CITY OF LAKEWOOD

PRODUCTIVITY STUDY OF JUVENILE JUSTICE AND POLICE PATROL SERVICES

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Appendices

Acknowledgements

I. OVERVIEW TO THE REPORT

1. Productivity

The productivity of criminal justice activities can proceed on several different levels of analysis. It may involve the examination of the performance of individuals, groups of individuals, organizations, subunits of organizations, and system wide interrelationships between several organizations. The choice of a particular level of analysis is dictated by the nature of the substantive problem.

In this Report, productivity of police patrol services and the delivery of juvenile justice services are the problems selected for analysis. Concerning the first problem, the performance of a subunit i.e., patrol division, with a larger organization, i.e., police department; will be subject to performance assessment. Concerning the second problem, the productivity of two organizations - the Lakewood Youth Service Bureau and the Jefferson County Social Services' Predelinquent/Delinquent project will be investigated.

2. Budgeting and Planning as Input-Output Measures

Productivity is usually defined as the return received for a given unit of input, or the amount of output for a given amount of input. This relationship is usually expressed as a ratio. The key words in this definition are "input" and "output". Before measuring productivity, one must know how much "input" is being committed to a service and how much "output" is resulting from a service.

Input and Project Budgeting: The input of organizational (or subunit) services can be measured in terms of the dollars spent for the service or

in terms of the manpower and equipment devoted to the service. For either measurement, the organization must be able to determine the amount of money or resources devoted to a particular activity. For instance, to measure the direct cost (input) of a juvenile diversion unit, the local government official must know the portion of the department budget(s) going to this activity. In the case of resources, one must know the amount of time these resources are being used for the diversion unit.

Budgeting (input analysis) analyzes in detail the many functions or activities organizations must perform to achieve its goals and objectives. A clearer picture can be obtained when services and budgeted costs are grouped under a specific set of objectives and goals, i.e. an identified project. Examples of police projects could fall under the functional headings of crime prevention, apprehension and deterrence, and juvenile diversion.

After a project is identified, along with budgeted costs, a base year can be established. From this base year, subsequent review and analysis of future project budget increases can take place.

Output and Planning: Whereas budgeting provides a method of analyzing input, planning provides a method for identifying the output desired. Planning establishes services and the goals and objectives to be served.

The service output of criminal justice organizations is more difficult to measure than input. The "output" is the actual service provided by the organization.* Output measurement can take many different forms depending

* An output can also be goods (as distinct from services) such as a chair from a factory. For criminal justice agencies, though, the major purpose is the provision of public safety and other services.

on the specific function of the organization. As an illustration, major

crime related police functions are the apprehension and deterrence of

criminals, prevention of crime and related to both, maintaining a feeling

of security in the community. The output data to measure the service

will differ depending on the identified objective and function.

Planning and Budgeting: Although budget (resource) analysis identifies

input, and planning identifies output, both processes occur interchangeably.

For effective budgeting to take place, planned objectives and goals need to

be identified. At the same time, budget analysis may indicate that initially

planned objectives and goals are unfeasible, thus causing their modification

and change.

3. Productivity Efficiency and Effectiveness

Productivity measurement utilizes budgetary and resource information

(input) and services provided (output) to determine the efficiency and/or

effectiveness of criminal justice services.

Efficiency (i.e. Productivity): Is the extent to which a service is pro-

vided at a minimum cost in resources, i.e. getting a greater return for the

dollar spent. For example, a police department that can increase its level

of service (output) to a greater extent than costs (input) has become more

efficient.

Since an increase in efficiency is obtained through the improved

utilization of manpower and equipment, a police administrator must first

be able to identify the present and anticipated work output of resources to

determine any change in cost-efficiency.

Effectiveness: Whereas efficiency relates work output to cost (resources),

effectiveness deals only with the extent to which a service accomplishes its purpose. For instance, a burglary attack team may be very efficient by increasing the amount of patrol time per officer, but not very effective in its purpose, the apprehension of burglars.

4. Selected Issue Areas

This Report examines criminal justice productivity on two different levels. First, the productivity of the particular kind of service provided by the patrol division of the Lakewood Department of Public Safety is analyzed along several key dimensions. Second, the delivery of juvenile justice services is assessed according to performance criteria. Here the Report looks at the services provided by the Lakewood Youth Services Bureau and the Jefferson County Department of Social Services' Predelinquent/ Delinquent Crisis Project. Both of these organizations have interrelationships with the Lakewood Department of Public Safety.

These two topical issues - patrol productivity and the delivery of juvenile justice services - are selected because they are both salient and tractable. The saliency of these topics arises from the fact that there is an increasing concern over the allocation of scarce resources to both of these areas. And these topics have the distinct advantage of being amenable to systematic empirical investigation for the purpose of determining effective and efficient resource allocations. Hence, while there are obvious substantive differences between the selected topics, they have two properties in common. Both topics are policy relevant and open to empirical analysis.

PART I

JUVENILE JUSTICE SERVICES

I.   INTRODUCTORY OVERVIEW

1.   Introduction

There are two prominent juvenile justice programs serving the City
of Lakewood, that provide diversion and other alternatives to formal
criminal processing. One is administered by the Lakewood Youth Service
Bureau (YSB), and the other by the Jefferson County Department of Social
Services (Social Services). (Further reference to these projects is made
in Appendix II). In addition to these two programs, the City's Department
of Public Safety has a Juvenile Division.

The initial purpose of the research was to develop a descriptive pro-
file of juvenile crime and related variables within the City. Twenty variables
were identified, including (1) juvenile population, (2) juvenile custody cases,
(3) police referrals, (4) other referrals, (5) custody referral, (6) non-custody
referral, (7) Children in Need of Supervision (CHINS), (8) Delinquents, (9)
counseling service, (10) referral service, (11) client refusal of service, (12)
aggravated assault, (13) burglary, (14) larceny, (15) auto theft, (16) van-
dalism, (17) housing units, (18) density, (19) trip attraction, and (20) calls
for service. These twenty variables were described in terms of twenty-four
geographical areas of the City.

Subsequent analysis and policy exploration followed from the descriptive
profile. The major focus and scope of study was directed at analyzing func-
tional outcomes such as counseling or referral and behavioral status of juveniles
by area of the City. Analysis of the descriptive data leads to suggestions for

additional research as well as proposals for policy and budgetary imple-
mentation. The proposals put forth are directed at management of juvenile
service delivery functions and where applicable at performance budgeting.
The performance budgeting proposals indentify productivity measures
and performance indicators.

2. Data Collection Methods

It is important to note that data are collected using various tech-
niques and that all data are not of the same time period. The following
is an account of data collection and its application to the identified
variables:

(1) juvenile population - actual data for 1975;

(2) juvenile custody cases - sample data from the months of
July 1975, January 1976, and March 1976;

(3) police referrals - actual data from October 1975 to March
1976;

(4) other referrals - actual data from October 1975 to March
1976;

(5) custody referral - actual data from October 1975 to March
1976;

(6) non-custody referral - actual data from October 1975 to
March 1976;

(7) CHINS behavior - actual data from October 1975 to March
1976;

(8) Delinquent behavior - actual data from October 1975 to
March 1976;

(9) counseling service - actual data from October 1975 to
March 1976;

(10)   referral service - actual data from October 1975 to March 1976;

(11)   client refusal of service - actual data from October 1975 to March 1976;

(12)   aggravated assault - actual data for the months of April and August 1975;

(13)   burglary - actual data for the months of April and August 1975;

(14)   larceny - actual data for the months of April and August 1975;

(15)   auto theft - actual data for the months of April and August 1975;

(16)   vandalism - actual data for the months of April and August 1975;

(17)   housing units - actual data for 1975;

(18)   density - actual data from 1975;

(19)   trip attraction - actual data from 1975; and

(20)   calls for service - sample data from April and August 1975.

Data on juvenile population, housing units and density were obtained from the City's Long Range Planning Section. All crime occurrence data were taken from computer print out listings provided by the Department of Public Safety. Juvenile custody data were obtained from Custody Forms and calls for service data from Radio Control Cards provided on micro-film. Trip attraction data were obtained from the Denver Regional Council of Governments' Second Generation - Trip Generation Model. All other data were obtained from YSB and Social Services.

3. Study Approach and Focus

The initial task was to develop a statistical profile of juvenile crime and its correlates by area of the City. All subsequent analysis was done by areas of the City, whether it be individual areas (i.e. beats) or aggregated areas. Client related characteristics, to include referral source, custody status, behavioral status, and service delivered were analyzed by organization (i.e. agency) involved and functionally, which included area based data from more than one agency but analyzed collectively. Tables I-1 and I-2 provide organizational data, and Tables I-3, I-4, I-5, I-6, I-7, and I-8 contain functional data. Table I-9 provides organizational data for the Youth Service Bureau. Tables I-10 and I-11 both provide functional data. Since the major focus and scope of study was directed at analyzing functional outcomes such as counseling or referral and behavioral status of juveniles by area of the City, these behavioral occurrences and relationships were assessed using data from three agencies, including the Lakewood Youth Service Bureau, the Lakewood Department of Public Safety, and the Jefferson County Department of Social Services. Of these three organizations, the Youth Service Bureau and the Jefferson County Department of Social Services were selected for study, independent of the statistical data available from the other agencies. Therefore, special treatment is given the statistical data associated with these two agencies. Tables I-1 and I-2 address the respective organizations. In addition, Table I-9 provides more selective treatment of Youth Service Bureau data.

All juvenile data have been developed to show relationships by residence of juveniles. For example, a crime that is committed in Beat 4 but committed by a juvenile who resides in Beat 7, its analyzed in terms of the juvenile characteristics of Beat 7. In conclusion, all characteristics associated with juveniles are plotted by area of residence of the juveniles.

Section II (Profile of Existing System and State) provides interpretation of the coefficient values. Reference is made to both expected and actual values with subsequent explanations. Section III deals with policy analysis and implications, and finally Section IV contains a discussion of possible policy and budgetary proposals.

4. Policy and Budgetary Proposals

Section III contains an analysis of existing and possible policy. This is followed by two policy proposals and nine budgetary proposals which are discussed in Section IV.

