is built on an operations plan that will support reaching the program mission. The mission of the enforcement program is to influence or cause motor carriers to comply with the law. An operations plan is made up of small plans or strategies that will result in compliance. A method of determining that the strategy did result in compliance must also be established. A diagram of the enforcement planning process is shown below.

Resources

People
 Building
 Equipment
 Truck Movement
 Information
 Violation
 Information
 Laws

Objective



Operations planning is deciding in advance what to do, how to do it, when to do it, and who is to do it. Although the director of the Office of Motor Vehicle Enforcement is ultimately responsible for the enforcement program,

each member of the office is responsible for contributing to the plan and helping to reach the objective. A feedback system provides information indicating that either the objective was reached or a change in the plan is necessary. The change in plan or corrective action involves changes in resources, taking action and getting feedback. The process continues until the objective is reached. This report will provide a basis for evaluating the current enforcement program and making future changes. Productivity and effectiveness evaluation measures are presented. The report is organized into seven chapters. Chapters 1 and 2 describe existing enforcement practices in Iowa. Chapter 3 introduces techniques used to monitor enforcement activities. Chapter 4 reviews enforcement strategies used by other states. The fifth chapter explains the operations planning process. Finally, Chapters 6 and 7 identify opportunities to implement various enforcement alternatives.

CHAPTER I. EXISTING ENFORCEMENT PROGRAM

1.1 ORGANIZATIONAL STRUCTURE

It is the responsibility of the Uniformed Field Enforcement Section of the Office of Motor Vehicle Enforcement to enforce laws and rules applicable to the operation of commercial vehicle on Iowa's highways. The Investigative Section is responsible for enforcement of laws and rules applicable to the licensing, titling, safety inspection and selling of vehicles in Iowa. While both areas are important, this report will focus on only the Uniformed Field Enforcement operation.

By Iowa Code, the Iowa Department of Transportation is given authority to stop, weigh and check commercial vehicles and to enforce the laws and regulations relative to the movement of these vehicles. Chapter 321.477 authorizes the Iowa Department of Transportation to designate by resolution certain of its employees as peace officers with limited to full authority to check and weigh vehicles and to make arrests for violations of Iowa Commercial motor vehicle laws. In addition Chapter 321.492 the peace officer is authorized to stop any commercial motor vehicle to find out if the vehicle and/or driver are in violation of Iowa Commercial Motor Vehicle laws. Chapter 321.465 authorizes the officer to utilize public scales and may require off-loading of any vehicles found overweight prior to being moved on the highway. MVE officers are authorized to enforce the following laws:

- a. Weight
- b. Registration (Interstate and Intrastate)
- c. Fuel
- d. Operators' Log Books
- e. Safety

- f. Driver License
- g. OMVUI
- h. Moving Violation
- i. Permit Load Violation
- j. Economic Authority
- k. Miscellaneous and Inspection
- l. Other (Provide testimony; assistance to other enforcement agencies)

Enforcement objectives and strategies are carried out through the enforcement command structure. Information is relayed from director of field enforcement services to the district captains, who in turn review assignments with the sergeants and officers located in the field. In this process the captains work very closely with enforcement officers in the field to develop enforcement strategies.

1.2 SUPPORTING ELEMENTS

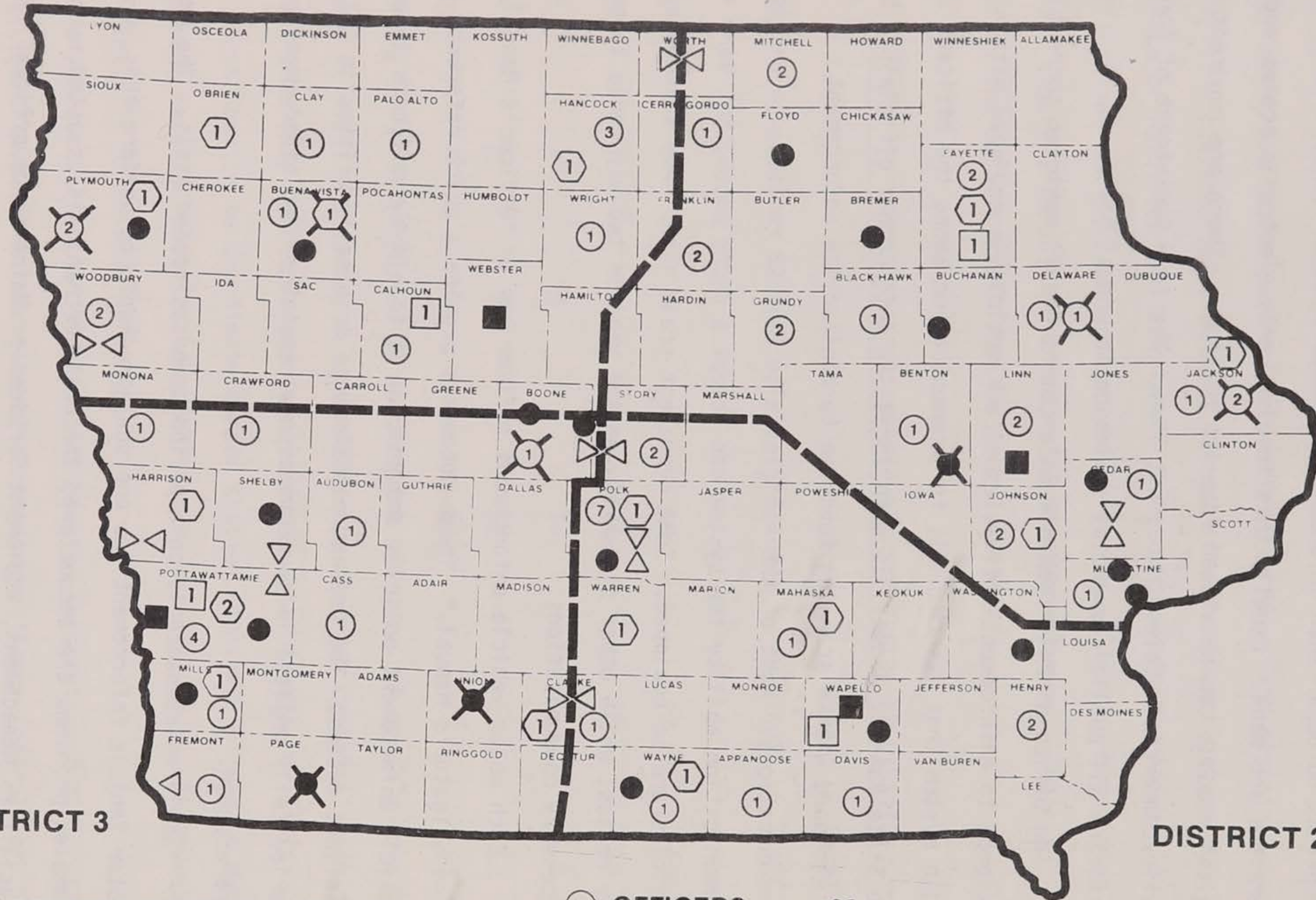
The Office of Motor Vehicle Enforcement has 37 permanent scale sites. The general locations of these permanent scale sites is illustrated in Figure 1. Of the 37 sites, 17 are located on Iowa's interstate system, while most of the remaining 20 sites are on Iowa's rural primary system. At the present time three of these sites are not being operated due to equipment or safety problems.

Portable scales are used by officers in remote areas where no other scales are available. The Office of Motor Vehicle Enforcement presently has 58 portable scales in use. The Loadometer Model "Highway Type A" scales are quite accurate (± 10 pounds), weigh approximately 95 pounds per scale, and use a mechanical weighing system. Those officers who do not have portable scales assigned and are a significant distance from an Iowa DOT permanent scale rely on public/commerical scales for weighing vehicles.

**FIGURE 1
LOCATION OF PERMANENT SCALE SITES,
OFFICERS & DISTRICT BOUNDARIES**

DISTRICT 4

DISTRICT 1



3

DISTRICT 3

DISTRICT 2

- PRIMARY ROAD SCALES - (20)
- △ INTERSTATE SCALES - (17)
- ⊗ SCALES INOPERABLE

- OFFICERS 63
- ⬡ SERGEANTS 16
- CAPTAINS 4
- ⊗ VACANCIES 6*

- DISTRICT HEADQUARTERS
- APPROX. DIST. BOUNDARY

*As of July 1981

Public/commercial scales are generally operated during an 8 a.m. - 5 p.m. 40-hour work week and are not available during evenings or weekends. Exceptions do occur when informal agreements between officers and scale operators are made. Usually this involves only electronic scales where the digital readout can be viewed from the platform. There are hundreds of public/commercial scales throughout Iowa. The Iowa Department of Agriculture certifies all public/commercial scales on an annual basis.

The Office of Motor Vehicle Enforcement has 79 vehicles currently assigned to enforcement activities. Each vehicle is equipped with a two-way radio system that has channels for communication among the officers and with the State Patrol, as well as with local law enforcement officials. Each radio is equipped with a scanning function to monitor law enforcement communications. Most of the vehicles also have CB radios. To extend its communication ability the system can accept a phone patch, but very few vehicles are so equipped. Some permanent scale sites have telephones and two-way radios, while other sites rely on the vehicle two-way radio to provide the necessary communications.

Each motor vehicle enforcement officer has an "Officer's Manual" and an "Investigator's Manual." These documents provide a quick reference of motor vehicle enforcement policies and procedures to aid the officers in performing assigned duties. The present manuals were originally written in 1976 and are periodically updated in segments as new regulatory and enforcement procedures are adopted.

Scale maintenance is on a periodic and as needed basis. The Office of Motor Vehicle Enforcement has one scale mechanic to perform this work. When complex problems are encountered the scale mechanic is assisted by staff from Facilities Management, Equipment Services or Maintenance offices. There are also instances where scale components are sent to the factory for repair or replacement.

1.3 OPERATING PROCEDURES

The state is divided into four enforcement districts (Appendix 1 identifies operational statistics), each with a district captain, sergeants (Officer IIs), and enforcement officers (Officer I). Each district also has a secretarial - clerical staff that is shared with the Investigative Section of the Office of Motor Vehicle Enforcement. The officer I and officer II classifications are part of the security unit for collective bargaining purpose. Figure 1 identifies existing district boundaries. Table 1 identifies the current staff size in each district.

TABLE 1. MOTOR VEHICLE ENFORCEMENT STAFF SIZE BY DISTRICT

District	Captain	(Officer II) Sergeants	(Officer I) Officers	Total Officers	Total Staff
1	1	4	18	22	23
2	1	4	14	18	19
3	1	4	13	17	18
4	<u>1</u>	<u>4</u>	<u>18</u>	<u>22</u>	<u>23</u>
Totals	4	16	63	79	83

See Figure 1 for distribution of enforcement officers. A monthly work schedule is usually prepared in advance by the district captain. Each district's monthly work schedule is reviewed by the Director of Field Enforcement Service to coordinate border station activity, eliminate duplicate enforcement on major routes, and coordinate major enforcement efforts such as 24-hour weekend enforcement program.

The approved schedule is distributed to the sergeants and officers. The work assigned involves either general county surveillance (patrol) or

permanent scale site operation (fixed). Currently 60 percent of the total time in motor vehicle enforcement operation is scheduled for patrol. Table 2 illustrates the mileage traveled by office staff. Data shown is the total of both patrol and fixed operations.

TABLE 2. MONEY AND MILEAGE SPENT ON OFFICIAL CARS USED
BY OFFICE OF MOTOR VEHICLE ENFORCEMENT

	Fiscal Year			
	1977	1978	1979	1980
\$ Official State Car Expense	177,029	233,264	239,363	314,731
Rate: \$ ÷ Miles	0.070	0.095	0.091	0.124
Miles of Travel By Official Cars	2,528,990	2,455,410	2,630,360	2,538,150
Estimated Mileage Traveled for Enforcement Officer	30,500	29,600	31,700	30,500

This table indicates each enforcement officer travels approximately 30,000 miles per year.

From one to three officers are assigned to fixed operations at a permanent scale site. The enforcement hours are scheduled in eight-hour increments to include some evening and weekend coverage. Where possible the fixed operations are supported by bypass enforcement to apprehend commercial vehicles avoiding the scales. Generally one or two officers are assigned to bypass enforcement. Communications are maintained between bypass activities and permanent scales sites with the motor vehicle enforcement radio system. Vehicles apprehended through bypass are generally escorted to the permanent scale sites for further checking. Portable scales are seldom used in bypass operations.

A patrol operation is used to enforce commercial vehicle laws in areas away from permanent scale sites. Enforcement hours are scheduled much the same as fixed operations, with the enforcement area generally being a county. One or more officers may be assigned to the county depending on the type of enforcement activity. Portable scales are generally used in patrol operations. Two portable scales are required for checking vehicle weights. Public/commercial scales are used for patrol enforcement where either portable scales are not available to the officer or it is more convenient. Public/commercial scales are also used where it may be necessary to validate the weights obtained with portable scales. A fee is generally charged by the scale owner for the use of public/commercial scales.

When a violation occurs the officer prepares an individual citation for each item. It is not unusual for one vehicle to receive four or five citations from a single enforcement action. During fixed and patrol enforcement operations, commercial vehicles are also checked for compliance with Iowa's safety and regulatory laws in addition to being checked for weight. Enforcement can vary from a single check for one or two items such as driver's logbook and chauffeur's license to a complete safety inspection.

Trucks with weight violations generally do not have a vehicle inspection report prepared unless an obvious safety violation is noted during the weighing operation.

A complete safety inspection takes approximately 20 to 30 minutes to perform. This does not include time that is spent by the officer explaining any violations resulting from the inspection and writing of citations. Total time, from stopping the vehicle until completion of citation writing, can take 40 to 60 minutes depending on the violations found.

Past experience has indicated that with enforcement needed in all counties and permanent scale facilities located in only 24 counties of the state, a higher percentage of enforcement hours are necessary in patrol operations. Thus, approximately 60 percent of the enforcement hours are now scheduled on patrol operations and the remaining 40 percent on permanent scale operations Table 3 identifies this split in enforcement activities.