II. PROFILE OF EXISTING SYSTEM AND STATE

I. Introduction

Eight tables were developed to describe the existing system and
state of juvenile crime and related characteristics. Tables I-1 and
I-2 present organizational data for the Youth Service Bureau and the
Jefferson County Department of Social Services respectively. Both
tables are titled 'Behavioral and Service Relationships to Juveniles'.
The remaining tables of this section all contain functional or activity
data developed from more than one agency serving the City.

It is important to note that all of the variables identified in Tables
I-3, I-4, I-6, I-7, and I-8 were developed specifically for study of
juvenile crime and related characteristics. This situation is not the
case with Table I-5. The dependant variables identified in Table I-5
were originally developed for study of 'Patrol Productivity' (i.e. Part
II of this Report) and as such have limited applicability to the area
of study contained in Part I of this Report.

The data contained in these tables will be discussed table by
table. The accompanying narrative will identify assumptions and
inferences made in the interpretation. In addition, reference to
certain limitations on interpretation of the data will be made.
Analysis of coefficient values will be stressed in this section.
Further analysis may occur in later sections discussing policy im-
lications.

Lakewood Youth Service Bureau

BEHAVIORAL AND SERVICE RELATIONSHIPS TO JUVENILES

Table I-1

Police Beat	Referral Source				Custody Status of Cases				Behavioral Status				Services Delivered				Refused	
	Police		Other		Custody		Non-Custody		CHINS		Delinquent		Counseling		Referral			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	24	7.32	0	0.00	19	7.01	5	5.55	8	5.03	16	7.92	12	5.36	2	4.65	10	10.20
2	8	2.43	1	3.03	7	2.58	2	2.22	3	1.88	6	2.97	6	2.68	0	0.00	3	3.06
3	24	7.32	2	6.06	20	7.38	6	6.66	10	6.28	16	7.92	13	5.80	4	9.30	9	9.19
4	5	1.52	1	3.03	5	1.84	1	1.11	4	2.51	2	.99	5	2.23	0	0.00	1	1.02
5	20	6.09	2	6.06	19	7.01	3	3.33	9	5.66	13	6.43	8	3.57	1	2.32	13	13.28
6	7	2.13	1	3.03	4	1.47	4	4.44	4	2.51	4	1.98	3	1.33	3	6.97	2	2.04
7	9	2.74	0	0.00	6	2.21	3	3.33	2	1.25	7	3.46	5	2.23	3	6.97	2	2.04
8	6	1.82	0	0.00	5	1.84	1	1.11	1	.62	5	2.47	5	2.23	0	0.00	1	1.02
9	6	1.82	2	6.06	6	2.21	2	2.22	5	3.14	3	1.48	4	1.78	1	2.32	4	4.08
10	32	9.75	4	12.12	25	9.22	11	12.22	18	11.32	18	8.91	22	9.82	6	13.96	7	7.14
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	14	4.26	0	0.00	11	4.06	3	3.33	3	1.88	11	5.44	3	1.33	5	11.62	6	6.12
13	9	2.74	1	3.03	7	2.58	3	3.33	5	3.14	5	2.47	9	4.0	1	2.32	0	0.00
14	10	3.04	1	3.03	8	2.95	3	3.33	6	3.77	5	2.47	7	3.12	1	2.32	3	3.06
15	35	10.67	3	9.09	32	11.82	6	6.66	16	10.07	22	10.89	27	12.05	2	4.65	10	10.20
16	32	9.75	5	15.15	28	10.34	9	10.00	21	13.21	16	7.92	24	10.71	5	11.62	8	8.16
17	16	4.80	3	9.09	13	4.79	6	6.66	7	4.40	12	5.94	11	4.91	4	9.30	4	4.08
18	11	3.35	3	9.09	9	3.32	5	5.55	7	4.40	7	3.46	9	4.0	1	2.32	4	4.08
19	10	3.04	0	0.00	9	3.32	1	1.11	3	1.88	7	3.46	8	3.57	0	0.00	2	2.04
20	9	2.74	1	3.03	8	2.95	2	2.22	4	2.51	6	2.97	9	4.0	0	0.00	2	2.04
21	26	7.93	3	9.09	19	7.01	10	11.11	14	8.81	15	7.42	25	11.16	2	4.65	3	3.06
22	1	.30	0	0.00	1	.36	0	0.00	1	.62	0	0.00	1	.45	0	0.00	0	0.00
23	10	3.04	0	0.00	6	2.21	4	4.44	6	3.77	4	1.98	6	2.68	2	4.65	2	2.04
24	4	1.21	0	0.00	4	1.47	0	0.00	2	1.25	2	.99	2	.90	0	0.00	2	2.04
	328	100	33	100	271	100	90	100	159	100	202	100	224	100	43	100	98	100

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2.   Description of Variables - Organizational Context

Lakewood Youth Service Bureau: The descriptive data here are contained in Table I-1. Police referrals comprise 90.9% of all YSB referrals. Of 361 referrals, police accounted for 328, and others comprise the remaining 33. The average (i.e. mean) numbers of police referrals per beat was 13.6, with Beats 15, 10, 16, 21, 1, and 3 having the highest in numbers and Beats 22, 24, 4, 8, and 19 having the lowest in number. Nine of the beats received no other referrals.

The average number of custody case referrals per beat is 11.29 with Beats 15, 16, 10, 3, 1, 5, and 21 comprising the largest numbers, and Beats 22, 24, 4, 6, and 8 the lowest numbers. Custody cases comprise 75.18% of the cases classified by custody status (i.e. includes custody and non-custody cases). Beats 10, 21, 16, 3, 15, and 17 have the highest number of non-custody referrals, and Beats 4, 8, 19, 22, and 24 have the lowest numbers. The average number of non-custody referrals per beat is 3.75.

Of the 361 cases classified by behavioral status (i.e. CHINS or Delinquent), 44% were CHINS. Beats 16, 10, 15, 21, and 3 have the highest numbers of CHINS referrals and Beats 2, 7, 8, 12, 19, 22, and 24 have the lowest numbers. The average number of CHINS referrals per beat is 6.62. Delinquent referrals comprise 56% of the referrals classified by behavioral status. The average number of Delinquent referrals per beat is 8.41, with Beats 15, 10, 1, 3, 16, 21, 5, 17, and 12

BEHAVIORAL AND SERVICE RELATIONSHIPS TO JUVENILES

Table I-2

Police Beat	Referral Source				Custody Status of Cases				Behavioral Status				Services Delivered			
	Police		Other		Custody		Non-Custody		CHINS		Delinquent		Counseling		Referral	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	1	1.49	6	4.05	3	5.17	4	2.56	4	2.5	3	5.35	6	3.77	1	1.85
2	4	5.97	5	3.37	1	1.72	8	5.12	8	5.0	1	1.78	7	4.40	2	3.70
3	5	7.46	2	1.35	1	1.72	6	3.84	5	3.12	2	3.57	6	3.77	1	1.85
4	5	7.46	5	3.37	5	8.62	5	3.20	5	3.12	5	8.92	9	5.66	1	1.85
5	4	5.97	7	4.73	3	5.17	8	5.12	7	4.37	4	7.14	9	5.66	2	3.70
6	2	2.98	3	2.02	1	1.72	4	2.56	3	1.87	2	3.57	3	1.88	2	3.70
7	3	4.47	8	5.40	1	1.72	10	6.41	7	4.37	4	7.14	8	5.03	3	5.55
8	3	4.47	11	7.43	1	1.72	13	8.33	8	5.0	6	10.71	4	2.51	10	18.51
9	1	1.49	3	2.02	3	5.17	1	.64	3	1.87	1	1.78	3	1.88	1	1.85
10	3	4.47	11	7.43	7	12.07	7	4.48	11	6.87	3	5.35	13	8.17	1	1.85
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	3	4.47	6	4.05	2	3.44	7	4.48	5	3.12	4	7.14	6	3.77	3	5.55
13	3	4.47	9	6.08	2	3.44	10	6.41	9	5.62	3	5.35	10	6.28	2	3.70
14	3	4.47	2	1.35	2	3.44	3	1.92	3	1.87	2	3.57	3	1.88	2	3.70
15	3	4.47	9	6.08	2	3.44	10	6.41	11	6.87	1	1.78	8	5.03	4	7.40
16	3	4.47	9	6.08	5	8.62	7	4.48	10	6.25	2	3.57	7	4.40	5	9.25
17	3	4.47	4	2.70	0		7	4.48	7	4.37	2	3.57	4	2.51	3	5.55
18	3	4.47	7	4.73	3	5.17	7	4.48	8	5.0	2	3.57	10	6.28	0	0.00
19	1	1.49	1	.67	1	1.72	1	.64	2	1.25	0	0.00	2	1.25	0	0.00
20	3	4.47	7	4.73	1	1.72	9	5.77	7	4.37	3	5.35	5	3.14	4	7.40
21	4	5.97	4	2.70	2	3.44	6	3.84	7	4.37	1	1.78	6	3.77	2	3.70
22	1	1.49	0	0.00	1	1.72	0	0.00	0	0.00	1	1.78	1	.62	0	0.00
23	4	5.97	22	14.88	7	12.07	19	12.18	23	14.38	3	5.35	22	13.85	4	7.40
24	2	2.98	7	4.73	4	6.89	4	2.56	7	4.37	1	1.78	7	4.40	1	1.85
	67	100	148	100	58	100	156	100	160	100	56	100	159	100	54	100

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significantly above average in the number of referrals and Beats 4, 9,
22, and 24 lowest in the number of referrals.

In terms of services delivered, a very large majority, 84%, received
counseling rather than referral service to another agency. The average
number of counseling cases per beat is 9.33. Beats 15, 16, 21, and 10
are noticably above the mean, and Beats 6, 9, 12, 21, and 24 are lowest
in the number of counseling cases. Only 16% of the service cases resulted
in referral to another agency. Seven of the beats have no cases that con-
tributed to the number of referrals.

There were 98 cases of clients refusing to accept a service from the
YSB, which is 27% of the total referrals. Beats 1, 5, and 15 were highest
in the number of refusals with Beats 2, 9, 12, and 24 proportionately
high in the incidence of refusals. Beats 4, 8, 13, 21, 22, and 23 are
both numerically and proportionately low in the levels of refusal.