TABLE 3. DISTRIBUTION ENFORCEMENT HOURS FY 1978 - 1980

FY	Fixed	%	Patrol	%	Total
1978	56,412	43.4	73,678	56.6	130,090
1979	53,277	41.6	74,756	58.4	128,033
1980	54,454	42.0	75,111	58.0	129,565

The ratio of fixed/patrol operations varies from district to district. Table 4 demonstrates this shift.

TABLE 4 FIXED/PATROL ENFORCEMENT HOURS BY DISTRICT FOR F.Y. 1980

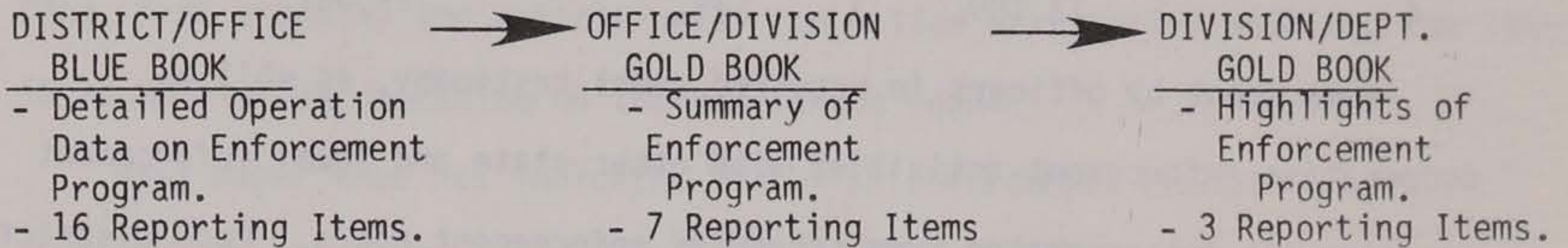
District	Enforcement Hour-Fixed	%	Enforcement Hours-Patrol	%
1	15,433	40	23,378	60
2	13,619	50	13,434	50
3	13,213	41	19,212	57
4	12,189	39	19,087	61

Time spent by officers in required court testimony, as well as cooperative enforcement activities with other state and local enforcement agencies, is not separated from scheduled enforcement hours. Each district also maintains some weekend surveillance. During fiscal year 1980 approximately 8 percent of the total enforcement hours were scheduled for weekends.

CHAPTER II EXISTING INFORMATION SYSTEMS

2.1 MANAGEMENT DATA BASE

The present management reporting system of the MVE office is represented in the following diagram:



Gold book is a monthly reporting system used to summarize data from each enforcement district. This report displays information on a year-to-date basis and enables Iowa DOT management to monitor the MVE program. Blue book is used by the administrative staff of the Office of Motor Vehicle Enforcement, Motor Vehicle Division, and the Iowa DOT Director's Office to monitor operations. The system utilizes a performance evaluation technique where objectives are established for each enforcement district on a monthly and line-item basis. Enforcement information is compiled from various data sources in the Office of Motor Vehicle Enforcement and a comparison is made against the established objectives to identify the level of performance. Two formats are prepared for the Blue Book; one on a monthly basis and the other on a cumulative monthly basis.

The present method for compiling information for Gold Book and Blue Book is to manually consolidate data from sergeants' and officers' weekly reports and the district captain's monthly report.

2.2 OPERATION DATA BASE

Management has access to previous monthly schedules and citation records to aid in the development of next month's work assignments and to evaluate present enforcement activities.

An example of the monthly schedule prepared by each district is illustrated in Figure. 2. The format of the schedule is the same for each district. Holidays, training sessions, district meetings or central office meetings are identified in the format. The schedule also includes a five-day work week for each officer that identifies, by each eight-hour time block, the location for scheduled enforcement activities. The information lists the specific permanent scale site or the county in which a patrol operation is scheduled. Items not included in the monthly schedule are:

- a. Vacation.
- b. Other time off.
- c. Time required for district court appearance.

Several computer programs have been developed to assist the Office of Motor Vehicle enforcement in using citation data. These programs are listed in Table 5.

Figure 2

**MONTHLY ENFORCEMENT SCHEDULE FOR
JANUARY 1980, DISTRICT 1**

Badge No.	1 Tue	2 Wed	3 Thu	4 Fri	5 Sat	6 Sun	7 Mon	8 Tue	9 Wed	10 Thu	11 Fri	12 Sat	13 Sun	14 Mon	15 Tue	16 Wed	17 Thu	18 Fri	19 Sat	20 Sun	21 Mon	22 Tue	23 Wed	24 Thu	25 Fri	26 Sat	27 Sun	28 Mon	29 Tue	30 Wed	31 Thu
T110	Holiday	7 am 19	6 am S13	7 am S3	Off	Off	7 am 96	6 am 22	7 am S3	7 am 34	7 am S13	Off	Off	4 pm S3	4 pm S13	2 pm S58	2 pm S3	2 pm S13	2 pm S58	2 pm S13	Off	Off	8 pm S3	8 pm S58	8 pm S13	Off	Off	7 am 33	6 am S13	7 am 22	7 am S3
T111	Holiday	7 am 33	6 am S13	7 am S3	Off	Off	7 am 19	6 am 22	7 am S3	7 am 3	7 am S13	Off	Off	4 pm S3	4 pm S13	2 pm S58	2 pm S3	2 pm S13	2 pm S58	2 pm S13	Off	Off	8 pm S3	8 pm S58	8 pm S13	Off	Off	7 am 33	6 am S13	7 am 22	7 am S3
T112	Holiday	7 am 3	6 am S13	7 am S3	Off	Off	7 am 33	6 am 22	7 am S3	7 am 96	7 am S13	Off	Off	4 pm S3	4 pm S13	2 pm S58	2 pm S3	2 pm S13	2 pm S58	2 pm S13	Off	Off	8 pm S3	8 pm S58	8 pm S13	Off	Off	7 am 33	6 am S13	7 am 22	7 am S3
T114	Holiday	7 am S38	6 am 17	6 am S39	Off	Off	6 am 66	7 am S39	7 am 17	7 am S13	6 am S38	Off	Off	7 am 98	7 am 66	7 am S39	7 am 17	6 am S13	Off	Off	3 pm S39	3 pm S13	4 pm S38	2 pm S13	2 pm S39	2 pm S38	2 pm S39	Off	Off	8 pm S38	8 pm S13
T115	Holiday	7 am S38	6 am 17	6 am S39	Off	Off	6 am 17	7 am S39	7 am 17	7 am S13	6 am S38	Off	Off	7 am 98	7 am 34	7 am S39	7 am 17	6 am S13	Off	Off	3 pm S39	3 pm S13	4 pm S38	2 pm S13	2 pm S39	2 pm S38	2 pm S39	Off	Off	8 pm S38	8 pm S13
T116	Holiday	7 am S38	6 am 17	6 am S39	Off	Off	6 am 45	7 am S39	7 am 17	7 am S13	7 am S38	Off	Off	7 am 98	7 am 45	7 am S39	7 am 17	6 am S13	Off	Off	3 pm S39	3 pm S13	4 pm S38	2 pm S13	2 pm S39	2 pm S38	2 pm S39	Off	Off	8 pm S38	8 pm S13

TABLE 5 DESCRIPTION OF EXISTING DATA PROCESSING

PROGRAMS - CITATION DATA

Program Number	Program Name	Program Description
P8421000	Card to Tape	Provides a format to transfer card data to magnetic tape for record retention and processing. Month and year of coding are entered on this record.
P8421020	Detail Citation List	Provides a detailed listing of all citations issued. Data on listing include the following: citation number, owner's name, city, state, fine, costs, violation code, additional fees, disposition, month and year. Program can be run by month or for any series of months.
P8421040	Yearly Citation Summary	Provides a summary listing of all citations by violation codes. Data on listing includes violation code, number of violators, fines, costs, additional fees and total costs. Program can be run for a single month, combination of months, or a year.
P8421060	Excessive Violations/ Fines Listing	Provides a summary listing of motor carriers with six or more violations and/or fines of \$300 or more. Data listing includes owner, violating code, citation number.

Table 5, Continued --

P842107	Citation Summary by Vehicle Type	Fines, cost and additional fees. Program can be run for single month, combination of months or year. Provides a summary listing of the number of violations, fines, costs additional fees and total costs for 14 vehicle types. Program can be run for single month, combination of months or year.
P842108	Citation Summary by County	Provides a summary listing of the number of violations within each violation code by county. Data includes fines, costs, additional fees and total costs. Monthly, combination of months or year's summary are available.
P842109	Citation Summary by Officer Badge Number	Provides a summary listing of the number of violations within each violation code by officer badge number. Data includes fines, costs, additional fees and total costs. Data may be listed for one or more officer or all officers. Monthly, combination of months or yearly listings are available.

Each citation issued by a motor vehicle enforcement officer is coded and retained on computer tape. Table 6 identifies the data coded from the citation.

TABLE 6. CITATION DATA RETAINED ON COMPUTER TAPE

Item	Column	Typical Data
1. Citation Number	1 - 7	A142982
*2. Owner's Name	8 - 32	World Grower's Alliance
*3. Owner's Address, City, State	33 - 57	Ontario, California
4. County where Citation was Issued	58 - 59	16
5. Vehicle Type	60 - 61	06
6. Officer Badge Number	62 - 64	143
7. Fine	65 - 70	\$20.00
8. Costs	71 - 75	\$6.00
9. Violation Code	76 - 78	241
10. Additional Fees	79 - 84	\$10.00
11. Disposition Code	85	1

*If owner is different from driver, this information is written on citation by arresting officer. The coded citations are processed on a monthly basis.

2.3 OTHER INFORMATIONAL DATA BASES

The inspection report provides a record of inspection activities conducted by the officer. Carrier regulations, licenses, fuel permits, drivers' logs and 45 specific safety violations are included in this report.

A copy of each inspection report is sent to the Federal Highway Administration for submittal to the Federal Office of Motor Carrier Safety. Another copy is maintained on file by the Office of Motor Vehicle Enforcement. It should be noted that at the present time none of the inspection information is coded or processed for computer tabulation.

Records are also maintained in the Motor Vehicle Enforcement district offices. For example, District 3 has initiated a record system to monitor enforcement activities at its permanent scale sites. Table 7 illustrates the type of data collected.

TABLE 7. SCALE OPERATION RECORDS, DISTRICT 3
STATION 28, AVOCA N. JULY 1980

Item	Week 1	Week 2	Week 3	Week 4	Week 5	Total
Hours Open	29	46	38	32	11	156
Vehicles Counted	1,068	1,821	1,391	1,300	367	5,947
Enforcement hours	58	196	70	79	30	433
Vehicles in Violation	29	54	41	34	12	170
Violations	51	109	54	63	27	304
Warnings	15	33	9	9	15	81

Data from this record is maintained on a weekly basis for each permanent station and summarized for the month and year.

This information is utilized to identify enforcement hour efforts and hours of scale operation to support making operational changes in the District 3 enforcement program. Other districts maintain a similar type of record on each permanent scale operation but not as detailed as that of District 3.

The Office of Transportation Inventory conducts a biennial traffic counting program on Iowa's primary and interstate network. The results of this program are published in a Traffic Book. The Traffic Book contains average daily traffic volumes for each primary and interstate route. Also identified is the percent of commercial vehicles. The most current traffic book available is for 1980. A biennial truck weight survey program is also conducted by the Office of Transportation Inventory. Twenty locations are included in the survey, of which

nine are permanent scale sites. The survey data is compiled into a report entitled "Iowa Truck Weight Study". The most recent survey is for 1979.

It should be noted Iowa is one of nine states selected for a special case study in cooperation with the Federal Highway Administration. The studies, entitled "Highway Performance Monitoring System" (HPMS) and "Truck Weights and HPMS Vehicle Classification" are being conducted for one year. The studies began November 1, 1980, and will be completed October 31, 1981. These studies focus on collecting traffic counts and weight data on weekdays and weekends throughout the entire year. They are expected to provide more reliable information on the seasonal and daily variations in commercial traffic.

CHAPTER III. TECHNIQUES TO MONITOR ENFORCEMENT ACTIVITIES

3.1 PERFORMANCE INDICATORS

Performance indicators are those measures adopted by management to evaluate specific key items. Often target values or benchmarks are assigned to indicators so an objective evaluation of system performance can be conducted. Performance measures are important factors in determining if available resources are being used to the fullest extent possible.

The mission of the uniformed field enforcement operation is to cause maximum motor carrier compliance with Iowa law. The August 1980 analysis and update of the 1975 Midwest Research Institute's "Optimum Staff Size of Traffic Weight Operations" presented the following ranges of staff size based on several assumed levels of undeterred violators*:

Percent of Undeterred Violators	Range of Required Staff Size
4	99 ± 5
5	90 ± 5
6	76 ± 5

The above figures are required staff size levels that are for the enforcement of overweight, oversize, registration and fuel tax regulations.

Staff levels are based on an econometric evaluation that compares staff size and corresponding budget levels to estimated dollar benefits accrued from reducing the level of non-compliance. While the MRI study compared the cost of increasing the MVE staff with the dollar benefits of reducing damage to roads, the study did not evaluate the efficiency of existing enforcement operating procedures.

*Undeterred Violators - defined in this report as the number of violators who, no matter what enforcement strategy is undertaken, will still violate the law.

Compliance is the number of trucks within the limits of the law. Level of compliance can also be thought of as the percent which do not comply, or trucks outside the limits of the law. The number of trucks complying with the law is an indication of the effectiveness of the enforcement activity. If compliance is high, proper enforcement strategies are being used. However, if compliance is low, corrective action must be taken. A standard, or expected level of performance, must be adopted to determine whether compliance is either high, low or acceptable. Following identification of the expected level of compliance, a method of measuring the result of actions taken to effect compliance must be established.

Two methods selected to measure performance in this project are effectiveness and productivity. The term effectiveness relates to the enforcement quality, while productivity can identify the quantity of enforcement.

Effectiveness observes the number of trucks the enforcement activity finds in violation and compares this to the number of trucks estimated to be in violation. This relationship can be shown in the following equation:

$$\text{Effectiveness} = \frac{\text{Number of Trucks Cited for Violations}}{\text{Number of Trucks Estimated to be in Violation}}$$

The relationship between non-compliance and effectiveness is not linear. The curve that the effectiveness ratio would be expected to follow cannot be defined. However, as the effectiveness ratio approaches 1, compliance increases and violators decrease. However, an optimum level is soon reached where further increases in enforcement activity will no longer increase compliance.

Productivity is used in conjunction with effectiveness to measure performance. Productivity relates to quantity and is demonstrated in the following equation:

$$\text{Productivity} = \frac{\text{Number of Trucks Measured}}{\text{Estimated Truck Traffic}}$$

This ratio allows levels to be established that will ensure compliance with Iowa's motor carrier laws.

3.2 AID TO DECISION-MAKING

Performance measures allow decision makers to get a better look at the operation, which will in turn have a direct bearing on the quality of the enforcement program. For example, performance measures will help highlight areas needing attention. They will also establish trends and allow for objective assessment of enforcement strategies used in the program.

CHAPTER IV. OTHER STATES' STRATEGIES - A REVIEW

OF STATE-OF-THE-ART TECHNIQUES

Various states have modified their enforcement activities to meet the ever-changing environment in which enforcement activities operate. The following is a brief synopsis of several states with advanced enforcement programs:

4.1 CALIFORNIA

With the volume of truck traffic increasing and an increase in the accident rates of trucks in California, there was a definite need to inspect more vehicles as a preventive measure. In response to this trend the California Highway Patrol (CHP) developed a "Critical Item Truck Inspection Guide" to maintain an effective level of enforcement on vehicle inspection that would reflect the increasing number of trucks on the highway and at the same time reduce the person-hours required for inspection. Prior to developing this guide the CHP conducted a detailed study of over 3,000 truck accidents to determine those mechanical defects that were most frequently identified as the major contributing cause in these accidents. Based on this analysis the following items were identified:

- a. Brakes;
- b. Steering;
- c. Tires;
- d. Wheels;
- e. Drawbars; and
- f. Fifth Wheels.

These defect areas became the focus of the "Critical Item Truck Inspection."

Drivers' logs were also included since there is a critical relationship

between driver fatigue and accident probability. In addition, the guide contains valuable hints and procedures to follow in conducting the inspection.

After developing the "Critical Item Truck Inspection Guide," the CHP reduced the time for vehicle inspection by 10 minutes. This enabled the CHP to increase the number of vehicles inspected during 1980 to 385,309, compared to 343,341 in 1979. This 12.2 percent increase was accomplished with a 2.5 percent reduction in total working hours. But even more important, during the first eight months of 1980 accident records indicated an 18.68 percent reduction in truck-at-fault collisions reported by the California Department of Transportation. The primary collision factor of defective brakes was reduced by 27.76 percent in those accidents, a very significant decrease.

The CHP has also initiated seminars on its "Critical Item Truck Inspection" program. These training seminars provide a three-to five-day classroom and "hands-on" instruction at one of their inspection facilities. They have found that this program is beneficial to the trucking industry. Over 60 industry representatives have attended the inspection seminars and many have incorporated an inspection into their operations.

The CHP also developed an automated enforcement data base. This data base provides computer-generated tables that identify enforcement activities on a quarterly basis, by station, division, and type of activity. With eight divisions, 10 vehicle inspection facilities, 88 mobile enforcement areas and 36 platform scale sites, they have found this information extremely valuable in evaluating enforcement activities throughout the state, planning future enforcement programs and management of these programs.

4.2 MINNESOTA

The State of Minnesota has recently installed an electronic scale system at two sites on I-35 just south of Minneapolis.

Truck traffic is controlled by manually operated traffic signals that display a red light during the weighing operation and a green light if the vehicle is legal. A violation is automatically printed and the driver is given further direction through a loud speaker system. Minnesota uses three persons during the scale operation. Two are weights and measures technicians that weigh the trucks and assist in conducting inspections, while the third is a peace officer who writes the necessary citations.

Gross vehicle weights are electronically displayed on a cathode-ray tube CRT mounted in a console. The console includes a printer that prints a scale ticket showing the weight on each platform scale, total gross weight of the vehicle, and time and date. Preprinted information on the scale location and highway can also be made available on the ticket. For overweight violations the citation number can also be entered.

Scale tickets can be printed on either an automatic or manual mode. The automatic mode is set up for the five-axle truck tractor trailer combination where no special axles are observed. The manual mode is utilized for special vehicles and the operator can enter identification data on type of axle groupings being weighed. The following printout illustrates these modes:

MANUAL PRINT MODE

TIME 10:58:01 DATE 04/21/81

CITATION 000000

```

◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆
◆ SCALE#4 ◆ ◆ SCALE#3 ◆ ◆ SCALE#2 ◆ ◆ SCALE#1 ◆
◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆

```

----- TRAFFIC DIRECTION ----->

```

SCALE#1 +000000LB
SCALE#2 +000000LB
SCALE#3 +000000LB
SCALE#4 +000000LB
TOTAL +000000LB

```

AUTOMATIC PRINT MODE

TIME 10:57:13 DATE 04/21/81

CITATION 000000

```
◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆
◆ SCALE#4 ◆ ◆ SCALE#3 ◆ ◆ SCALE#2 ◆ ◆ SCALE#1 ◆
◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆ ◆◆◆◆◆◆◆◆◆◆◆
```

----- TRAFFIC DIRECTION ----->

SCALE#1 +000000LB

SCALE#2 +000000LB

SCALE#3 +000000LB

SUBTOTAL +000000LB (2 & 3 ONLY)

SCALE#4 +000000LB

TOTAL +000000LB

4.3 IDAHO

The state patrol in Idaho presently has two portable weigh-in-motion (WIM) systems in operation and plans to purchase two additional units. Idaho has operated the portable systems for approximately six months and has been pleased with their performance. Their major problem has been servicing. The system is made in West Germany and the only U.S. distributor at this time is located in Massachusetts.

They use a three-to four-man team to operate the system, with one person involved in weighing while the remaining officers are conducting inspections, doing static weighing and writing citations. They indicated that if only weight were being checked the operation could be handled by one person. They have found that while the system can be operated from the car battery, a preferred power source is a portable generator.

The Idaho State Patrol also has four permanent WIM installations at ports of entry on their interstate system. With the WIM capability they are able to have a 24-hour operation with approximately the same

Salary/support costs encountered in an eight-hour day using conventional static scales.

4.4 GEORGIA

Georgia experimented with a reduced crew size in individual enforcement teams in 1979. It was determined an effective weighing operation could be performed with only two officers. Subsequently, with reduced crew size, new enforcement teams were created. Georgia also tested a one-officer concept at one of its permanent weigh stations. Of course it is recognized that with one officer only weight can be checked, but this is considered the top priority of the enforcement assignment. With the splitting of crews and adopting a more aggressive posture, the number of vehicles actually weighed for December 1979 through May 1980 increased 35 percent over the same period of the previous year.

4.5 FLORIDIA

In mid-1980 the Florida Department of Transportation installed one of the most advanced permanent scale systems available. The system is on Interstate 10 west of Tallahassee. A single officer can weigh and communicate with trucks on either side of the interstate highway. The system was developed by the Toledo Scale Manufacturing Company of Toledo, Ohio. Its design includes a major control tower on one side of Interstate 10 with a smaller security building on the opposite side.

The system includes fully electronic scales combined with a mini-processor computer connected to a CRT display, and monitoring equipment. While driving onto the scale the trucker faces a red light. The weights of each axle are stored in the mini-computer, displayed on the CRT, and automatically compared against the state's legal weights. If the truck is within legal limits the signal automatically changes to green, allowing the

trucker to proceed. If the truck exceeds the legal limits the light remains red and the trucker is advised of the violation and a citation is prepared automatically.

One officer can operate the system through the use of a closed circuit television system that monitors truck traffic. Each side has two television cameras equipped with zoom, vertical and horizontal scanning capabilities. Through the video system trucks can be viewed for safety defects, proper registration data and proper alignment on the scales. This, combined with audio communication between officer and trucker, allows both scales to be operated at the same time.

The system was built in conjunction with the mainline construction of Interstate 10. According to information from the Florida Department of Transportation, the total system cost was around \$450,000. Of this total the electronic scales, television cameras, mini-computer and monitoring equipment was approximately \$250,000.

The Weight Bureau of the Florida Department of Transportation is satisfied with the system and finds the one officer concept working quite well. They are planning further refinements in this sophisticated system at another interstate weigh station where WIM equipment will be installed to monitor and screen trucks. Those trucks within legal limits will slow to approximately 30 mph for screening but will not be required to stop.

4.6 MODIFICATIONS TO WEIGHTING PROCEDURES

1. Several states have adopted a strategy that allows empty trucks to bypass scales to increase the capacity of permanent scales. Some states have few problems with the concept; other states have installed a "bump" on the bypass route to verify the trucks' status.
2. Weigh-in-motion incorporated in a permanent scale operation allows

screening of potential overweight trucks. Accuracy is within 2 to 5 percent of total axle weight.

3. Minnesota enacted a law in 1980 that requires shippers or receivers of goods to maintain written records of the origin, weight, and composition of each shipment, including the date of loading, name and address of shipper, and the registration number or other means of vehicle identification by which the shipment was transported. Such records are to be retained for 30 days and open to inspection and copying by state law enforcement officers. All records found in violation of Minnesota's weight laws will be subject to appropriate penalties and fines. During the first five months of the law approximately 135 overweight cases were processed.

V. OPERATIONS PLANNING PROCESS

5.1 COMPONENTS OF THE PLANNING PROCESS

The operations planning process involves a series of components directed toward achieving the enforcement program mission. The components of the planning process are:

Phase 1 - Define Program Objectives.

Phase 2 - Develop Strategies to Reach Program Objectives.

Phase 3 - Train Personnel.

Phase 4 - Monitor Program and Take Corrective Action.

Phase 1 of the planning process defines the objectives. A more detailed description of each phase of the planning process follows.

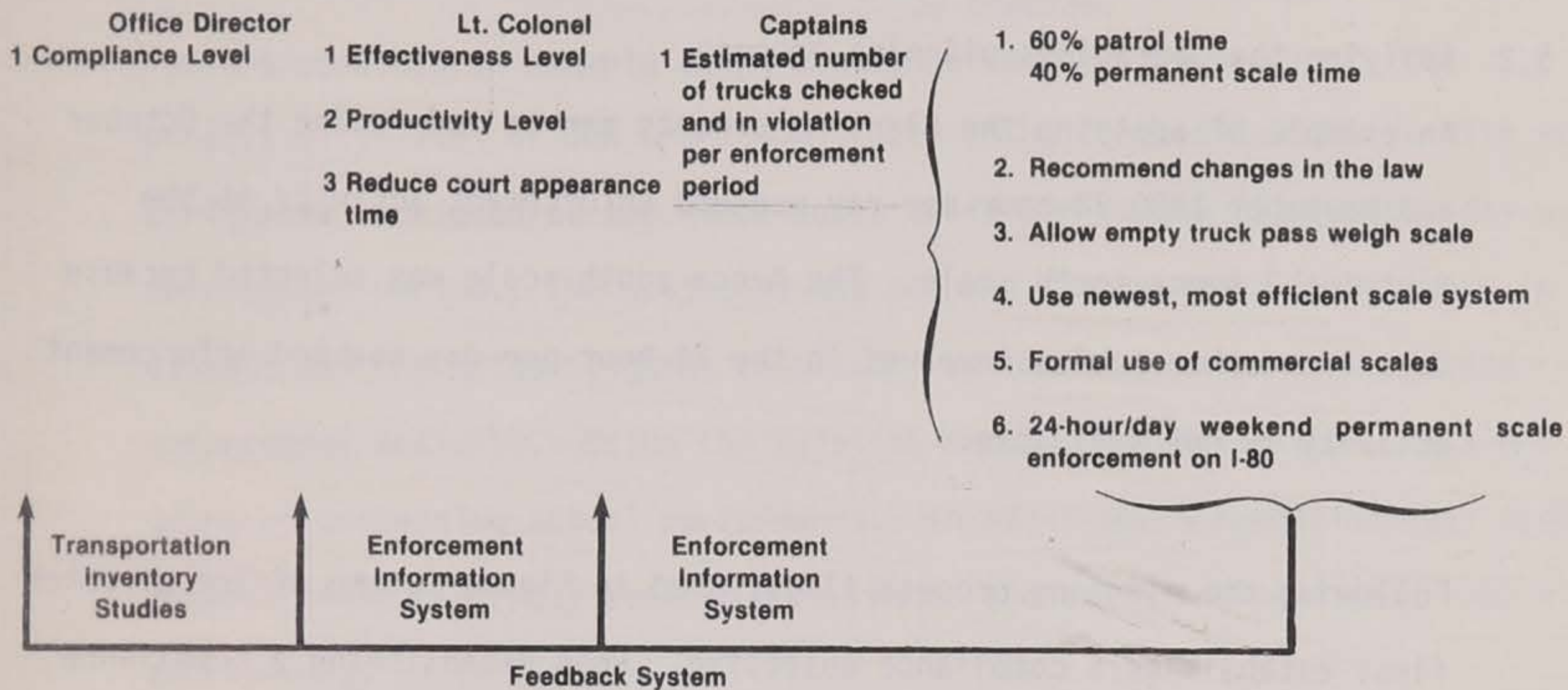
Phase 1 -

The mission of the Office of Motor Vehicle Enforcement Uniformed Field Officer Section, is to "cause motor carriers to comply with the law." This mission statement provides a basis to develop objectives that will cause compliance. An objective is the end toward which the enforcement activity is aimed. Developing objectives involves the office director, lieutenant colonel, captains and sergeants. Although objectives will be different for each of the levels listed above, all of the objectives will support the mission. Figure 3 illustrates the relationship between the mission of the Office of Motor Vehicle Enforcement and objectives developed at levels within the office.

FIGURE 3
OPERATIONS PLANNING PROCESS MISSION:
Cause Motor Carrier Compliance

OBJECTIVES

STRATEGIES



Phase 2 -

Once the objectives have been developed and agreed upon, enforcement strategies can be developed. An enforcement strategy is a general program of activity designed to reach objectives.