Jefferson County Department of Social Services: The data described
here are contained in Table I-2. Police referrals comprised 31.25% and
other referrals 68.75%. There are 67 police referrals which is an average
of 2.79 per beat. The average number of other referrals per beat is 6.16.
Beat 23 is the most notable extreme, having 22 referrals. Beats 8, 10,
13, 15, and 16 are also high in the number of other referrals, and Beats
3, 9, 19, and 22 are lowest in the number of other referrals.

Of the cases classified by custody status, 27.17% are custody cases and 72.83% are non-custody cases. The average number of custody cases per beat is 2.41 with Beats 4, 10, 16, and 23 highest in the numbers of custody cases. Fourteen of the twenty-four beats were below the mean (i.e. 2.41) for custody referrals. The average number of non-custody cases per beat is 6.50. Beats 7, 8, 13, 15, and 23 are highest in the numbers of non-custody cases and Beats 9, 14, 19, and 22 lowest in the numbers of non-custody cases.

The majority of cases classified by behavioral status were CHINS, comprising 74.07%. The average number of CHINS per beat is 6.66. Again, Beat 23 comprises a disproportionate number of CHINS with 23. Others high in CHINS include Beats 10, 15, and 16. Beats 6, 9, 14, 19, and 22 are lowest in the numbers of CHINS. Delinquents comprise 25.93% of the cases classified by behavioral status. The average number of delinquents per beat is 2.33.

Three out of four (i.e. 75.18%) cases resulted in counseling service, and 24.82% in referral service to another agency. The average number of counseling cases per beat is 6.62. Beats 23, 10, 12, and 18 are highest in the number of counseling cases, and Beats 6, 9, 14, 19, and 22 are lowest in the number of counseling cases. The average number of referrals to another agency is 2.25 per beat. The most notable Beat is 8 which had 10 of the 54 referrals.

3. Organizational Comparisons

A comparison is made of referral and service levels between the YSB and the Jefferson County Department of Social Services. Six month data for the months of October 1975 through March 1976 were obtained from the YSB, and five months data for the months of November, 1975 through March 1976 from Social Services. Percentage distributions and absolute numbers are provided as follows:

	YSB #	YSB (%)	Social Services #	Social Services (%)	Total #	Total (%)
Police Referrals	328	(83.33)	67	(16.67)	395	(100)
Other Referrals	33	(18.04)	148	(81.96)	181	(100)
Custody Cases	271	(82.64)	58	(17.36)	329	(100)
Non-Custody Cases	90	(36.31)	156	(63.69)	246	(100)
CHINS	159	(49.75)	160	(50.25)	319	(100)
Delinquents	202	(78.74)	56	(21.26)	258	(100)
Counseling Cases	224	(58.82)	159	(41.18)	383	(100)
Referral Cases	43	(44.14)	54	(55.86)	97	(100)

The Department of Social Services has no record keeping system of clients who refuse services. Therefore no comparative data are available.

4. Correlation Methodology

A correlation analysis was performed for each of the variables contained in Tables I-3 through I-8. Spearman's Correlation Coefficient was used throughout this part of the Report.

A coefficient is a number that can range from "+1" to "-1". This number reflects the extent to which there is a positive or negative linear association between two variables. The range of coefficient values is:

$$-1 = \text{strong negative relation}$$
$$0 = \text{no (neutral) relation}$$
$$+1 = \text{strong positive relation}$$

As a rule of thumb, values that range from .0-.30 are interpreted as representing weak relations, .31 to .60 as moderate relations, and .61 and higher as strong relations. The following narrative describes the computed correlation coefficients.

DELINQUENCY AND SERVICE DELIVERY

Table I-3

Police Beat	Delinquent Behavior		Counseling Service		Referral Service		Refusal of Service	
	N	R	N	R	N	R	N	R
1	19	3	10	6	3	5	6	2
2	7	15	3	20	1	10	3	8
3	18	4	11	5	2	8	5	4
4	7	15	7	8	0	17	0	17
5	17	6	8	7	1	10	8	1
6	6	20	5	16	0	17	1	13
7	11	10	7	8	3	5	1	13
8	11	10	7	8	4	2	0	17
9	4	21	3	20	1	10	0	17
10	21	2	13	2	4	2	4	7
11	-	24	-	24	-	17	-	17
12	15	8	5	16	4	2	6	2
13	8	14	7	8	1	10	0	17
14	7	15	6	12	1	10	0	17
15	23	1	18	1	0	17	5	4
16	18	4	13	2	0	17	5	4
17	14	9	6	12	5	1	3	8
18	9	12	6	12	1	10	2	10
19	7	15	5	16	0	17	2	10
20	9	12	6	12	2	8	1	13
21	16	7	13	2	3	5	0	17
22	1	23	1	23	0	17	0	17
23	7	15	4	19	1	10	2	10
24	3	22	2	22	0	17	1	13
Rank Coefficient				.88		.55		.74

5. Delinquency and Service Delivery (Table I-3)

In Table I-3, Delinquent behavior is identified as the independent variable, and counseling service, referral service, and refusal of service by client are dependent variables. For both YSB and Social Services, counseling is the primary service delivered. Of the 258 cases classified as Delinquent, 67.4% (i.e. 173) received counseling services. Referrals comprised 21.3% and refusals 14.3%. (Percentage distributions total 103% because some cases resulted in both counseling and referral). The actual coefficient value of (.88) for counseling service cases falls within an expected range, as does the actual coefficient value of (.55) for referral service cases. Counseling is the primary and preferred service delivered, and as such contributes to the explanation of the high (.88) coefficient value. In addition, the large proportion of counseling cases, probably provides part of the explanation. The expected coefficient value for refusal was between .45 to .65. This range was expected to be similar to that for the coefficient value for referral service cases. Therefore the actual value of (.74) is viewed as mildly unexpected. However, it may be explained in part due to the high proportion (i.e. 21.32%) of Delinquents that refuse service, compared to only 11.91% of CHINS that refuse service (refer to Table I-4).

6. CHINS and Service Delivery (Table I-4)

The same dependent variables are identified in Table I-4, however,

the independent variable of Delinquency has been replaced by the variable

of CHINS. The actual coefficient value of (.92) for counseling service

is very high. This extremely high value is slightly higher than what was

expected. A similar coefficient value was expected for CHINS as was

obtained for Delinquents in Table I-3. Counseling is not only the primary

and preferred service delivered for Delinquents but CHINS as well. The

CHINS cases also had a disproportionate number of counseling service

cases compared to referrals and refusals. For these reasons a high

coefficient value was expected. A moderate relationship was anticipated

between CHINS and referral service, which is represented by the actual

value of (.57). The actual coefficient value of (.48) for refusal of ser-

vice, which is lower than the coefficient value for refusal of service

amongst Delinquents, is an expected value. The fact that this coef-

ficient value is lower than the corresponding coefficient value for De-

linquents, may be explained in part due to the proportionately small

percentage (i.e. 11.91%) of refusals amongst CHINS. Service refusal

rates amongst CHINS and Delinquents are discussed later. They will

be discussed under the Section on Policy Analysis and Implications with

focus on both differences by the area of the City and by service outcomes

to include refusal of service.

CHINS AND SERVICE DELIVERY

Table I-4

Police Beat	CHINS Behavior		Counseling Service		Referral Service		Refusal of Service	
	N	R	N	R	N	R	N	R
1	12	11	8	11	0	19	4	3
2	11	12	10	7	1	16	0	16
3	15	7	8	11	3	9	4	3
4	9	14	7	14	1	16	1	10
5	16	6	9	10	2	13	5	1
6	7	21	1	22	5	4	1	10
7	9	14	6	16	3	9	0	16
8	9	14	2	21	6	2	1	10
9	8	19	4	18	0	19	4	3
10	29	2	18	3	6	2	5	1
11	–	24	–	24	–	19	–	16
12	8	19	4	18	4	6	0	16
13	14	9	10	7	4	6	0	16
14	9	14	4	18	2	13	3	6
15	17	5	11	6	4	6	2	8
16	31	1	19	2	9	1	3	6
17	14	9	10	7	3	9	1	10
18	15	7	13	5	0	19	2	8
19	5	22	5	17	0	19	0	16
20	11	12	8	11	2	13	1	10
21	21	4	18	3	3	9	0	16
22	1	23	1	22	0	19	0	16
23	29	2	24	1	5	4	0	16
24	9	14	7	14	1	16	1	10
Rank Coefficient				.92		.57		.48

7. Juvenile Population and Selected Social Correlates (Table I-5)

Table I-5 contains a series of dependent variables that were selected primarily for study of the police patrol function. The independent variable of juvenile population was selected specifically for study of juvenile crime and its characteristics. Therefore, some of the dependent variables have limited applicability to the independent variable. Some interpretation is made of the coefficient values but the interpretive and inferential limitations are also identified.

The most prominent limitation on interpretation of the values associated with the crime variables, is that these variables take into account crimes committed by both juveniles and adults, not just juveniles. Nevertheless, certain assumptions and inferences are made. It is assumed that of the five (i.e. aggravated assault, burglary, larceny, auto theft, and vandalism) crimes selected, juveniles commit a disproportionate number of vandalisms, larcenies, and burglaries of total crimes. It is further assumed that these disproportions are greatest for vandalism, next greatest for larceny, and last for burglary. With those two assumptions stated, vandalism was expected to have a higher coefficient value (.63) than larceny (.25) and larceny (.25) a higher coefficient value than burglary (.54). However larceny fails to show a higher coefficient value (.25) than burglary which is (.54). Therefore, this outcome was unexpected. Even if beats 2 (Westland Shopping Center), 4 (JCRS Shopping Center) and 19 (Villa Italia Shopping Center) are omitted, the correlation coefficient value for larceny remains less than that for burglary.

No expected values for aggravated assault and auto theft were made and subsequently no interpretation of their coefficient values, (.14) and (-.02) respectively, is made. However, if larceny and auto thefts are assumed to occur in activity centers, then their low coefficient values tend to be explained in part by the low coefficient value between juvenile population and trip attraction (.14), which is a variable designed to represent activity flow. The low coefficient value for calls for service (.09) also becomes understandable. This can be seen by examining the following relations. To further understand and explain these relations, larceny was selected as the independent variable and auto theft, trip attraction , and calls for service as dependent variables. The following coefficient values emerged at (.58), (.57), and (.60) respectively. One general inference from these statistical data is made. There is little correspondence between activity centers that are high in the incidence of larceny and auto theft and resident juvenile population. However, this inference can not be made for the crimes of burglary and vandalism. In essence, burglaries and acts of vandalism occur disproportionately closer to a juvenile's place of residence than do acts of larceny and auto theft. Related discussion of calls for service and crime variables is made in Part II of this Report.