Phase 3 -

Employee training and development must occur on a continuing basis. Employee training is critical to work toward MVE objectives. A comprehensive, on-going training program must be established and maintained.

Phase 4 -

In order to determine that objectives have been reached and the mission is being accomplished, an information system must be established to feed back actual performance resulting from strategies. Timely and accurate information must be given to those people responsible for establishing objectives and

strategies so informed decisions can be made to either continue the existing strategy or adopt a new strategy.

5.2 Applying the operations planning process

An example of applying the planning process can be made using the October and November 1980 24-hour-per-day weekend enforcement activity at the District 3 Avoca south scale. The Avoca south scale was selected because data from other scales involved in the 24-hour-per-day weekend enforcement activity is not available.

Following the planning process illustrated in Figure 3, the office director first establishes a compliance objective. When establishing a compliance objective the office director should use all available sources of data. The Office of Transportation Inventory obtains information on commercial truck travel and weight. In 1979 the Office of Transportation Inventory identified 14.89 percent of all trucks weighed were in excess of Iowa weight laws. Another source of information is the motor vehicle enforcement activity results provided to the Federal Highway Administration. In fiscal year 1980 it was reported that 2.3 percent of all the trucks checked were in violation of Iowa weight laws. In addition to the two sources of information discussed above, the office director should use historical data and any information available from other states and federal reports when establishing an initial compliance objective. Care should be taken to ensure the information sources used are consistent and apply to Iowa laws. Once the office director establishes a compliance level (for this example assume 90%), the remaining members of the management team can establish objectives and develop strategies for enforcement staff. Typical responsibilities could include:

Management Level

Duties

Lieutenant Colonel.....Establish effectiveness and productivity levels.
 Captain.....Establish minimum number of trucks to be checked.

Table 8 combines an example using assumed effectiveness level of 70%, productivity level of 80% and 1,500 trucks to be checked in 24 hrs. with actual performance achieved at the Avoca south scale during the 24-hour-per-day weekend enforcement period. The projected and planned figures were established in the example and the actual figures resulted from the 24-hour-per-day weekend enforcement activity. Using the existing manual feedback system, data was gathered concerning actual performance. In addition, a comparison was made between 24-hour-per-day weekend performance and average fiscal year 1980 eight-hour-per-day performance.

TABLE 8. COMPARISON OF PRODUCTIVITY AND EFFECTIVENESS, 24-HOUR PER DAY WEEKEND ENFORCEMENT, DISTRICT 3, AVOCA S. SCALE

Time Period	Estimated Truck Traffic	Projected Trucks Checked	Actual Trucks Checked	Productivity		Estimated Trucks in Violation	Number of Trucks Cited	Effectiveness	
				Planned	Actual			Planned	Actual
24-Hour/Day Weekend Enforcement	1,862	1,500	1,526	80%	82%	186	121	70%	65%
Average FY 1980 8-Hour/	621	..	342	..	55%	62	10	..	16%

As Figure 3 illustrates, a feedback system is necessary to measure the effect of strategies on reaching the compliance level objective established by the office director. Measuring the effect of strategies on reaching a compliance level objective takes place over an extended period of time. Interim regional studies can be conducted to identify the effect of strategies.

TABLE 8. COMPARISON OF PRODUCTIVITY AND EFFECTIVENESS, 24-HOUR PER DAY WEEKEND ENFORCEMENT, DISTRICT 8, AVOGA 8 SCALE

CHAPTER VI. ANALYSIS OF MOTOR VEHICLE ENFORCEMENT PROGRAM USING PLANNING PROCESS COMPONENTS

6.1 MOTOR VEHICLE ENFORCEMENT PROGRAM OBJECTIVES

The mission identified by the Office of Motor Vehicle Enforcement is to enforce laws to cause maximum compliance by motor carriers. The performance measures are effectiveness and productivity. While there are several strategies that can be implemented to accomplish the mission, the Office of Motor Vehicle Enforcement uses the following:

- (1) Mixture of patrolling and fixed enforcement operations; and
- (2) Weekend enforcement.

6.2 ALLOCATE PROGRAM RESOURCES BASED ON ADOPTED PLAN

The visibility of the weigh scale usually generates a positive reflection from the general public (i.e., public perceives scales as an enforcement deterrent). On the other hand, the percent of motor carriers that are in violation view fixed scales as something that can be easily avoided. The Office of Motor Vehicle Enforcement uses a mixture of 40 percent fixed with 60 percent for patrol as an enforcement plan. In addition, eight percent of the enforcement officers will occasionally shift to weekend enforcement. A detailed evaluation of the enforcement plan cannot be made at this time because the computerized citation record does not separate the fixed scale and patrol activities.

However, the special enforcement program conducted in October and November 1980 demonstrates how a change in strategy (plan) can affect the results of an enforcement activity.

The following criteria was considered in evaluating the existing 37 fixed scales:

- (1) availability of motor carrier traffic;
- (2) ease of avoidance by motor carrier traffic.
- (3) safety of sites as it relates to traffic conflicts;
- (4) maintenance of equipment and its effect on enforcement operations plan;
- (5) general physical condition of facility.

Of these items, 1 and 2 play an important role in determining how efficiently the scale can operate.

Standards establishing the minimum level of truck traffic and enforcement activity must be developed in order to plan for building new scales, upgrading existing scales and deleting scales from the enforcement system. For this report, standards were set at 1) 600 trucks per day minimum passing the scale (California study); and 2) capable of weighing 100 trucks per hour minimum.

The standards were applied by establishing that:

- (1) if one condition exists, a detailed review of the scale operation should be completed.
- (2) if both conditions exist, the operations plan should be changed to reduce the amount of time the scale is open.

Table 9 compares the fixed scales in each district using the above conditions.

All districts schedule a 40-hour work week in their operations. A technique used in all districts except District 1 is "PK", or pick location. Some districts had up to 20 percent of their person-hours scheduled "PK" in fiscal year 1980. For example, in District 3 for July 1980 of the 418 total person-days, 73 (17.5 percent) were "PK" locations. To provide documented data illustrating total hours scheduled for permanent scales and patrol activities, the monthly schedule for fiscal year 1980 was summarized for District 1. Figures 4, 5, and 6 illustrate the total person-days scheduled in District 1 by patrol, permanent scale and county total for fiscal year 1980.

TABLE 9

Scale	No.	Dist.	1980 Truck Volume		Est. Weighing Capacity Vehicle/Hour	Rating System				Summary E'
			Est. ADT	Est. Peak Hour		A' Avoidance	B' Safety	C' Maintenance	D' Facilities	
Atkins	01	1	1,402	140	80	1	1	1	1	1
Cedar N.	07	1	2,573	257	240	2	4	0	4	3.2
Cedar S.	08	1	2,574	257	240	2	4	0	4	3.2
Charles City	13	1	543	54	80	1	0	0	0	0
Denver	03	1	1,089	109	30	1	0	0	0	0
Jesup	58	1	830	83	60	1	0	2	0	0
Mechanicsville	06	1	683	68	80	1	0	0	0	0
Agency	33	2	560	56	30	1	0	0	0	0
Ainsworth	34	2	797	80	30	2	0	0	0	0
Atalissa	22	2	195	20	80	2	0	2	0	0
Polk N.	25	2	2,553	255	240	2	4	0	4	3.2
Polk S.	26	2	2,554	255	240	2	4	0	4	3.2
Corydon	35	2	302	30	80	1	0	0	0	0
Hubbell	24	2	417	42	80	1	0	0	0	0
Muscatine	21	2	697	70	30	1	0	3	0	0
Clarke E.	10	3	794	79	120	1	4	0	4	3.2
Clarke W.	11	3	794	79	120	1	4	0	4	3.2
Alton	41	3	319	32	60	2	0	1	0	0
Avoca N.	28	3	1,689	169	240	1	4	0	4	3.0
Avoca S.	29	3	1,689	169	240	1	4	0	4	3.0
Carson	27	3	228	23	30	1	0	2	0	0
Clarinda	40	3	180	18	60	2	0	1	0	0
Fremont	14	3	1,508	150	120	1	4	0	0	3.2
Glenwood	20	3	447	45	30	2	0	0	0	0
Harlan	42	3	391	39	60	1	0	0	0	0
Missouri Valley E.	17	3	1,178	118	80	1	4	0	4	3.2
Missouri Valley W.	18	3	1,179	118	80	1	4	0	4	3.2
LeMars	23	4	1,516	152	80	1	0	0	0	0
Midvale	30	4	187	18	80	1	0	2	0	0
Ogden	02	4	601	60	80	1	0	0	0	0
Salix E.	36	4	790	79	80	1	4	0	4	3.2
Salix W.	37	4	791	79	80	1	4	0	4	3.2
Storm Lake	05	4	340	34	30	1	0	0	0	0
Story E.	31	4	1,257	126	80	2	4	4	4	3.5
Story W.	32	4	1,257	126	80	2	4	4	4	3.5
Worth E.	38	4	918	92	120	1	4	4	4	3.2
Worth W.	39	4	918	92	120	1	4	4	4	3.2

(1) Estimated average daily traffic (ADT) from 1980 Primary and Interstate Traffic Book. Directional volume on interstate station is 50 percent of total interstate truck volume at station. For station located at primary road intersection, Est. ADT includes volume on all routes.

(2) Estimated per hour volume is assumed to be 10 percent of estimated ADT.

(3) Estimated weighing capacity (Veh/hr):

Estimated capacity is for continual weight checking only based on following assumptions:

3-platform electronic scales - 1 vehicle every 15 seconds or 240/hr.

2-platform electronic scales - 1 vehicle every 30 seconds or 120/hr.

1-platform electronic scale - 1 vehicle every 60 seconds or 60/hr.

1-platform (12' x 24' or 10 x 34 beam scale) - 1 vehicle every 45 seconds or 80/hr.

1-platform (12' x 12" beam scale) - 1 vehicle every 1.5 minutes or 30/hr.

Estimated weighing capacities are for a 5-axis truck tractor semi trailer. Age and condition of scale may affect the capacity shown.

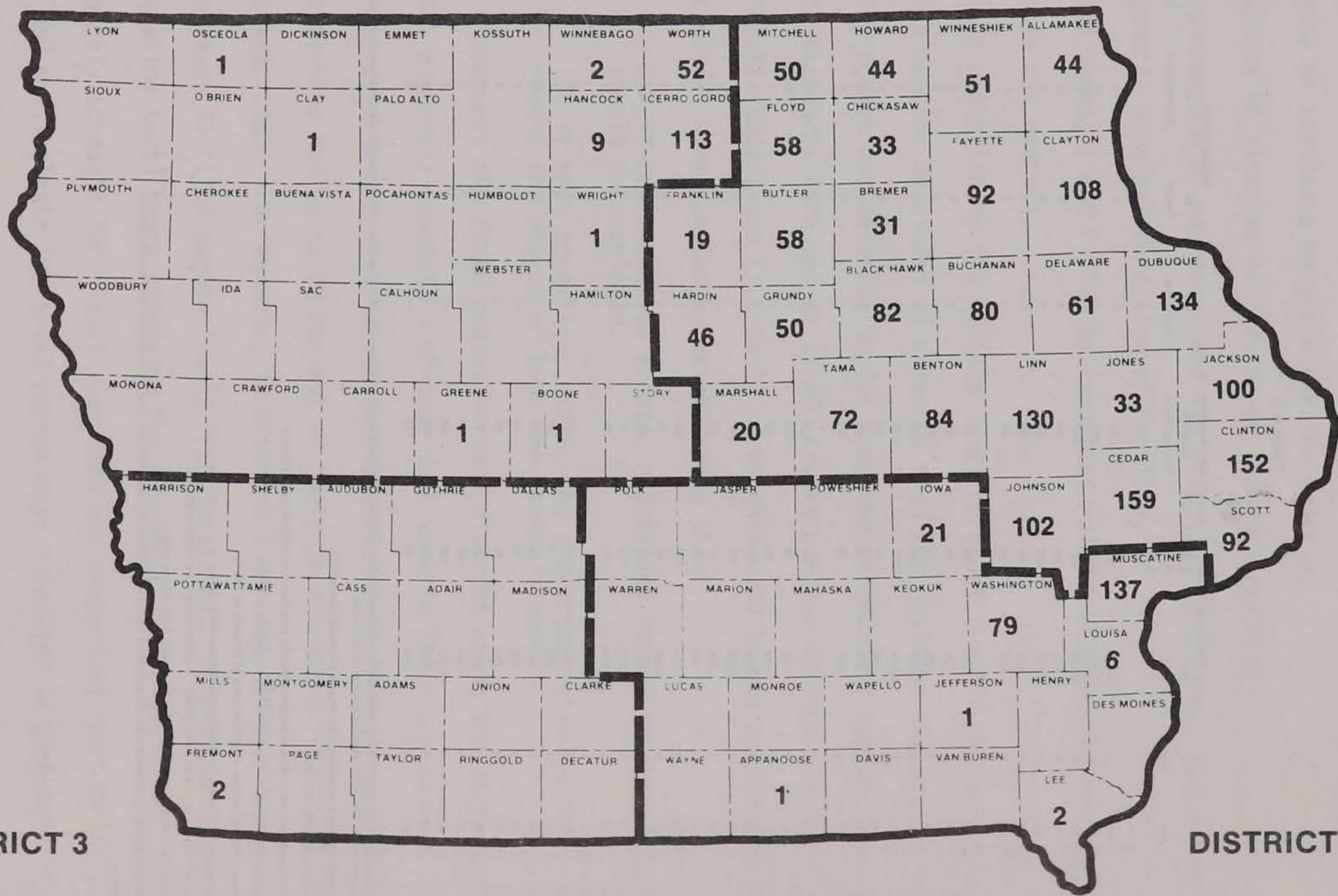
(4) Appendix 2

**FIGURE 4
DISTRIBUTION OF SCHEDULED ENFORCEMENT FOR DISTRICT 1**

DISTRICT 4

DISTRICT 1

36



PROPOSED DISTRICT BOUNDARIES

SCHEDULED PERSON DAYS = 2415

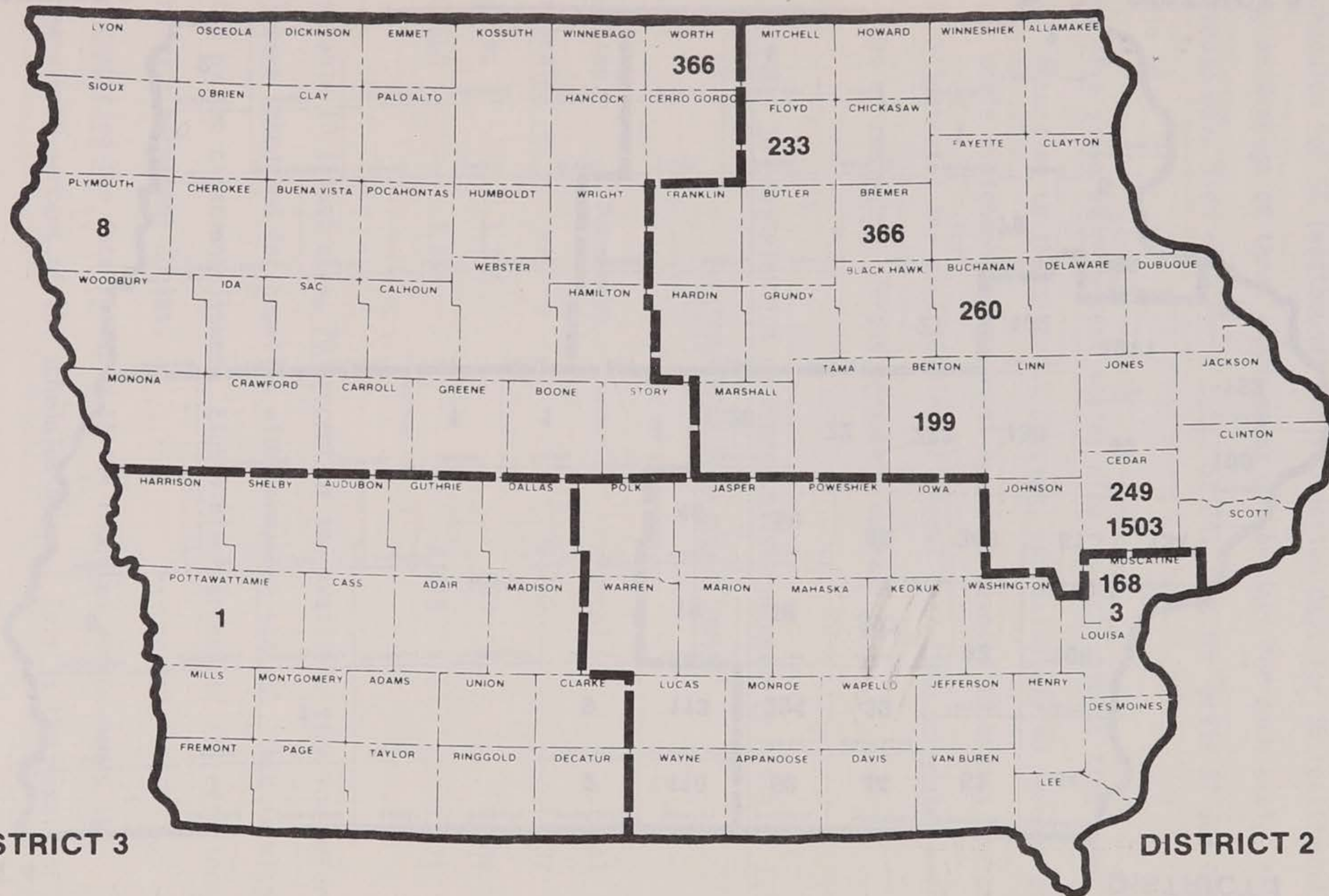
FOR ROVING OPERATIONS

**DATA SOURCE:
F.Y. '80 MONTHLY SCHEDULE**

**FIGURE 5
DISTRIBUTION OF SCHEDULED ENFORCEMENT FOR DISTRICT 1**

DISTRICT 4

DISTRICT 1



37

DISTRICT 3

DISTRICT 2

**SCHEDULED PERSON DAYS = 3356
AT PERMANENT SCALES**

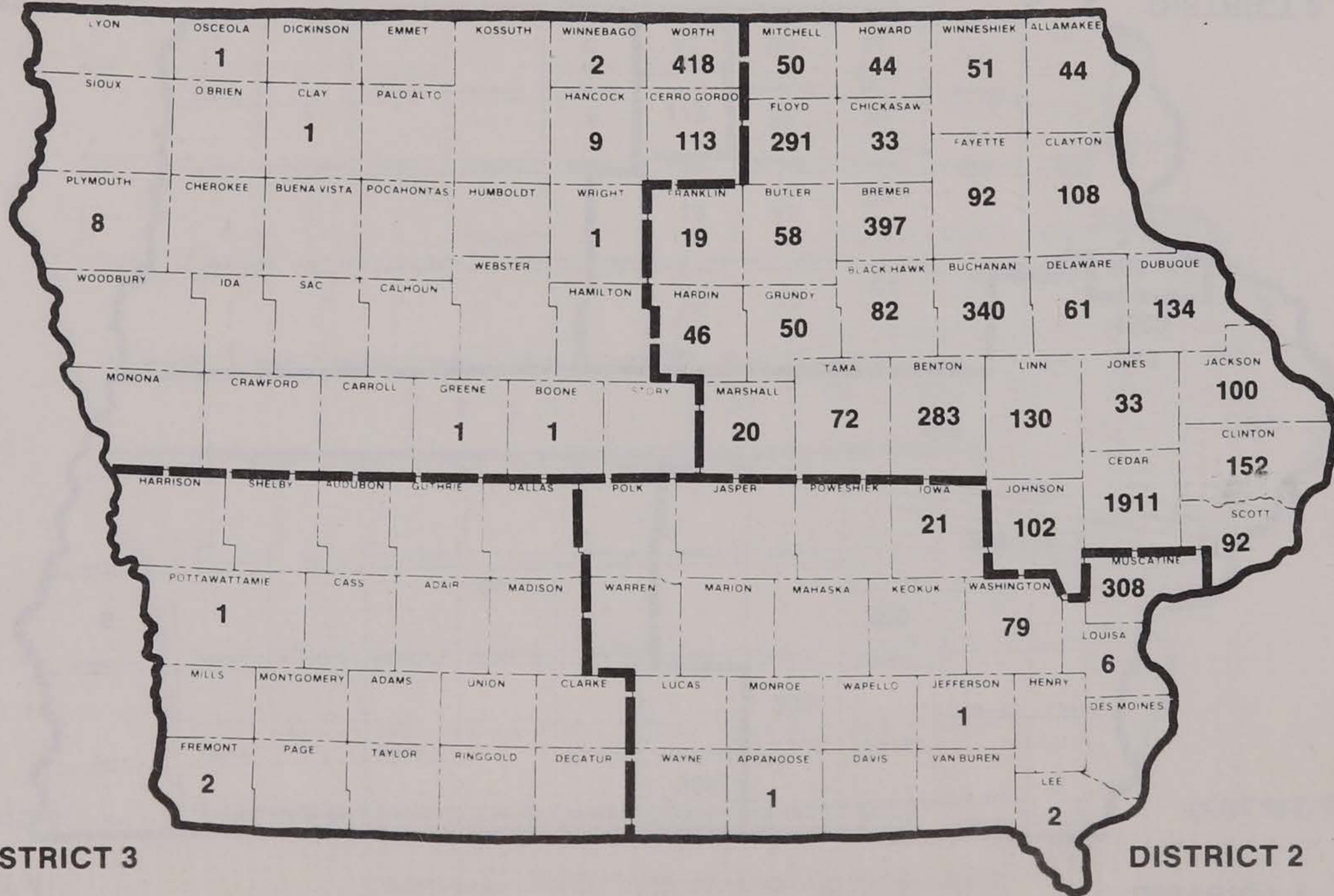
— — — — — PROPOSED DISTRICT BOUNDARIES

**DATA SOURCE: F.Y. '80
MONTHLY SCHEDULE DISTRICT 1**

**FIGURE 6
DISTRIBUTION OF SCHEDULED ENFORCEMENT IN DISTRICT 1
(PERMANENT AND ROVING OPERATIONS)**

DISTRICT 4

DISTRICT 1



38

DISTRICT 3

DISTRICT 2

— — — — — PROPOSED DISTRICT BOUNDARIES

**TOTAL SCHEDULED PERSON DAYS = 5771
ROVING & PERMANENT**

**DATA SOURCE F.Y. '80
MONTHLY SCHEDULE DISTRICT 1**

The influence the Cedar County I-80 station has on the scheduling is quite evident. Of the total permanent scale person-days scheduled (3,357), almost 50 percent of the hours (1,603) were scheduled for these stations. 723 person-days were scheduled for S7 (westbound) and 780 person-days for S8 (eastbound). Assuming an average of three enforcement person-days for each scale, these scales would have been open for a total of 241 days for scale S7 and 260 days for scale S8.

The days shown at permanent scales also reflects bypass time spent by the officer. According to the district captain, approximately 40 percent of the permanent scale assignment enforcement hours is devoted to bypass operations. Table 10 illustrates the distribution of fiscal year 1980 scheduled enforcement person-days by the patrol versus permanent operations.

TABLE 10 DISTRIBUTION OF PERSON-DAYS SCHEDULED IN DISTRICT 1,
FISCAL YEAR 1980 OPERATIONS

Counties	Type of Operation		
	Permanent	Patrol	Total
Without Scales	---	1,732	1,732
With Scales	3,356	683	4,039
TOTALS	3,356	2,415	5,771

As Table 10 illustrates, 70 percent of the available time for enforcement (4,039) were scheduled for counties with permanent scales. This is also supported by the citations issued. Eighty-nine percent of all citations were in counties with permanent scales.

In comparing the data in Table 11 the reported person-hours is approximately 50 percent of the scheduled hours. This is the result of two

significant factors that affect scheduling: (1) travel time, and (2) bypass activity. There was insufficient data available at this time to identify the detailed impact these factors have on the scheduled hours.

A comparison of the data, however, does indicate a consistent percent distribution of hours scheduled versus hours reported by station. The only major exception is the Cedar County I-80 scales where the hours reported by each station were not in balance with the hours scheduled. The distribution of total hours (44.9 percent scheduled versus 44.3 percent reported) were the same.

TABLE 11. COMPARISON OF SCHEDULED HOURS VERSUS ACTUAL HOURS
AT PERMANENT SCALES IN DISTRICT 1, FISCAL YEAR 1980

Scale Name	County	Scheduled Enforcement Hours	%	Reported Enforcement Hours	%	Ratio: Reported Scheduled
01 Atkins	Benton	1,592	5.9	750	5.5	0.47
07 Cedar N.	Cedar	5,784	21.6	1,850	13.5	0.32
08 Cedar S.	Cedar	6,240	23.3	4,210	30.8	0.67
13 Charles City	Floyd	1,864	7.0	1,200	8.8	0.41
03 Denver	Bremer	2,928	10.9	1,540	11.3	0.52
58 Jesup	Buchanan	2,080	7.8	1,010	7.3	0.48
06 Mechanicsville	Cedar	1,992	7.4	860	6.3	0.43
34 Ainsworth	Washington	0	0	40	---	---
38 Worth E.	Worth	1,336	4.9	870	6.4	0.65
39 Worth W.	Worth	1,592	5.9	590	4.3	0.37
22 Atalissa	Muscatine	1,344	5.0	690	5.1	0.51
21 Muscatine	Muscatine	24	---	50	---	2.08
TOTAL		26,776	100.0%	13,660	100.0%	0.51

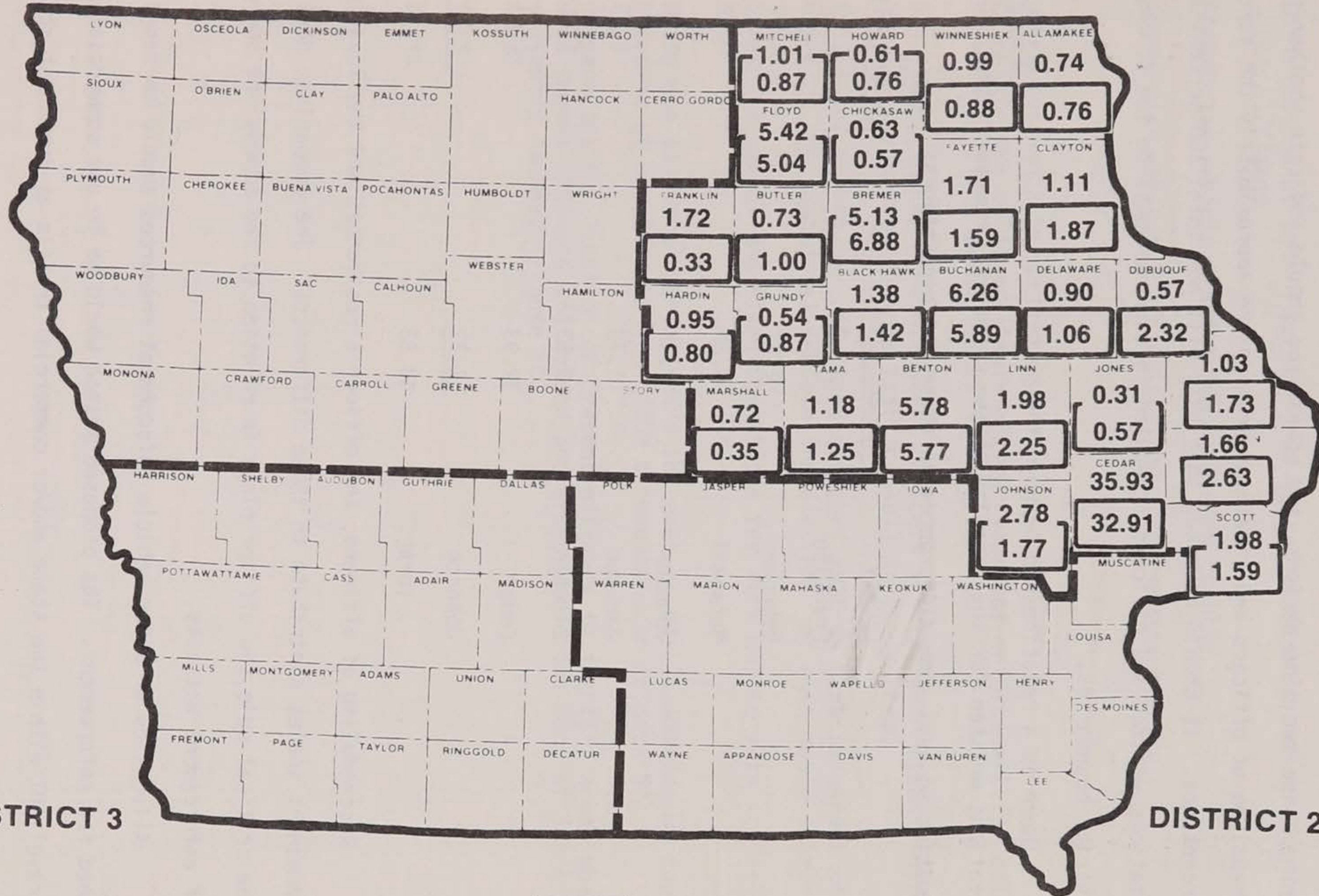
Figure 7 was developed for comparison of hours scheduled against enforcement activity. This figure compares the percent distribution of person-years scheduled in District 1 during fiscal year 1980 to the percent