The actual values for the remaining two dependent variables, housing units and density are as expected. Their values are (.70) and (.43) respectively. It is assumed that proportionately more adults live in higher density areas (e.g. apartments), thus resulting in a lower coefficient value for density (.43) than housing units (.70). (The "N" in density represents the density factor of people per square acre).

JUVENILE POPULATION AND SELECTED SOCIAL CORRELATES

Table I-5

Police Beat	Juvenile Population		Aggravated Assault		Burglary		Larceny		Auto Theft		Vandalism		Housing Units		Density		Trip Attraction		Calls For Service	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1	2752	7	2	21	12	15	26	14	1	16	22	9	2044	6	6.4	17	33873	10	9	11
2	867	21	5	12	11	16	105	2	2	12	26	4	641	22	7.2	11	38102	4	8	14
3	2350	12	14	2	26	4	50	6	9	3	28	3	2350	5	7.4	9	39412	2	29	3
4	1225	16	10	6	18	8	77	3	12	1	20	11	1837	8	8.7	7	37541	7	38	1
5	2934	4	11	5	29	2	39	10	5	6	10	18	2384	4	6.8	15	35869	8	8	14
6	1500	14	2	21	14	13	39	10	9	3	20	11	1536	13	9.6	4	18737	19	22	4
7	994	19	3	18	16	11	18	20	2	12	9	19	1063	18	6.4	17	20375	17	5	20
8	1008	18	16	1	22	7	45	7	11	2	16	14	1114	17	7.4	9	25578	15	38	1
9	909	20	9	7	9	17	18	20	5	6	6	22	999	19	6.7	16	16368	22	7	18
10	2532	10	9	7	18	8	23	17	0	20	24	8	1799	11	2.8	22	27307	13	10	10
11	–	24	5	12	2	23	6	23	1	16	2	23	–	24	–	24	39633	1	0	23
12	2732	8	6	10	13	14	28	13	2	12	16	14	1803	9	6.9	13	26220	14	7	18
13	2435	11	14	2	23	6	44	9	8	5	18	13	1859	7	9.4	6	30190	11	13	7
14	1125	17	4	6	18	8	24	16	1	16	14	17	934	20	9.5	5	11424	23	18	5
15	6086	1	13	4	25	5	45	7	0	20	25	7	3075	1	10.6	2	35148	9	8	14
16	2837	5	5	12	5	22	38	12	3	9	26	4	1467	14	8.3	8	19751	18	4	21
17	2604	9	2	21	8	18	22	18	0	20	21	10	1569	12	7.0	12	17379	21	4	21
18	5185	2	4	16	28	3	54	5	2	12	40	1	2846	2	9.8	3	38035	5	14	6
19	788	22	3	18	8	18	158	1	3	9	15	16	724	21	6.9	13	38690	3	12	9
20	1450	15	5	12	8	18	25	15	5	6	8	21	1316	16	6.3	19	17499	20	13	7
21	4654	3	6	10	31	1	55	4	3	9	26	4	2830	3	11.1	1	37999	6	9	11
22	310	23	0	24	0	24	1	24	0	20	0	24	163	23	.36	23	7324	24	0	23
23	2822	6	3	18	15	12	19	19	1	16	37	2	1802	10	4.7	20	27666	12	8	14
24	2019	13	9	7	6	21	13	22	0	20	9	19	1418	15	4.7	20	21728	16	9	11
Rank Coefficient				.14		.54		.25		-.02		.63		.70		.43		.14		.09

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CORRELATES OF JUVENILE POPULATION AND ALL REFERRALS

Table I-6

Police Beat	Juvenile Population		Tot.Juvenile Custodies*		Police Referral		Other Referral		Custody Referral		NonCustody Referral		CHINS Behavior		Delinquent Behavior		Counseling Service		Referral Service		Refused Service	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1	2752	7	12	10	25	6	6	14	22	4	9	16	12	11	19	3	18	8	3	13	10	2
2	867	21	9	13	12	13	6	14	8	18	10	14	11	12	7	15	13	14	2	17	3	11
3	2350	12	14	7	29	5	4	19	21	6	12	10	15	7	18	4	19	5	5	9	9	4
4	1225	16	6	17	10	18	6	14	10	12	6	18	9	14	7	15	14	12	1	19	1	20
5	2934	4	25	1	24	7	9	8	22	4	11	12	16	6	17	6	17	9	3	13	13	1
6	1500	14	4	19	9	19	4	19	5	22	8	17	7	21	6	20	6	22	5	9	2	14
7	994	19	7	16	12	13	8	9	7	20	13	7	9	14	11	10	13	14	6	6	2	14
8	1008	18	16	4	9	20	11	5	6	21	14	6	9	14	11	10	9	18	10	1	1	20
9	909	20	3	21	7	21	5	18	9	15	3	21	8	19	4	21	7	21	2	17	4	8
10	2532	10	15	5	35	2	15	2	32	3	18	2	29	2	21	2	15	10	7	4	7	6
11	-	24	-	23	-	24	-	23	-	24	-	23	-	24	-	24	-	24	-	22	-	22
12	2732	8	8	15	17	9	6	14	13	8	10	14	8	19	15	8	9	18	8	3	6	7
13	2435	11	15	5	12	13	10	6	9	15	13	7	14	9	8	14	19	5	3	13	0	22
14	1125	17	9	13	13	12	3	21	10	12	6	18	9	14	7	15	10	16	3	13	3	11
15	6086	1	13	9	38	1	12	4	34	1	16	3	17	5	23	1	35	1	6	6	10	2
16	2837	5	19	2	33	3	14	3	33	2	16	3	31	1	18	4	31	2	10	1	8	5
17	2604	9	12	12	19	8	7	11	13	8	13	7	14	9	14	9	15	10	7	4	4	8
18	5185	2	14	7	14	10	10	6	12	11	12	10	15	7	9	12	19	5	1	19	4	8
19	788	22	5	18	11	17	1	22	10	12	2	22	5	22	7	15	10	16	0	22	2	14
20	1450	15	4	19	12	13	8	9	9	15	11	12	11	12	9	12	14	12	4	11	2	14
21	4654	3	18	3	30	4	7	11	21	6	16	3	21	4	16	7	31	2	4	11	3	11
22	310	23	2	22	2	23	0	23	2	23	0	23	1	23	1	23	2	23	0	22	0	23
23	2822	6	12	10	14	10	22	1	13	8	23	1	29	2	7	15	28	4	6	6	2	14
24	2019	13	0	23	6	22	7	11	8	18	4	20	9	14	3	22	9	18	1	19	2	14
Rank Coefficient				.69		.80		.66		.79		.64		.76		.68		.80		.48		.65

* Total refers to number of cases

8.   Correlates of Juvenile Population and All Referrals (Table I-6)

Table I-6 identifies juvenile population as the independent variable, and
total juvenile custody cases, police referrals, other referrals, custody referrals,
non-custody referrals, CHINS, Delinquents, counseling service cases, referral
service cases, and refusal of service by client as dependent variables. The
most salient observation made about the coefficient values contained in Table
I-6 is that all values fell within an expected range. The only value possibly
considered unexpected is that for referral service which is (.48). The coefficient
value for counseling service, (.80) was expected to be higher than the coefficient
values for either referral service (.48) or refusal of service (.65)   which is in
fact the case. However, the difference in coefficient values (.65) for refusal of
service and (.48) for referral service are mildly unexpected, although their dif-
ferences are not viewed as significant. The high coefficient value (.80)
for counseling services was expected for two reasons. First, counseling is the
primary or preferred service delivered by both YSB and Social Services, and
secondly, counseling cases comprise the greatest number (i.e. 343 cases of
542 total cases) of cases having a service or non-service outcome.

The actual coefficient value of (.69) for total juvenile custodies falls within
an expected range. Additional expected values appear for police referral (.80)
and other referral (.66). The higher value for police referral compared to other
referral was expected. It was assumed that proportionately more police referrals
occur closer to the residence of the juvenile. The lower value for other referral is
explained in part by referrals from schools, relatives, and other service agencies,

that have less correspondence or association with a juvenile's place
of residence. Further speculation is made that the difference between
the values of (.80) and (.66) may be accounted for in large part due to
vandalism cases, which occur disproportionately close to a juvenile's
place of residence.

Both actual coefficient values for custody cases (.79) and non-
custody cases (.64) were expected as was the relative difference in
coefficient magnitudes. The assumption was made that proportionately
more custody referrals occur closer to the residence of the juvenile. Thus
resulting in a higher coefficient value for custody referrals compared to
non-custody referrals.

The two remaining coefficient values for CHINS (.76) and Delinquents
(.68), also reflect expected values and magnitudes. It is assumed that
proportionately more CHINS behavior than delinquent behavior occurs
closer to a juvenile's place of residence, and hence the difference in mag-
nitude of values is explained in part by this phenomena.

9. Correlates of Juvenile Population and Police Referrals (Table I-7)

Table I-7 contains only police referrals and as such the dependent
variables of the other referral and non-custody referrals are omitted. The
independent variable of juvenile population and all other dependent variables
are retained in Table I-7.

Again, all actual values fell within an expected range with the excep-
tion of referral services, which had a coefficient value of -.15. This value,
however, is not accepted as valid because of the small N, and hence no

Interpretation of its meaning is rendered. Due to the high number of

ties among the ranks, the appropriateness of Spearman's Correlation

Coefficient was called into question. A second coefficient value was

computed using Kendall's Tau, which makes an adjustment for ties.

The subsequent value is (.52) which falls within an expected range.

Interpretation of the remaining coefficient values is provided.

The same relationship between the independent variable, juvenile popu-

lation and dependent variable of total juvenile custody cases is the same

as identified previously under 'all referrals', and is represented by the

value of (.69).

The high actual coefficient value of (.80) for total police referrals

was expected, as was the high value of (.79) for police custody refer-

rals. However, the closeness of these values is mildly unexpected.