FIGURE 7
COMPARISON OF TIME SCHEDULED IN DISTRICT 1 COUNTIES F.Y. 80 TO
CITATIONS ISSUED, JULY 1, 1980 TO MARCH 6, 1981

DISTRICT 4

DISTRICT 1

41



XXX = PERCENT DISTRIBUTION OF CITATION ISSUED

XXX = PERCENT DISTRIBUTION OF SCHEDULED TIME

— — — PROPOSED DISTRICT BOUNDARIES

distribution of citations issued during the July 1980 to March 1981 period. Since there have been no major changes in enforcement officers or activity during these two time periods, the comparison should indicate whether or not the scheduling of officers and citations written are approximately the same percentages. It should be noted that this will not total 100 percent due to citations written and officers scheduled in counties outside the proposed district boundaries.

There is a relationship between the percentage of scheduled hours and citations written for the majority of the counties. However, the following counties do have some differences in these two percentages:

<u>County</u>	<u>Percent Scheduled</u>	<u>Percent Citations</u>
Franklin	0.33	1.72
Dubuque	2.32	0.57
Marshall	0.35	0.72
Johnson	1.77	2.78
Jackson	1.73	1.03
Clinton	2.63	1.66
Cedar	32.93	35.93
Johnson	<u>1.77</u>	<u>2.78</u>
TOTAL	43.83	47.19

Rescheduling of officers, the officer's residences and the location of permanent scales contribute to these differences. The comparison does indicate the critical role the officer plays in relation to the scheduling and placement of enforcement activity.

Allocation of motor vehicle enforcement resources should be based on the need for enforcement. The proposed method would be to use commercial vehicle travel ADT within the state and/or commercial traffic at permanent scales to

distribute enforcement resources. The following procedure is used to identify enforcement areas for an officer or group of officers. Information needed:

- (1) Total available person-years;
- (2) Distribution of patrol versus fixed operation (current distribution is 60/40 - patrol/fixed);
- (3) Commercial vehicle traffic (ADT) in each county;
- (4) Commercial vehicle traffic (ADT) at each permanent scale.

Methodology:

1. Calculate the total available officer-years of enforcement for patrol and fixed operations using the 60/40 distribution.
2. Distribute the 60 percent patrol officers year to each county based on the average commercial vehicle traffic (ADT) in the county.
3. Distribute the 40 percent fixed officers year to each permanent scale site based on the commercial vehicle traffic (ADT) of each scale site.
4. Summarize patrol and fixed operations for each county with scales (Figure 8).
5. Using the allocated person-years for each county, summarize by county or grouping of counties to a minimum of one officer (Figure 9).
6. Compare against location of present officers to identify areas where enforcement officers are needed and areas where too many officers are presently located (Figure 10).

**FIGURE 8
DISTRIBUTION OF ENFORCEMENT RESOURCES BASED ON ADT
AND 60/40 ROVING FIXED ALLOCATION**

**DISTRICT 4
19 PERSON
YEARS**

**DISTRICT 1
23 PERSON YEARS**

44



**DISTRICT 3
18 PERSON YEARS**

**DISTRICT 2
19 PERSON YEARS**

— — — PROPOSED DISTRICT BOUNDARIES

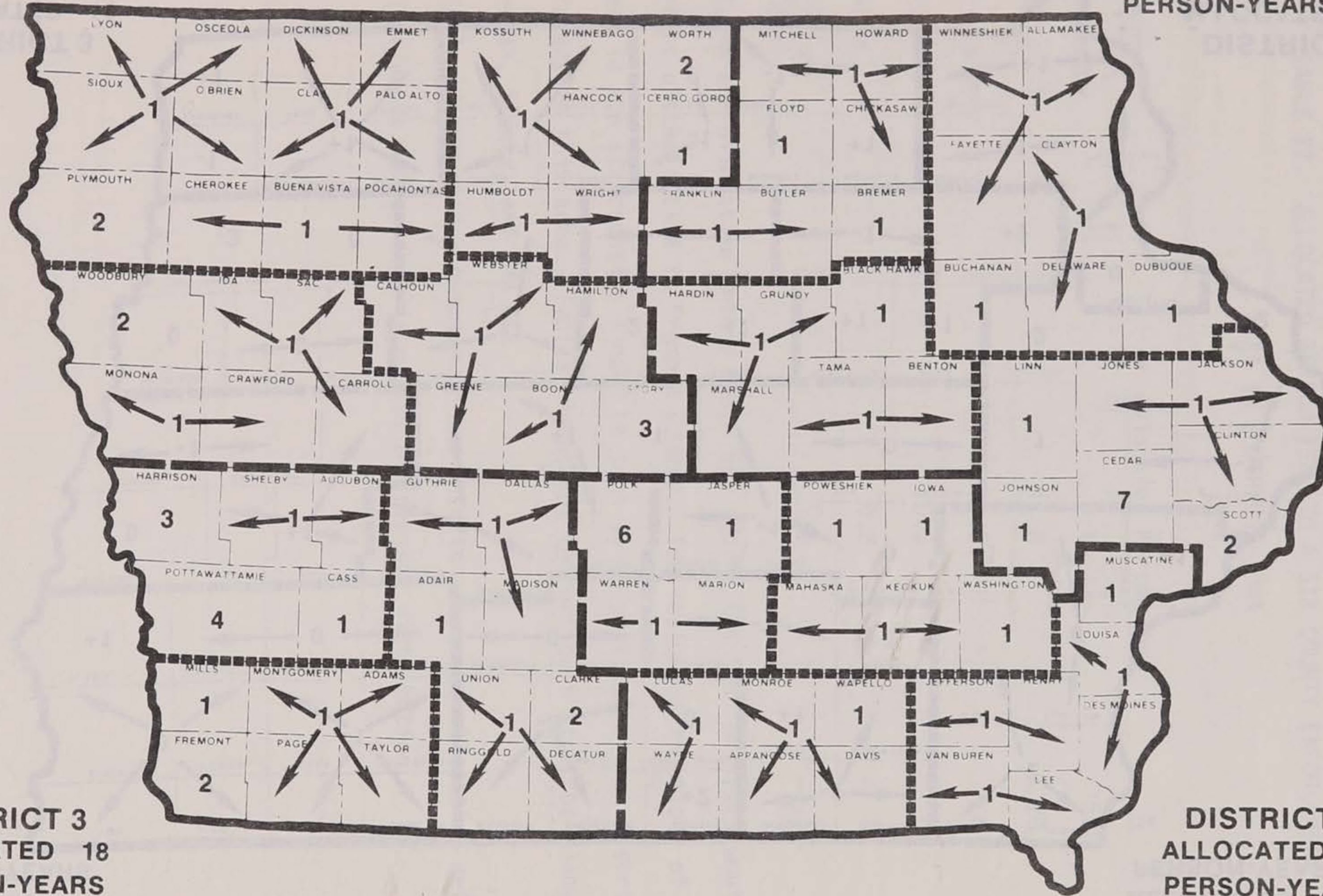
FIGURE 9

ALLOCATED OFFICERS BY COUNTY, GROUPING OF COUNTIES AND AREAS
BASED ON 60/40 ADT MODEL

DISTRICT 4
ALLOCATED 19
PERSON-YEARS

DISTRICT 1
ALLOCATED 23
PERSON-YEARS

45



DISTRICT 3
ALLOCATED 18
PERSON-YEARS

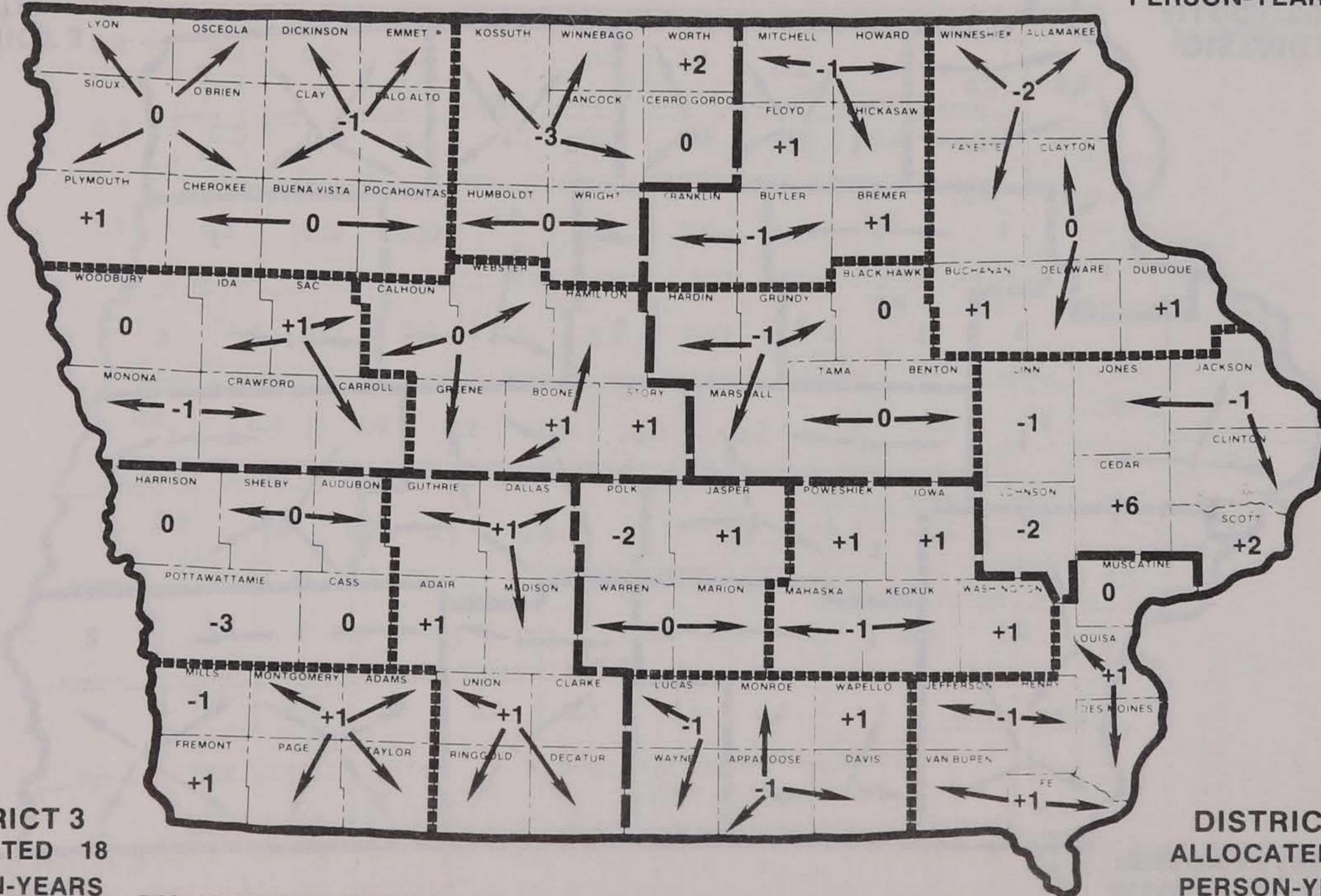
DISTRICT 2
ALLOCATED 19
PERSON-YEARS

———— PROPOSED DISTRICT BOUNDARIES
 - - - - - PROPOSED GROUPING OF COUNTIES TO AREAS

FIGURE 10
DISTRIBUTION OF EXISTING STAFF OF 79 OFFICERS
TO MATCH 60/40 ADT ALLOCATION MODEL

DISTRICT 4
ALLOCATED 19
PERSON-YEARS

DISTRICT 1
ALLOCATED 23
PERSON-YEARS



46

DISTRICT 3
ALLOCATED 18
PERSON-YEARS

DISTRICT 2
ALLOCATED 19
PERSON-YEARS

DISTRIBUTION CONSIDERS 6 VACANCIES AS OF JULY, 1981

- + INDICATES OFFICERS NEEDED
- INDICATES EXCESS OFFICERS
- o OFFICERS PRESENTLY LOCATED IN AREA

- — — — — PROPOSED DISTRICT BOUNDARIES
- PROPOSED ENFORCEMENT AREA BOUNDARIES

Table 12 illustrates a summary of six counties in southwest Iowa to an enforcement area for four person-years.

TABLE 12. ALLOCATED PERSON-YEAR TO A SIX COUNTY ENFORCEMENT AREA IN SOUTHWEST IOWA

<u>County</u>	<u>Allocated Person-Year</u>	<u>%</u>
Fremont	2.1	52
Mills	1.0	25
Montgomery	0.3	8
Page	0.3	8
Adams	0.2	5
<u>Taylor</u>	<u>0.1</u>	<u>2</u>
<u>Total</u>	<u>4</u>	<u>100.</u>

Using the allocation method described above, the four officers would spend 52 percent of their time in Fremont County. The residence locations of the four officers in the six counties should be such as to provide an even distribution of officers in this area. Typical locations for officers might be Glenwood, Shenandoah, Sidney, and Red Oak.