A value of approximately (.70) was anticipated for police custody referrals.

The mildly high value of (.64) for delinquent behavior falls within an

expected range, as does the value of (.63) for CHINS behavior. Although,

both moderate values were expected, their closeness was not expected.

The mildly high value of (.72) for counseling services also falls within an

expected range. Again, because police provide proportionately more delin-

quent referrals, and because delinquents have a much higher service refusal

rate than do CHINS, the mildly high value for counseling service is viewed

as expected. Support for this thesis is provided by the high moderate coef-

ficient value of (.58) for refusal of service.

CHINS behavior has a coefficient value of (.63). This value was expected to be greater than the value for Delinquents, which in fact is the case, but was expected to be (.70) or more. Therefore this value is viewed as mildly unexpected.

10. Comparison Between Data on Police and All Referrals

The statistical outcomes in Tables I-6 and I-7, generally are characterized as expected. The coefficient values for counseling service (.80) and refusal of service (.65) for 'all referrals' and counseling service (.55) and refusal of service for 'police referrals' all fell within an expected range. A higher expected coefficient value for Delinquents of (.68) under 'all referrals' compared to it's value of (.52) for 'police referrals' was expected.

The moderate to strong coefficient values to emerge for all dependent variables implies a strong predictive and explanatory capability for juvenile population. Juvenile population as a single variable explains a great deal of the relationship with most of the dependent variables. Although, it is not explicit, the independent variable of juvenile population presumably accounts for such properties as affluence, housing units, physical mobility, etc. These non-explicit properties undoubtedly contribute to the powerful predictive capability of the independent variable. Juvenile population, as an independent variable, demonstrates that moderate to strong relations emerge simply by having the juvenile population. Other variables, subsequently explain the magnitude of the coefficient values.

CORRELATES OF JUVENILE POPULATION AND POLICE REFERRALS

Table I-7

Police Beat	Juvenile Population		Total Juvenile Custody Cases		Total Police Referrals		Police Custody Referrals		CHINS Behavior		Delinquent Behavior		Counseling Service		Referral Service		Refusal of Services	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1	2752	7	12	10	25	6	22	4	8	6	17	6	12	7	1	5	10	1
2	867	21	9	13	12	13	8	18	5	8	7	13	8	13	1	5	3	10
3	2350	12	14	7	29	5	21	6	11	4	18	5	19	5	3	3	7	4
4	1225	16	6	17	10	18	10	12	5	8	5	19	9	10	1	5	0	21
5	2934	4	25	1	24	7	22	4	5	8	19	3	12	7	3	3	9	2
6	1500	14	4	19	9	19	5	22	4	14	5	19	4	20	3	3	2	16
7	994	19	7	16	12	13	7	20	4	14	8	11	6	17	3	3	2	10
8	1008	18	16	4	9	19	6	21	3	20	6	17	5	19	3	3	1	20
9	909	20	3	21	7	21	9	15	2	22	5	19	3	21	1	5	3	10
10	2532	10	15	5	35	2	32	3	15	2	20	2	21	4	2	4	7	4
11	–	24	–	23	–	24	–	24	–	24	–	24	–	24	–	6	–	21
12	2732	8	8	15	17	9	13	8	3	20	14	7	6	17	4	2	5	7
13	2435	11	15	5	12	13	9	15	4	14	8	11	10	9	2	4	0	21
14	1125	17	9	13	13	12	10	12	6	13	7	13	8	13	2	4	3	10
15	6086	1	13	9	38	1	34	1	13	3	25	1	25	1	5	1	8	3
16	2837	5	19	2	33	3	33	2	19	1	14	7	23	3	4	2	6	6
17	2604	9	11	12	19	8	13	8	5	8	14	7	13	6	2	4	4	8
18	5185	2	14	7	14	10	12	11	4	14	10	10	9	10	1	5	4	8
19	788	22	5	18	11	17	10	12	4	14	7	13	8	13	0	6	2	10
20	1450	15	4	19	12	13	9	15	5	8	7	13	9	10	1	5	2	16
21	4654	3	18	3	30	4	21	6	11	4	16	3	25	1	2	4	3	10
22	310	23	2	22	2	23	2	23	1	23	1	23	2	23	0	6	0	21
23	2822	6	12	10	14	10	13	8	8	6	6	17	8	13	4	2	2	16
24	2019	13	0	23	6	22	8	18	4	14	2	22	3	21	1	5	2	16
Rank Coefficient				.69		.80		.79		.63		.64		.72		±.15*		.58

* A second correlation coefficient was computed using Kendall's Tau, which resulted in a value of .52 (refer to narrative for explanation)

11. Correlates of juvenile Custody (Table I-8)

Total juvenile custody cases is the independent variable and total
police referrals, police custody referrals, CHINS, Delinquents, counseling
service cases, referral service cases, and refusal of service by client
cases serve as the dependent variables. All of the coefficient values
that appear in Table I-8, fall within an expected range.

The actual coefficient values for total police referrals (.75) and police
custody referrals (.66) appear as expected. These coefficient value rela-
tions may appear to be somewhat unusual or unexpected, and as such a partial
explanation is provided. Although proportionately more delinquents are
taken into custody than CHINS, proportionately fewer delinquents get re-
ferred for services. This phenomena exists in large part because a deter-
mination of family and juvenile interest in other services is made prior to
a decision by police to refer. So in essence, there are custody cases that
police would like to refer for other services, but do not because a pre-
liminary indication by parents or juveniles is made that services will be
refused.

The strong coefficient values of (.81) for CHINS and particularly (.88)
for Delinquent are understandable, if you keep in mind the select grouping,
namely total juvenile custody cases, used as the independent variable.

A higher coefficient value for counseling service cases (.77) was ex-
pected and moderate values for referral service and refusal of service were
expected. It is believed that the moderate values occurred because custody

cases which are referred have lower than average counseling outcomes and subsequently higher referral and/or refusal outcomes. Although, both referral service and refusal of service were expected to have moderate coefficient values, which in fact is the case, the higher value (.56) for referral service was not necessarily expected.

12. Data on Non-Lakewood Juveniles

One indicator of the ratio of Lakewood to non-Lakewood juvenile residence was obtained. Lakewood residences comprise 62% of the custody cases. Of the 38% non-Lakewood residences that could be identified by other jurisdiction, 102 of 147 were located. The following breakdown exists:

(1) Denver with 53 = 54.0%
(2) Unincorporated Jefferson County with 22 = 22.4%
(3) Arvada with 12 = 12.24%
(4) Wheat Ridge with 5 = 4.90%
(5) Edgewater with 3 = 2.94%
(6) Evergreen with 2 = 1.96%
(7) Arapahoe County with 2 = 1.96%
(8) Out of region with 1 = .98%

However, because data on non-custody cases was not obtained, limited inferences can be made on the ratio of Lakewood to non-Lakewood juveniles.

13. Conclusions About Existing System and State

Four prominent conclusions are made from the preceeding interpretations. The first of these pertains to area based relationships for essentially all dependent variables. A substantial distribution around the mean for police referrals highlights certain differences by area of the City. There are

differences by area of the City for other referral, but the distribution is not as great as for police referrals. Custody and non-custody differences exist by area of the City, with a wider range of distribution for custody cases. A similar pattern exists for CHINS and Delinquents, with CHINS ? exhibiting a greater range of distribution by area of the City than Delinquents. Areas of the City also display substantial differences in the ratios and relationships of counseling cases to referral and/or refusal cases.

The second major conclusion applies to organizational data for the YSB and Social Services. Major differences, by referral source, custody status, and behavioral status exist in terms of the percentage distributions associated with each agency. Less prominent differences exist between the two agencies as regards the percent of counseling cases and referral cases.

A third significant conclusion regards the percent of cases resulting in client refusal of service. Since all such data applies to YSB, the conclusion has greater organizational (i.e. YSB) than functional significance. The overall refusal rate of 27% and the greatly disproportionate refusal rate in selected beats is viewed as a problem and examined later.

Although the final conclusion is drawn from limited assumptions and inferences, its implications are noteworthy. Area (i.e. beat) relationships between juvenile population and the crimes of vandalism and burglary differ substantially from the relationships that exist between juvenile population

and the crimes of larceny and auto theft.

These conclusions and others are dealt with in more detail under the various topical headings of this Section that discuss data contained in the various tables. Further treatment of these conclusions will be made in subsequent sections dealing with policy analysis.

Conclusions drawn about the existing system and state must be understood within a context that makes no reference to a commonly recognized or accepted organizational model and performance standards and norms. As such, the strength and applicability of the most salient and prominent conclusions are best understood through an awareness of bivariate relationships only, and not through a composite profile that combines a series of bivariate relationships into one aggregate picture. Although normative models and standards are not used as points of descriptive and analytic reference, both empirical and normative considerations will be dealt with in the next section.

Table I-8

Police Beat	Total Juvenile Custody Cases		Total Police Referrals		Police Custody Referrals		CHINS Behavior		Delinquent Behavior		Counseling Service		Referral Service		Refusal of Services	
	N	R	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1	12	10	25	6	22	4	12	11	19	3	18	8	3	13	10	2
2	9	13	12	13	8	18	11	12	7	15	13	14	2	17	3	11
3	14	7	29	5	21	6	15	7	18	4	19	5	5	9	9	4
4	6	17	10	18	10	12	9	14	7	15	14	12	1	19	1	20
5	25	1	24	7	22	4	16	6	17	6	17	9	3	13	13	1
6	4	19	9	19	5	22	7	21	6	20	6	22	5	9	2	14
7	7	16	12	13	7	20	9	14	11	10	13	14	6	6	2	14
8	16	4	9	20	6	21	9	14	11	10	9	18	10	1	1	20
9	3	21	7	21	9	15	8	19	4	21	7	21	2	17	4	8
10	15	5	35	2	32	3	29	2	21	2	15	10	7	4	7	6
11	-	23	-	24	-	24	-	24	-	24	-	24	-	22	-	22
12	8	15	17	9	13	8	8	19	15	8	9	18	8	3	6	7
13	15	5	12	13	9	15	14	9	8	14	19	5	3	13	0	22
14	9	13	13	12	10	12	9	14	7	15	10	16	3	13	3	11
15	13	9	38	1	34	1	17	5	23	1	35	1	6	6	10	2
16	19	2	33	3	33	2	31	1	18	4	31	2	10	1	8	5
17	12	12	19	8	13	8	14	9	14	9	15	10	7	4	4	8
18	14	7	14	10	12	11	15	7	9	12	19	5	1	19	4	8
19	5	18	11	17	10	12	5	22	7	15	10	16	0	22	2	14
20	4	19	12	13	9	15	11	12	9	12	14	12	4	11	2	14
21	18	3	30	4	21	6	21	4	16	7	31	2	4	11	3	11
22	2	22	2	23	2	23	1	23	1	23	2	23	0	22	0	23
23	12	10	14	10	13	8	29	2	7	15	28	4	6	6	2	14
24	0	23	6	22	8	18	9	14	3	22	9	18	1	19	2	14
Rank Coefficient				.75		.66		.81		.88		.77		.56		.49

III. POLICY ANALYSIS AND IMPLICATIONS

I. Introduction

Inferences about existing policy and reference to potential policy are analyzed in light of the existing data and their relationships. Two general components comprise this section. The first of these components focuses on aggregated data presented in three tables. The next series of topical headings contain analysis of policy by client's referral source, custody status, behavioral status, service delivered, crime prevention, and community outreach.