Table 13 presents a summary of the results using the allocation method described above and a comparison with the present distribution.

TABLE 13. COMPARISON OF ALLOCATED OFFICERS VS. PRESENT OFFICERS BY DISTRICT

<u>District</u>	<u>Present Officers</u>	<u>Allocated Officers</u>
1	22	23
2	18	19
3	17	18
4	22	19
TOTAL	79	79

The difference in assignment of allocated officers by district can be attributed to the following:

- (1) The county line boundary used to delineate districts may not be compatible with present assignment and location of officers for district operations.
- (2) District 4 has proportionately less commercial vehicle traffic than other districts.

Officer assignments for District 1 were compared to hours allocated from the proposed distribution method. Data was based on fiscal year 1980 and the results are illustrated in Figure 11.

Differences identified in Figure 11 can be attributed in part to the following:

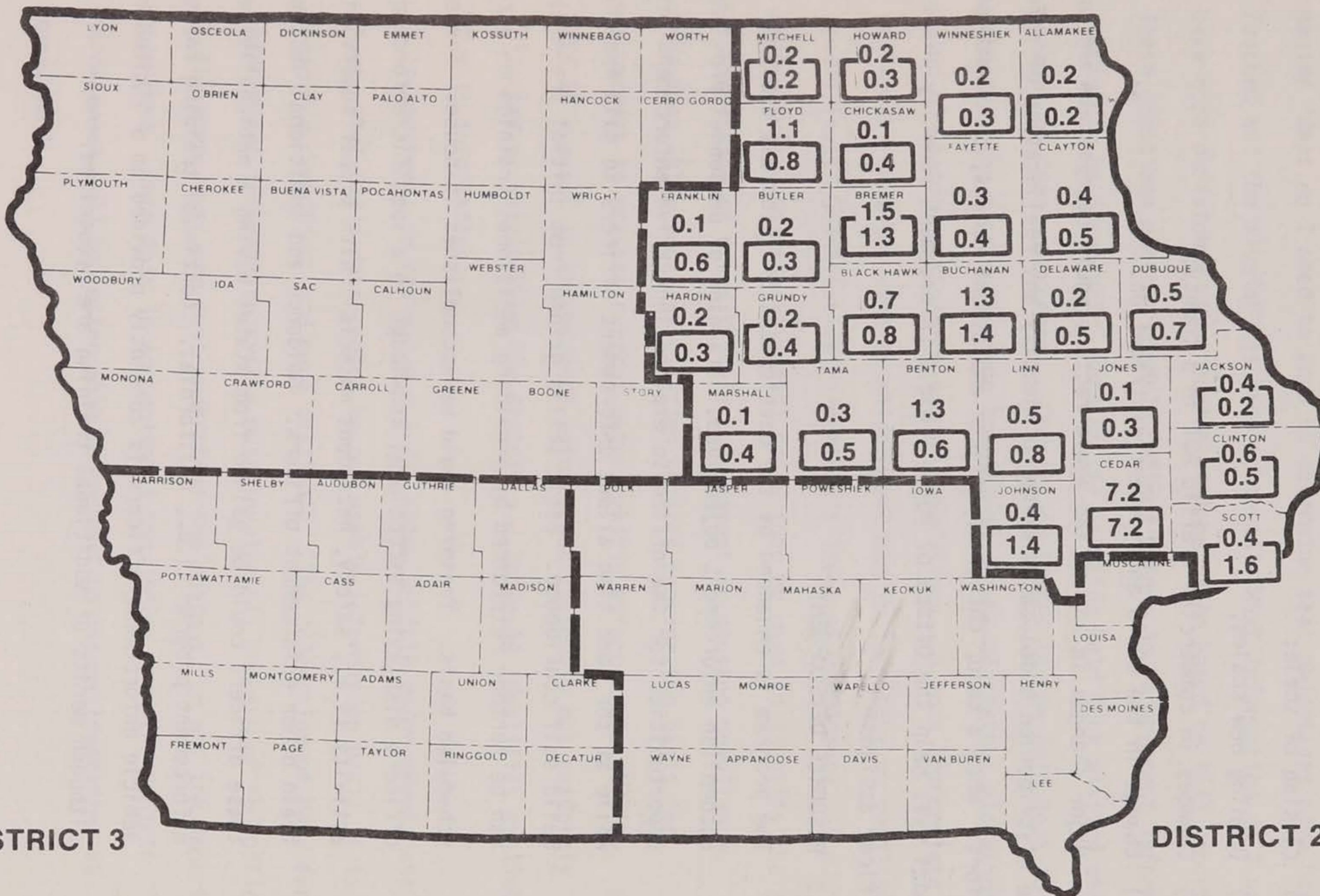
- (1) Of the 22 officers presently assigned to District 1, only 18.71, or 85 percent, were scheduled within the proposed district boundaries. Enforcement effort from other districts along bordering counties was not tabulated, so a comparison of total enforcement effort could not be made.
- (2) Permanent scale counties generally had a higher amount of enforcement hours under the present assignment than the proposed method.

FIGURE 11

COMPARISON OF SCHEDULED PERSON-YEARS PER COUNTY TO ALLOCATED PERSON-YEARS (60/40) FOR DISTRICT 1

DISTRICT 4

DISTRICT 1



49

DISTRICT 3

DISTRICT 2

XXX

XXX

SCHEDULED PERSON-YEARS-F.Y. '80

ALLOCATED 60/40 DISTRIBUTION PERSON-YEARS

PROPOSED DISTRICT BOUNDARIES

Changes in the following factors will affect the allocation of available enforcement effort in a county:

- (1) Closing of scale;
- (2) Opening new scales;
- (3) Changes in commercial traffic ADT in a county;
- (4) Change in the 60/40 enforcement distribution.

Major changes in any of the above factors would necessitate the updating of the distribution model calculation to identify any reallocation of enforcement effort. When a major change in officer employment occurs, an update of the model will help the Office of Motor Vehicle Enforcement identify changes in officer assignment.

6.3 RESOURCE DEVELOPMENT

The program is enhanced by the development of resources used to accomplish enforcement objectives. Training of personnel provides opportunities for the office to explore innovative enforcement procedures while at the same time allows enforcement officers to gain experience and build self confidence. Basic skills gained from initial training programs can be further reinforced by providing additional training on a regularly scheduled basis. Training could be accomplished in-house. For example, officers displaying exceptional knowledge in a specific enforcement activity (i.e., safety, hazardous material) with proper supervision could train other enforcement officers. Guidance and additional instruction for these officers could be gained from states having a nationally recognized enforcement program (i.e., California). Continued training for motor vehicle enforcement officers is currently provided on a limited basis, although merits of additional training are recognized.

6.4 MONITOR PROGRAM/TAKE CORRECTIVE ACTION

In order to develop the necessary reports and analyses, managers must decide "What do I need to know to determine that objectives have been reached and the mission has been achieved? What information do I need to make good decisions? What action will be taken based on this report?" These questions must be clearly defined before an enforcement information system can be developed. Part of the existing Gold Book mission statement relates to fair enforcement. Objectives listed in the Gold Book to support achieving the mission include the dollar amount of serious violations and a ratio of statutory fines to actual court fines. A more appropriate mission statement for motor vehicle enforcement may include causing compliance with Iowa's laws. Quantitative objectives a level of compliance, (i.e., productivity and effectiveness) could then be used to identify the progress of the Office of Motor Vehicle Enforcement in causing compliance. Gold Book, Blue Book and citation records provide the basis for management to measure current motor vehicle enforcement activity. However, data to support an enforcement information system is not uniformly collected or retained by the districts. Table 14 identifies availability of this information.

It is apparent, in reviewing current motor vehicle enforcement data files, that field data cannot become usable information until it is organized, verified and made available. The collection of data for the enforcement information system must involve all members of the office. Furthermore, everyone must understand the reasons for and the importance of this data. Once this is accomplished the Office of Motor Vehicle Enforcement will be better able to respond to issues identified by management.

TABLE 14. AVAILABILITY OF DATA ITEMS FOR PRODUCTIVITY - EFFECTIVENESS RATIOS

	ITEM	District #1		District #2		District #3		District #4	
		Station /Month	Total /Year	Station /Month	Total /Year	Station /Month	Total /Year	Station /Month	Total /Year
PERMANENT	Total Trucks Checked/Station/Month	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	Total Trucks in Violation/Station/Month	No	No	No	No	Yes	Yes	No	Yes
	Total Operating Hours/Station/Month	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	Total Manhours/Station/Month	Yes	Yes	No	No	Yes	Yes	No	Yes
	Comments	Available for 11 months only		For full fiscal year, monthly		For full fiscal year, monthly		For fiscal year total annual only	

	ITEM	DISTRICT #1		DISTRICT #2		DISTRICT #3		DISTRICT #4	
		County Month	Total Year	County Month	Total Year	County Month	Total Year	County Month	Total Year
PATROL	Total Trucks checked/county/month	No	No	No	No	No	No	No	No
	Total Trucks in Violation/county/month	No	Yes*	No	Yes*	No	Yes*	No	Yes*
	Total Enforcement Hours/county/month	No	No	No	No	No	No	No	No
	Total Enforcement Person-hours/counts/month	No	No	No	No	No	No	No	No

Comments: *Trucks in Violation data is limited to county code of citation and counties with not permanent scales.

CHAPTER VII. CONCLUSIONS

7.1 FUTURE MOTOR VEHICLE ENFORCEMENT PROGRAM

The enforcement program is based on an operations plan intended to cause compliance with the law. The operations plan is based on the allocation of resources. The MRI study talked about increasing the enforcement staff level while this report suggest focusing on effectiveness and productivity instead of increasing staff level. However, before either can take place, an enforcement information system must be established to:

- 1) measure the results of the existing program.
- 2) take corrective action necessary.
- 3) develop a new plan.

The followinging general reports are proposed to support the enforcement information system:

- (1) Compliance Report,
- (2) Productivity Report,
- (3) Activity Report,
- (4) Violation History, and
- (5) Citation History.

Figure 12 illustrates the report topic and distribution.

The compliance report provides information regarding the effectiveness of the enforcement activities. All office members are responsible for helping achieve the office mission and must receive feedback on results of their work. Compliance is defined as the number of trucks cited in violation of the law divided by the number of trucks estimated to be in violation, based on

studies conducted by the Iowa DOT, contiguous states and the FHWA. The denominator is determined by multiplying the total estimated number of trucks by the percent violation rate adopted, based on sources mentioned in Chapter V.

The productivity report provides information regarding the number of trucks checked, which is an indicator of efficiency and is directly related to compliance. As productivity increases, compliance should increase. Coordination with other states and the U.S. DOT may improve compliance. Productivity is defined as the number of trucks checked divided by the estimated truck traffic, which is based on studies conducted by the Iowa DOT, contiguous states, and the FHWA. The activity report provides information regarding the actual performance compared with performance objectives established in the plan.

Violation history identifies violators, violation trends and provides a basis for taking action in addition to field enforcement.

Citation history provides such information as fine levels and court disposition. An indication of the magnitude of plea bargaining could be obtained.

Figures 13 and 13a suggest the data base necessary to provide the proposed reports. Current source documents are listed when available. The process to place data in the data base should be automated to the greatest extent possible. For example, enforcement hours by scale, patrol and court can be obtained by entering specific function codes on the current time sheet.

**FIGURE 12.
REPORTS AND DISTRIBUTION**

Report	Distribution					
	Div. Dir.	Office Dir.	Col.	Captain	Officer II	Officer I
A. Compliance Report						
1. State Total	X	X	X	X	X	X
2. Patrol Total	X	X	X	X	X	X
3. Scale Total	X	X	X	X	X	X
4. District Total		X	X	X	X	X
5. District Patrol Total		X	X	X	X	X
6. District Scale Total		X	X	X	X	X
7. County Patrol			X	X	X	X
8. Scale			X	X	X	X
B. Productivity Report						
1. State Total	X	X	X	X	X	X
2. Patrol Total	X	X	X	X	X	X
3. Scale Total	X	X	X	X	X	X
4. District Total		X	X	X	X	X
5. District Patrol Total			X	X	X	X
6. District Scale Total			X	X	X	X
7. County Patrol			X	X	X	X
8. Scale			X	X	X	X
C. Activity Report (Hours)						
1. State Total		X	X	X		
2. Patrol Total		X	X	X		
3. Scale Total		X	X	X		
4. Non-Enforcement Total		X	X	X		
5. District Total	X	X	X	X		
6. District Patrol Total			X	X		
7. District Scale Total			X	X		
8. District Non-Enforcement Total			X	X		
9. Officer Total				X		
10. Officer Patrol Total				X		
11. Officer Scale Total				X		
12. Officer Non-Enforcement Total				X		
D. Violation History						
		X				
E. Citation History						
		X	X	X	X	X

FIGURE 13
DATA BASE - VIOLATION RECORDS

	Item	Source	Retained on Citation Tape
1.	I.C.C. Motor Carrier Number	Vehicle Ins. Report-Added to Citation	No
2.	Name of Motor Carrier	Vehicle Ins. Report-Added to Citation	Yes
3.	Street	Vehicle Ins. Report	No
4.	City	Vehicle Ins. Report-Added to Citation	Yes
5.	State	Vehicle Ins. Report-Added to Citation	Yes
6.	Zip Code	Vehicle Ins. Report	No
7.	Drivers Name	Vehicle Ins. Report & Citation	No
8.	Date of Issuing Citation	Vehicle Ins. Report & Citation	No
9.	Location of Issuing Citation	Vehicle Ins. Report & Citation	County Only
10.	Origin & Destination of Trip	Vehicle Ins. Report	No
11.	Intra-Interstate Traffic	Vehicle Ins. Report	No
12.	Violation & Type	Vehicle Ins. Report & Citation	Yes
13.	Citation Number	Vehicle Ins. Report & Citation	Yes
14.	Fine	Citation	Yes
15.	Court Costs	Citation	Yes
16.	Disposition	Vehicle Inspection Report & Citation	Yes
17.	Officer Badge Number	Vehicle Inspection Report & Citation	Yes

Figure 13 a
DATA BASE - OPERATIONS

Item	Source
1. Enforcement Labor Hours Total	District Blue Books
District	Form 42108-Sergeants Weekly Report Form
Officer	Form 42103-Officers Weekly Report Form
2. Patrol Labor Hours Total	Same as above
District	"
Officer	"
3. Scale Labor Hours Total	Same as above
District	"
Officer	"
4. Court Labor Hours Total	Presently Not Documented
District	"
Officer	"
5. Other Labor Hours Total	District Blue Book
District	Form 42108-Sergeants Weekly Report
Officer	Form 42103-Officers Weekly Reports
6. Trucks Checked Total	Blue Book-includes only Patrol Violations
District	Form 42108-Traffic Count Sheet
7. Trucks Checked Patrol Total	Only truck in violation documented
District	"
County	"
Officer	"
8. Trucks Checked Scale Total	District Blue Book
District	Form 42108 & Form 770
Scale	Scale Traffic Count Sheet-Form 770
9. Estimated Truck Traffic Total	Presently not used
District	"
County	"
Scale	"
10. Trucks Cited For Violation Total	Citation Tape
District	Form 770 & Citation Report
County	Citation Tape
Scale	Form 770 & Citation Report
Officer	Citation Tape

Figure 13 a (cont.)