2. Analysis of Aggregate Data

A limited presentation is made in this topical heading on policy relevant issues identified from Tables I-9, I-10, and I-11. More comprehensive examination, where appropriate, is made under the succeeding topics (i.e. 3-8) of this section. Table I-9 contains data by percentage distribution and absolute number for a series of variables that are grouped into eight separate clusters. Beat 11, which comprises one cluster, is the Federal Center and as such no data in Table I-9 are associated with it. All of the data contained in Table I-9 are for the YSB. Generally, other beats are clustered using major streets as boundaries.

The first of these policy relevant topics pertains to the low percentage of other referrals. One possible implication from this phenomena is the absence or failure of community interaction with the YSB. To the extent that community involvement in the criminal justice system contributes to crime prevention, the assumption is made that limited use of the community

as a resource is being made. Although, the number of other referrals is small, comparison of proportions between police and others can be made. (Compare percentages for each cluster to determine which is higher or lower). As clusters differ in terms of the percentage of other referrals, strategies dealing with community outreach should be considered. For example, only clusters 1, 2, and 5; 13, 14, 19, 20, and 21; and 23 and 24 have proportionately more police referrals.

Custody status provides a second policy issue area. Service delivery outcomes may have implications for the type of client that is referred to YSB. Strategies to deal with variations throughout the City may acknowledge custody status differences. For example, all clusters of the City have similar ratios of custody to non-custody, except Beats 1, 2, and 5; and 15, 16, and 22. The later clusters are characterized by proportionately more custodies than non-custodies. Custody status differences are closely related to behavioral status and as such the implications of one presumably affect the other.

Behavioral status is the third policy relevant issue. The clusters are approximately evenly divided between those having a greater proportion of CHINS than Delinquents and vice-versa. If CHINS behavior is assumed to be one indicator of potential delinquent behavior, differences in these ratios may have implications for crime prevention strategies. For example, where CHINS behavior is proportionately greater than delinquent behavior, a crime prevention strategy may gain importance.

A fourth prominent issue regards the percentage of clients refusing

service. The overall 27% refusal rate as well as particular clusters (e.g. Beats 1, 2, and 5) that are significantly higher than average, suggests two possible implications. One has to do with an outreach strategy for selected target areas of the City and the second regards the viability of referral as a service to clientele from selected target areas.

Within the various clusters of Table I-9, certain relationships emerge as noteworthy success examples. These examples, to the extent that distinguishing characteristics are identified, may serve as models or standards for performance within other clusters. Beats 13, 14, 19, 20 and 21 appear to provide two prominent examples. The beats are high in the proportion of referrals, which suggests a high efficiency ratio. But being efficient does not necessarily mean being effective as well. Therefore an examination of service outcomes becomes important. A high effectiveness ratio exists if the ratio of refusals to counseled or refusals to counseled and referred is used as the standard. Since counseled is the preferred service to be delivered, the ratio of counseled to refusal implies a strong measure of success for the cluster comprised of Beats 13, 14, 19, 20 and 21. Taken together, the high efficiency and effectiveness ratios tend to confirm the contention of successful performance within this cluster.

Certain interesting relationships between juvenile population and total juvenile custody cases exist. Four of the clusters, (i.e., 1st, 2nd, 3rd, and 7th), identified in Table I-10, have proportionately

more juvenile custodies than juvenile population. Beats 12, 17, and 18;
and 23 and 24 have significantly less percentage of custody cases than
juvenile population. As was the case with many of the relationships dis-
cussed for Table I-9, there appear to be implications for policies dealing
with outreach and crime prevention.

Two salient implications for policy emerge from Table I-11. Those
clusters that exhibit proportionately fewer police custody referrals and
total police referrals may be prime targets for an outreach strategy. Beats
1, 2, and 5 provide the most prominent example, with both police custody
referrals and total police referrals proportionately less than total juvenile
custody cases.

The second implication deals with the statistical flow associated with
Beats 15, 16, and 22. This cluster ranks fourth (tie) for total juvenile
custody cases, yet first for police custody referrals. It appears that re-
ferral of custody clients from Beats 15, 16, and 22 to YSB is a viable and
possibly preferred policy of the Public Safety Department. But a high number
of referrals doesn't guarantee success. However, by observing the service
outcomes for Beats 15, 16, and 22 in Table I-9, it becomes apparent that
counseling as the preferred service outcome experiences a successful ratio.
Therefore, the policy or strategy of custody referral, which is high, proves
to be quite desirable because of the proportionately high counseling service
outcomes. As such, the statistical flows associated with Beats 15, 16, and
22 demonstrate a successful policy. If a model is to be selected from Table
I-11, presumably it should be the cluster of Beats 15, 16, and 22.

SELECTED VARIABLES[*] BY POLICE BEAT CLUSTERS

Table I-9

Police Beat Clusters	Referral Source		Custody Status of Cases		Behavioral Status		Service Delivered		
	Police N(%)	Other N(%)	Custody N(%)	Non-Custody N(%)	CHINS N(%)	Delinquent N(%)	Counseling N(%)	Referral N(%)	Refused N(%)
1,2,5	52 (15.87)	3 (9.0)	45 (16.6)	10 (11.11)	20 (12.57)	35 (17.33)	26 (11.61)	3 (6.97)	26 (26.59)
3,4,6,7,8,9	57 (17.39)	6 (18.18)	46 (16.97)	17 (18.90)	26 (16.36)	37 (18.34)	35 (15.62)	11 (25.64)	19 (19.41)
10	32 (9.75)	4 (12.12)	25 (9.22)	11 (12.22)	18 (11.32)	18 (8.91)	22 (9.82)	6 (13.96)	7 (7.14)
11									
15,16,22	68 (20.74)	8 (24.27)	61 (22.52)	15 (16.66)	38 (23.92)	38 (18.83)	52 (23.25)	7 (16.28)	18 (18.38)
12,17,18	41 (12.5)	6 (18.18)	33 (12.18)	14 (15.57)	17 (10.69)	30 (14.85)	23 (10.27)	10 (23.25)	14 (14.28)
13,14,19,20, 21	64 (19.53)	6 (18.18)	51 (18.83)	19 (21.14)	32 (20.16)	38 (18.83)	58 (25.90)	4 (9.30)	10 (10.20)
23,24	14 (4.26)	0 (0.0)	10 (3.69)	4 (4.44)	8 (5.03)	6 (2.97)	8 (3.57)	2 (4.65)	4 (4.08)
Totals	328 (100)	33 (100)	271 (100)	90 (100)	159 (100)	202 (100)	224 (100)	43 (100)	98 (100)

[*] Contains only YSB data

CRIMES AND OTHER VARIABLES BY POLICE BEAT CLUSTERS

Table I-10

Police Beat Clusters	Juvenile Population N(%)	Total Juvenile Custodies N(%)	Aggravated Assault N(%)	Burglary N(%)	Larceny N(%)	Auto Theft N(%)	Vandalism N(%)
1,2,5	6553 (12.57)	46 (19.01)	18 (10.84)	52 (14.26)	170 (17.51)	8 (9.41)	58 (13.24)
3,4,6,7,8 9	7986 (15.33)	50 (20.66)	54 (33.33)	105 (28.81)	247 (25.44)	48 (56.49)	99 (22.62)
10	2532 (4.85)	15 (6.19)	9 (5.42)	18 (4.93)	23 (2.36)	0 (0.0)	24 (5.47)
11			5 (3.0)	2 (0.54)	6 (.61)	1 (1.17)	2 (.45)
15,16,22	9233 (17.73)	34 (14.06)	24 (14.47)	30 (8.22)	84 (8.64)	3 (3.52)	51 (11.65)
12,17,18	10521 (20.20)	34 (14.06)	12 (7.23)	49 (13.44)	104 (10.70)	4 (4.70)	77 (17.60)
13,14,19,20 21	10452 (20.08)	51 (21.09)	32 (19.30)	88 (24.15)	306 (31.54)	20 (23.52)	81 (18.51)
23,24	4841 (9.29)	12 (4.96)	12 (7.23)	21 (5.75)	32 (3.29)	1 (1.17)	46 (10.50)
Totals	52118 (100)	242 (100)	166 (100)	365 (100)	972 (100)	85 (100)	438 (100)

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CUSTODY AND REFERRAL VARIABLES BY POLICE BEAT CLUSTERS

Table I-11

Police Beat Clusters	Total Juvenile Custody Cases N(%)	Police Custody Referrals N(%)	Total Police Referrals N(%)
1,2,5	46 (19.01)	52 (16.20)	61 (15.52)
3,4,6,7,8,9	50 (20.66)	56 (17.45)	76 (19.34)
10	15 (6.19)	32 (9.97)	35 (8.91)
11			
15,16,22	34 (14.06)	69 (21.50)	73 (18.58)
12,17,18	34 (14.06)	38 (11.84)	50 (12.72)
13,14,19,20,21	51 (21.09)	59 (18.38)	78 (19.88)
23,24	12 (4.96)	15 (4.67)	20 (5.08)
Totals	242 (100)	321 (100)	393 (100)

3. Policy Analysis of Referral Source Data

Since referral source has a significant relationship to all other variables (i.e. custody status, behavioral status, and service delivered), the policy implications of referral source data are paramount. The most striking statistical disparity for YSB is between police referrals (i.e. 328) and other referrals (i.e. 33). These statistical disparities support an inquiry into the viability and effectiveness of policy and strategy directed at community interaction (i.e. referral and acceptance) with YSB. One operating premise of YSB is that it provides the community with a referral alternative to the Department of Public Safety. The small number of other referrals to YSB provides limited evidence at best in support of any such policy.