11.	Estimated Trucks In Violation Total	Presently not used
	District	"
	County	"
	Scale	"
12.	Scale Hours Open Total	District Blue Book
	District	Form 42108
	Scale	Form 770
13.	Scale Downtime Total	District Blue Book
	District	Form 42108
	Scale	Available but not identified by scale
14.	Portable Scales Used Total	Not Documented
	District	"
	County	"
	Officer	"
15.	Commercial Scale Used Total	Not Documented
	District	"
	County	"
	Officer	"
16.	Automobile Downtime Total	Not Documented
	District	"
	Officer	"
17.	Two Way Radio Downtime Total	Not Documented
	District	"
	Officer	"

7.2 SUPPORTING ELEMENTS

Changes proposed for the existing citation record, safety inspection, and scheduling procedure are identified in Table 15.

TABLE 15

Citation Record:

<u>Modification</u>	<u>Usage</u>
(1) Code citation upon issuance	Citation data will be more current for use in enforcement information system.
(2) Code date of issuance	Citation data can be more directly related to enforcement effort during a specific time period.
(3) Update disposition code for citation, paid, appealed, district court outstanding	By adopting special citation disposition codes, any citation that goes to district court or is not paid upon issuance will be identified. A listing of these citations can be updated upon receipt of citation and disposition from district court. This can be used to identify the proportion of district court citations to total citations in addition to changes in fine due to "plea bargaining" or errors by officers.
(4) Add codes to indicate type of enforcement activity	Code citations by enforcement activity, for example: fixed operations "F", Station Number, bypass "B" Station Number, Patrol "P" county citation issued in.
(5) Add and code ICC motor carrier number	This will help in correlating citation resulting from a safety inspection with the inspection report.
(6) Code driver's name if different from owner's	This will help to identify frequency of violations by drivers for particular companies and help them identify drivers that are habitual violators.
(7) Identify multiple citations with specific code	This will help to identify frequency of multiple citations. A high frequency may indicate need for automated citation printers since almost three-fourths of the data for a citation is duplicated for each citation period.

Safety Inspection:

A study completed by the U.S. DOT indicates that out of a random sample of 307 safety inspected vehicles, 104 were placed out of service because of safety violations. This represents 34 percent of the total. This number is also supported by studies conducted by the Office of Motor Vehicle Enforcement, which have shown approximately 35 percent of all commercial vehicles are operating with safety defects. To increase the number of commercial vehicles checked for safety violations an abbreviated inspection form is proposed. Defective brakes and tires are contributing factors in 65 percent of traffic accidents. Similar experiences have been documented in California. Based on this data the following items are identified as being critical for inspection:

- | | |
|---------------|------------------------------|
| (1) Brakes; | (4) Wheels; |
| (2) Steering; | (5) Drawbar/fifth wheel; and |
| (3) Tires; | (6) Driver log. |

Figure 14 illustrates the critical inspection format used by the California Highway Patrol. The concept involves inspecting only the six critical items. If a defect(s) is found the vehicle would be given a complete safety inspection. Use of this process would meet performance requirements of the FHWA and the Bureau of Motor Carrier Safety, and at the same time increase the number of commercial vehicles inspected for safety defects.

Figure 14

DEPARTMENT OF CALIFORNIA HIGHWAY PATROL			
CRITICAL ITEM INSPECTION			
DATE	TIME	LOC. CODE	BEAT
INSPECTION BY		I.D. NUMBER	
VEHICLE LICENSE			
#1	#2	#3	#4
1. BRAKE ADJUSTMENT			
LEFT			
RIGHT			
2. AIR LOSS		COMPLIES	
		YES	NO
APPLIED			
UNAPPLIED			
3. LOW AIR PRESSURE WARNING DEVICE			
4. BRAKE HOSES			
5. BRAKE DRUMS			
6. BRAKE SHOES			
7. STEERING COMPONENTS			
8. WHEELS — CRACKS/LOOSE NUTS			
9. TIRES — WEAR/DEFECTS/OVERLOADING			
10. DRAWBAR/FIFTH WHEEL			
11. DRIVER'S LOG			
COMMENTS			
215	O. H. 215C ISSUED		281
	<input type="checkbox"/> YES <input type="checkbox"/> NO		#
CHP 4078 (9-77)			
57368-456 1-78 ZXM IUP USP			

Establishment of officer schedules for different enforcement strategies can become tedious and in some cases overwhelming. Computers can be used to assist in developing work assignments for each officer. The following concepts should be included in a computer-assisted scheduling process:

Scheduling:

<u>Input</u>	<u>Analysis</u>	<u>Output</u>
Total enforcement hours required for month (fixed and patrol)	Via computer - randomly generate eight-hour blocks of enforcement time for each day of required enforcement. Identify as fixed or patrol.	A computer printout that identifies the days scheduled for scale, hours and personnel by fixed or patrol activity
Percentage of enforcement periods by eight-hour blocks	Assign officer badge numbers to each eight-hour period.	A computer printout for each officer that identifies daily assignments
Percentage of bypass hours associated with scale.	Adjust when necessary to avoid conflicts with adjacent station on major or interstate routes.	
Badge number of officers available to work at permanent scale sites and county.		

Figure 15 illustrates a sample format of a typical monthly schedule for an officer. The column labeled "actual" could be used by the officer to document schedule changes. An "x" could be used to indicate activity was performed as scheduled.

FIGURE 15

Item	Sunday		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday	
	Sched.	Act.	Sched.	Act.	Sched.	Act.	Sched.	Act.	Sched.	Act.	Sched.	Act.	Sched.	Act.
Date			1		2		3		4		5		6	
Time											8-4	X	4-12	X
County											77	X	77	X
Scale											25	X	25B	X
Date	7		8		9		10		11		12		13	
Time	8-4	X	4-12	12-8	8-12	Sick					4-12	X		
County	77	X	77	X	77						50	X		
Scale	26	X	26	25B	25						Roving	X		
Date	14		15		16		17		18		19		20	
Time			12-8	8-4	8-4	X	12-8	X	8-4	X	4-12	8-4		
County			85	77	77	X	77	X	77	X	77	X		
Scale			31	26	26	X	25	X	25B	X	26	District Court		
Date	21		22		23		24		25		26		27	
Time			8-4	X	12-8	8-12	4-12		4-12		8-4	Vac		
County			91	X	77	X	77		85		85			
Scale			Roving	X	25	26	26		32		32			
Date	28		29		30									
Time			12-8	X	8-4	12-8								
County			77	X	77	X								
Scale			25	26	26	X								

B = Bypass Enforcement

R = Roving

7.3 IMPLEMENTATION

Enforcement Information System

Although an information system currently exists, a considerable amount of work is necessary to improve its accuracy and automate the system. The effect non-compliance can have on the rate of highway deterioration, and the projected financial shortfall in accomplishing system preservation, causes a high priority to be placed on influencing motor carriers to comply with Iowa laws.

Implementation of the enforcement information system requires development of additional computer programs. The following data processing alternatives should be considered:

- (1) Schedule development in the Office of Data Processing;
- (2) Hire a consultant;
- (3) Schedule development in the Office of Motor Vehicle Enforcement; or
- (4) Schedule development in the Office of Transportation Research.

Cost and priority level established within the department will dictate appropriate action. Current changes in philosophy regarding user involvement in data base management and preparation of computer programs offer the Office of Motor Vehicle Enforcement the flexibility of exploring all the options listed.

Existing Operations Plan

The existing plan has been described as employing a 60/40 patrol/scale enforcement mix, with some weekend enforcement. The 24-hour per day weekend enforcement strategy resulted in increasing the effectiveness of the Avoca south scale (Table 11). However, this report cannot recommend this strategy be continued or modified due to insufficient data from the current information system.

Future Operations Plan

The Offices of Motor Vehicle Enforcement and Transportation Research can develop strategies to modify the existing operations plan. The strategies would include such traditional activities as:

- (1) 60/40 patrol/fixed enforcement,
- (2) Weekend,
- (3) Portable scale operations,
- (4) Coordinated fixed and bypass activities; and

non-traditional activities as:

- (1) Allow empty trucks to pass weigh scales,
- (2) Modify safety inspections,
- (3) Use weight tickets from any public scale to issue citations to overweight vehicles,
- (4) 16/24-hour scale operations,
- (5) Weigh-in-motion/semi-portable scales.
- (6) Automated scale equipment

Again, implementing new strategies without an information system to feed back the result of such action cannot be recommended.

APPENDIX 1

EXISTING OPERATIONS PER SCALES BY DISTRICT

<u>Item</u>	1	2	3	4	<u>State/Avg.</u>
Permanent Scales	7	8	12	10	37
Truck ADT/Scale	1,350	1,061	874	880	1,006
Officers/Scale	3.14	2.25	1.5	2.1	2.13
Operating Hours/Scale	883	844	622	670	732
Person-Hours/Scale	2,205	1,702	1,101	1,219	1,471
<u>Person-Hours per Scale</u> <u>Operating Hours per Scale</u>	2.50	2.02	1.77	1.82	2.01
Trucks Checked/Scale	25,195	18,758	18,902	11,594	18,086
<u>Trucks Checked/Scale</u> <u>Operating Hours/Scale</u>	28.5	22.2	31.9	17.3	24.7
<u>Trucks Checked/Scale</u> <u>Person-Hours/Scale</u>	11.4	11.0	17.2	9.5	12.3
Citations/Scale	1,587	1,106	904	939	1,087
<u>Trucks Checked/Scale</u> <u>Citations/Scale</u>	15.9	16.9	20.9	12.3	16.6
<u>Citations/Scale</u> <u>Operating Hours/Scale</u>	1.80	1.31	1.45	1.40	1.48
<u>Citations/Scale</u> <u>Person-Hours/Scale</u>	0.72	0.64	0.82	0.77	0.74
Citations/County	727	720	864	523	688
Inspections/County	232	141	125	136	161

EXISTING OPERATIONS PER COUNTY BY DISTRICT

<u>Item</u>	1	2	3	4	<u>State/Avg.</u>
Number of Counties	27	22	19	31	99
Permanent Scales/County	0.26	0.36	0.63	0.32	0.37
Public Elevators/County	14	10	10	14	12
Portable Scales/County	0.81	0.36	.63	0.51	0.52
Primary & Interstate Miles/County	114	103	106	99	105
MVE Vehicle Miles/County	19,815	17,727	22,316	13,903	17,978
Patrol Hours/County	866	610	1,011	615	758
Scale Hours/County	572	619	695	393	550
Total Enforcement Hours/County	1,438	1,229	1,706	1,008	1,308

APPENDIX 2

Following is a brief synopsis of assumptions used in developing the factor ratings in Table 9.

	<u>Rating</u>	<u>Assumptions</u>
A. <u>AVOIDANCE</u>	1	- Very Easily Bypassed - Nearby parallel Primary or Secondary Highways within one mile. Little or no out-of-Distance Travel.
	2	- Easily Bypassed - Parallel primary and secondary roads one-five miles. Some out-of-Distance Travel by Trucker.
	3	- Border line - Alternate available routes five-ten miles. Out-of-Distance Travel generally experienced by trucker.
	4	- Difficult - Minimal accessibility to alternate routes, more out of Distance Travel experienced by Trucker, Bypass may change trucker route.

	<u>Rating</u>	<u>Assumptions</u>
B. <u>SAFETY</u>	0	- Unknown at this time.
	1	- Poor sight distance, very close to travel way, restricted weighing operation, major conflict with other vehicles.
	2	- Better sight distance, adequate space between highway and station less conflict with other vehicles.
	3	- Good sight distance, weighing facility separated from highway. Minimal exit and entrance problem.
	4	- Excellent sight distance, complete separation from Highway no exit and entrance problems.

	<u>Rating</u>	<u>Assumptions</u>
C. <u>MAINTENANCE</u>	0	- Unknown at this time.
	1	- Scale down time over 50 percent of scheduled operating hours. Maintenance costs very high. Major reconstruction would be needed.
	2	- Scale down time 25-50 percent of scheduled operating hours. Maintenance costs higher than average. Some reconstruction would be needed.

- 3 - Scale down time 5-25 percent of scheduled operating hours. Average maintenance costs. No reconstruction would be needed.
- 4 - Scale down time less than 5 percent of total scheduled operating hours. Maintenance cost minimal.

	<u>Rating</u>	<u>Assumptions</u>
D. Facilities	0	- Unknown at this time.
	1	- Building in disrepair, no utilities or communication, storage space for less than 5 trucks.
	2	- Building usable, electricity and phone no Motor Vehicle Enforcement Radio, storage for 5-10 trucks.
	3	- Building in good shape, all utilities but limited communication system. Storage for 10-20 trucks.
	4	- Modern building, individual office area. All utilities, Motor Vehicle Enforcement radio communications, storage for more than 20