No breakout is made of beats or clusters that are particularly high or low in the proportion of other referrals. The small number of other referrals throughout the City suggests that serious consideration be given to an outreach strategy or policy possibly city-wide, but at the very least within selected target areas.

The small number of other referrals to YSB may be explained in part by the correspondingly high proportion of other referrals to Social Services. Social Services had 148 other referrals and only 67 police referrals. At the present time Social Service presumably has greater community visibility and awareness, in large part due to legal mandates and options. Promoting greater community awareness to YSB may be a difficult task. The development of an outreach strategy is viewed as one prominent method of satisfying such a task. An effort to promote YSB's visibility is not necessarily viewed

as a competitive act with Social Services. But this issue is suggested for further research as part of any policy or strategy to promote the agencies visibility and subsequent community interaction.

Broad policy implications may be better understood by examining beats or beat clusters characterized by extreme phenomena. Beat 10 (refer to Table I-6) is both high (i.e. 2nd) in police referrals and other referrals. It was speculated that police referrals may be high in part due to the aggresive and efficient behavior of individual officers. However, that phenomena doesn't contribute to the explanation about other referrals which are also ranked second. Perhaps a broader explanation that attributes community interaction with both police officers and other agencies (i.e. primarily Social Services) proves more viable.

Beat 15 may provide an illustration of successful policy. It ranks 9th in total juvenile custodies, yet 1st in police referrals. This success may only reflect on the efficiency of the policy (i.e. to refer high proportions of custody cases). However, by analyzing the service outcomes for counseling and refusal of service, it becomes apparent that success characterizes the efficiency and effectiveness of the police as regards clients from Beat 15. Another example of successful policy directed at community interaction appears to exist in Beat 23. It ranks 10th in both custody cases and police referrals yet 1st in other referrals. This particularly high rank for other referrals is accounted for in large part due to Social Service referrals.

Beat 3 provides a mixed example of success and failure. This beat

ranks 12th in juvenile population, 7th in custody cases, 5th in police referrals, yet only 19th in other referrals. The high rank in police referral suggests a high efficiency rate but its rank of 19th for other referrals implies an absence of community interaction with other agencies.

Beats 5 and 15 provide contrasting examples. Beat 5 ranks 1st in custody cases and 7th in police referrals, which is characterized as a policy failure if it is assumed that police referrals are viewed as desirable. Although Beat 15 only ranks 9th in custody cases it ranks 1st in police referrals, which is cited as an example of successful policy implementation.

4. Policy Analysis of Custody Status Data

The policy implications associated with custody status appear to be far more limited than are the cases with referral sources, behavioral status or service delivered. It is assumed that it is preferable to take fewer (i.e. to reduce the number or percentage) juveniles into custody. To the extent that YSB and Social Services demonstrate successful service outcomes (i.e. counsel or referral), police may be encouraged to handle more juveniles in a non-custody fashion. However, the implications for any such policy change of this sort are quite limited. Police officers have minimal discretion regarding custody and non-custody classifications. It is important though, to note that there is some discretion and as such there is some applicability of this policy.

A synergistic relationship may best characterize this policy with that of one dealing with refusal of service by clients. To the extent that the

YSB reduces the proportion of refusals and to the extent that YSB and Social Services increase the proportion of counseling cases, police may have an inducement to use more discretion in non-custody classification and subsequent referral.

Those beats that are proportionately high in custody compared to non-custody cases, presumably would be logical choices to implement such a policy or strategy. Seven prominent examples exist with regard to the YSB. They include Beats 1, 5, 8, 15, 19, 20, and 24. The most notable examples· for Social Services include Beats 1, 4, 9, 10, 14, 16, and 24.

Two prominent examples highlight the mixed results of existing policy. Beats 5 and 8 illustrate apparent failures (refer to Table I-7). Beat 5 ranks 1st in custody cases and only 4th (tie) in custody referrals. Similarly Beat 8 ranks 4th in custody cases yet only 21st in custody referrals. A contrasting example is provided with Beat 15, which ranks 9th in custody cases but 1st in custody referrals. The assumption is made once again, that referrals reflect the preferred policy and as such Beat 15 represents successful implementation of that policy.

5. Policy Analysis of Behavioral Status Data

Difference in the proportion of CHINS to Delinquents may imply strength or weakness in existing juvenile policy. Two assumptions are stated. The first assumption is that areas characterized by proportionately more delinquent than CHINS behavior, should be viewed as areas with the greatest existing problem. However, the second assumption is that areas characterized by proportionately high CHINS behavior may become high in delinquent behavior

in the near future. These two assumptions acknowledge the possibility of delinquent behavior shifting by area of the City in terms of its magnitude.

Beats that are particularly high in the proportion of CHINS to Delinquents, may be prime areas for implementation of selected crime prevention strategies and policies. If CHINS are viewed as potential Delinquents, then areas with proportionately high numbers of CHINS pose the greatest possibility of potential delinquent behavior. YSB data on beats significantly high in the proportion of CHINS include Beats 10, 16, and 21. For Social Services, Beats 2, 15, 16, 21, 23, and 24 are particularly noteworthy.

A second major policy implication is associated with Delinquent status and refusal of service. Delinquents have a higher refusal rate (55 of 258) or 21% than do CHINS (38 of 309) or 12%. (Refer to Tables I-3 and I-4 and remember that refusals came only from YSB data). Therefore, as the refusal rate for Delinquents decreases, police should view referral of Delinquents to YSB as an increasingly preferred policy. It is possible that the existing referral rate for Delinquents would be higher if fewer refusals of service existed. This policy is discussed in greater detail under the next topical heading.

6. Policy Analysis of Service Delivered and Refusal Data

Two preliminary comments are made. Refusal data were obtained only from the YSB. Secondly, the YSB refusal data discussed in this part of the Report, pertains to individuals (i.e. cases) that have been received by the agency. It does not contain data on potential clients that refuse YSB services prior to being referred. In essence there are two refusal stages.

One is at the police level (i.e. an individual indicates that he/she will not accept YSB services) and at YSB where an individual actually refuses services. Therefore, the 27% refusal rate does not include those individuals who indicate in advance that they will not accept YSB services. If both categories were combined, the overall refusal rate may be as high as double the 27% rate.

Special attention is now given to service delivered (i.e. counseling or referral) and refusal of service data for the YSB. In a previous discussion on aggregate data (i.e. Table I-9), reference was made to the high proportion of refusals in Beats 1, 2 and 5. These three beats highlight another significant relationship. All have a disproportionate number of refusals compared to referrals. The aggregate ratio of refusals to referrals is approximately 2.25 to 1.00, yet the ratio for these three beats is 8.66 to 1.00 (i.e. 26 to 3). This greatly disproportionate ratio of refusals to referrals, calls into question the viability of a referral policy as an alternative or option to counseling. To the extent that referral is not a meaningful option for clientele from certain areas of the City, it may be speculated that refusals are proportionately high because referral options are exercised in moderation at best.

Three of the four beats highest in counseling service provide an additional interesting phenomena. The three (i.e. Beats 10, 16, and 21) all have correspondingly higher counseling rates than refusal rates. The fourth (i.e. Beat 15) is very close to the average. Comparing the phenomena of Beats 1, 2, and 5, and that of Beats 10, 16, and 22, it may be inferred that for

certain areas of the City, the preferred (i.e. avoidance of refusal) policy may be referral.

Certain disparities between referrals and refusals are further high-lighted in Table I-8, which provides collective data. The following beats and their respective ranks (i.e. referral first and refusal second) are provided:

> Beat 1 is 13th (tie) and 2nd
> Beat 2 is 17th and 11th
> Beat 3 is 9th and 4th
> Beat 5 is 13th (tie) and 1st
> Beat 9 is 17th and 8th
> Beat 15 is 6th and 2nd
> Beat 18 is 19th and 8th

The higher refusal rate of Delinquents compared to CHINS, which is approximately 1 out of 4.5 for Delinquents and 1 out of 8.0 for CHINS also has policy implications. (These refusal ratios are based on total CHINS and Delinquents, not just YSB cases. YSB organizational data appear in Tables I-1 and I-9).

Both YSB and Social Services identify counseling as the preferred and primary service. Therefore, it is assumed that counseling outcomes are preferable to referral outcomes (some exceptions) and that referral outcomes are preferable to refusal of service. As such beats with higher proportions for counseling, next highest for referral and last for refusal are assumed to exhibit the greatest level of service delivery success. The one exception pertains to beats that are extremely high in counseling outcomes but not necessarily higher in referral outcomes compared to refusal outcomes.

Examples of apparent success and failure exist, as regards service

delivery policy. Beats 2, 18, 21, and 23 display very successful outcomes for CHINS (Refer to Table I-4). However, Beats 3, 6, 8, 9, 12, and 14 provide illustrations of failures. Table I-3 for Delinquents also contains examples of success and failure. Beats 1, 2, and 5 are noteworthy failures. These three beats all have higher ranks for refusal than for counseling, including Beat 1 which ranks 7th and 1st respectively, Beat 2 which is 13th and 10th, and Beat 5 which is 7th and 2nd. Beats 13, 14, and 21 exhibit prominent successful outcomes.

There was some expectation that counseling outcomes would serve as a predictive variable for the optional outcomes of referral and refusal. In essence, knowing the counseling outcomes would permit one to expect certain ratios of referral and refusal outcomes. Such an expectation, very clearly would have had policy implications. However, counseling outcomes apparently provide no predictive capability, as evidenced by the non-patterned outcomes for both referrals and refusals.

7. Policy Analysis of Crime Prevention

Policy applications to referral source, custody status, behavioral status, and service delivery also have direct implications for a crime prevention policy. In large part, a crime prevention policy and subsequent strategy, emerges from policy considerations in the previously identified areas.

Crime prevention policy can be directed at target areas, clientele, and/or activities. Two crime prevention strategies are explored. The first of these strategies explores the applicability to the target clientele or

population of CHINS. The assumption is made that CHINS (i.e. pre-delinquent) behavior is a good indicator of potential Delinquent behavior. Areas that demonstrate proportionately more CHINS than Delinquent behavior, may exhibit greater potential for Delinquent behavior. Therefore, such areas should be considered as target areas for crime prevention strategies.

Certain areas of the City illustrate this relationship, and as such may be thought of as target areas. Beats 16, 23, and 24 are examples. Beat 16 ranks 4th in Delinquents, yet 1st in CHINS. A more dramatic difference is exhibited in Beat 23, which ranks 15th in Delinquents, yet 2nd in CHINS. Beat 24 has less disparity than Beat 23, but its ranks are 22nd for Delinquents and 14th for CHINS. These two beats, however, provide a convenient cluster for implementation of a crime prevention policy. Although Beat 10 ranks 2nd for both CHINS and Delinquents, it may also serve as a good target area for such a policy.

A second strategy is discussed that examines areas of the City exhibiting proportionately more other referral source contact than police referral source contact. It is assumed that areas demonstrating proportionately more other referrals than police referrals, may be areas that have developed a greater level of interaction with juvenile justice serving agencies and more community involvement. That greater level of interaction and involvement should serve to promote crime prevention policy and related strategies.

Four beats contain notable differences in rank for police and other

referrals. Beat 8 is 20th for police, yet 5th for other, while Beat 13 is 13th for police and 6th for other. Beat 23 dramatically illustrates this disparity with a rank of 10th for police yet 1st for other. Although Beat 24 has a less dramatic difference (i.e. police rank 22nd and other 11th), it is also noteworthy.

Beats 10 and 16 are also identified for consideration because they rank very high in other referrals, 2nd and 3rd respectively, even though they are equally high for police referrals.

8. Policy Analysis of Community Outreach

Any outreach strategy may be closely related to a crime prevention policy, and presumably is developed in conjunction with strategies pertaining to referral sources and service outcomes, as well as both custody status and behavioral status. Outreach pertains to any policy and related strategy that involves interaction and involvement with the community outside of a formal organizational setting or structure. It also strongly implies pre-problem contact with the community, and the ability to establish an agency's visibility and convey its sense of purpose prior to need of the agency's services.

The most significant indicator of the need for an outreach policy is service delivery outcomes (i.e. successes and failures). Since refusal outcomes only pertain to the YSB, an examination of organizational data is made. Beats 1, 2, 5, 9, and 12 are the most notable examples of beats exhibiting proportionately high service refusal rates compared to counsel and/or referral rates. Beats 1, 2, and 5 provide a convenient

cluster for implementation of an outreach policy.

Areas with proportionately high referral outcomes, may also serve as outreach target areas. Although referral service is clearly preferable to refusal of service, for most areas of the City, counseling is preferred to referral. Beats with notably high referral rates include 6, 7, 12, and 17.

If delinquent behavior is assumed to represent the most critical juvenile problems for the YSB and Public Safety Department, areas proportionately high in Delinquents compared to CHINS may be logical choices for a target area. This assumption acknowledges the severity of an existing problem, as distinct from a crime prevention policy which may be directed at potential problem areas.

YSB data on behavioral status show Beats 1, 2, 5, 8, 12, 15, 17, and 19 proportionately higher in Delinquents than CHINS. Four of these beats also show proportionately higher ratios of Delinquents to CHINS for Social Services data. Those beats include 1, 5, 8, and 12. Since four beats demonstrate proportionately high Delinquent referrals for both the YSB and Social Services, those four may be logical choices for implementation of an outreach strategy.

A general outreach strategy, presumably should take into account the relationship between police and other referrals throughout the City. In the case of the YSB, the other referrals are significantly low citywide, thus suggesting some type of general, broad based outreach policy. Selected strategies may tend to reflect specific problems associated with certain target beats. The demands for an outreach strategy may not be necessary

at all with regard to Social Services. Their current ratio of police to other referrals is 1.0 - 3.2, implying a high level of interaction with the community. In summary, an outreach policy has been examined with emphasis on YSB organizational data. In addition, a series of outreach strategies have been explored which take into account services delivered and refused, behavioral status and referral sources.

9. Conclusions

This section has presented an analysis of aggregate data, which are contained in Tables I-9, I-10, and I-11. It was followed by a series of topical headings (i.e. 3 - 6) that analyzed four categories (i.e. referral source, custody status, behavioral status, and services delivered or refused) in terms of policy implications. Two additional policy issues (i.e. crime prevention and community outreach) were examined in large part as they relate to existing or explored policy within the four previously identified areas.

IV. POLICY AND BUDGETARY PROPOSALS

I. Introduction

Two general policies (i.e. crime prevention and community outreach)

with specific strategies are proposed. Selected productivity measures and

performance indicators are identified for both the YSB and the Department

of Public Safety. The measures and indicators are identified within the

existing performance budget structure, which in part includes the following

topical headings:

> - performance objectives
> - indicators of performance
>   - demand
>   - workload
>   - productivity
>   - effectiveness

2. Policy Proposals

Two policies are proposed. The first of these is a crime prevention

policy and the second is a community outreach policy. The crime preven-

tion policy builds from a premise of greatest opportunity while the community

outreach policy emerges from a premise based on greatest need.

Policy I (Crime Prevention):

A strate. y for crime prevention is developed from two indicators. The

proportion of CHINS to Delinquent referrals by area of the City is the first.

Those areas of the City highest in the proportion of CHINS to Delinquents

are viewed as demonstrating the potential for increased delinquent behavior.

Using CHINS as an indicator, Beats 10, 15, 16, 23, and 24 emerge as sug-

gested target areas. The second policy indicator pertains to the ratio of

other to police referrals. Areas that have demonstrated high ratios are

viewed as having the greatest opportunity for a crime prevention strategy.

Beats 8, 10, 16, 23, and 24 emerge as suggested target areas using referral sources as an indicator.

The suggested target areas include those beats that were identified from both indicators. Any beats identified from one indicator but not the other are selected as optional target areas. Therefore, the following beats are identified as:

suggested target areas - Beats 10, 16, 23, and 24; and

optional target areas - Beats 8 and 15

Although Beat 15 is identified as an optional target area using the two selection criteria, strong encouragement is made for its inclusion in the suggested target areas. Its geographical proximity to Beats 10 and 16, provide a convenient cluster for a target area. Additionally, despite the fact that CHINS comprise proportionately fewer referrals than Delinquents, CHINS are still very high.

Policy 2 (Community Outreach):

Three indicators were utilized in selecting target areas for an outreach policy. Service outcomes, including refusal of service, is the first. Those areas highest in service refusal and/or low in counseling are identified as suggested target areas for such a policy. They include Beats 1, 2, 5, 6, 7, and 12. The second selection criterion is delinquent behavior status. Those beats highest in delinquent referrals compared to CHINS referrals are viewed as areas exhibiting the greatest problem, and subsequently the greatest need. These beats include 1, 2, 5, 8, 12, and 15. The third indicator also

draws upon beats demonstrating the greatest need for an outreach policy. Those beats are proportionately low in the ratio of other referrals to police referrals, and include Beats 1, 3, 12, and 15.

Any beat identified from two of the three indicators is identified in the suggested target areas. Beats identified from only one indicator are listed under optional target areas. As such the following proposals are offered, including:

suggested target areas - Beats 1, 2, 5, 12, and 15; and

optional target areas - Beats 3, 6, 7, 8, and 17

The cluster of Beats 3, 6, 7, and 8 lends itself to a more concentrated outreach strategy because of geographical proximity than does Beat 17, which may be a decision factor affecting the optional target areas.

In summary, the selection of policy indicators differs for each of the two policy proposals. Moreover, two different premises are used as foundations for development of the two policies. The crime prevention policy builds from a premise of greatest opportunity while the community outreach policy emerges from a premise based on greatest need. (Refer back to Section III, topics 7 and 8 for discussion of policy rationale).

3. Budgetary Proposals

Nine proposals are made for inclusion in a performance budget. These proposals use terminology and format that are consistent with the existing (i.e. 1976) performance budget of the City. They are identified as follows:

Budget Proposal 1: YSB

Performance Objectives

- to reduce the client refusal rate citywide by 5%.
- to reduce the client refusal rate in selected target areas (i.e. Beats 1, 2, 3, 5, 9, 15 and 18), collectively by 10%.

Measurement

1. Demand
    - juvenile justice system diversion counseling and referral services

2. Workload
    - total program hours
    - hours per counsel
    - hours per referral
    - cases per counselor

3. Productivity
    - cost per hour
    - cost per case
    - cost per successful outcome case

4. Effectiveness
    - reduce client service refusals

Budget Proposal 2: YSB*

Performance Objectives

- to reduce the Delinquent refusal of services rate citywide by 5%

Measurement

1. Demand
    - juvenile justice system diversion counseling and referral services

2. Workload
    - total program hours
    - hours per counsel
    - hours per referral
    - cases per counselor

3. Productivity
    - cost per hour
    - cost per case
    - cost per successful outcome case

4. Effectiveness
    - reduce client service refusals

* This objective is addressed in a broader context in Proposal 1

Budget Proposal 3: YSB

Performance Objectives

- to increase the ratio of counsel cases to refusal cases by 3%
- to increase the ratio of referral cases to refusal cases by 2%

Measurement

1. Demand
    - juvenile justice system counseling and referral services

2. Workload
    - total hours
    - hours per counsel case
    - hours per referral case
    - cases per counselor

3. Productivity
    - cost per hour
    - cost per case
    - cost per successful outcome case

4. Effectiveness
    - increase counseling and referral case to refusal case ratio

Budget Proposal 4: YSB

Performance Objectives

- to increase communty involvement and interaction citywide with the YSB
- to increase community involvement and interaction in selected areas (i.e. Beats 1, 2, 3, 5, 6, 7, 8, 12, 15, and 17)* with the YSB
- to provide a non-police referral option to the community for problems associated with juveniles.

Measurement

1. Demand
    - increased involvement and interaction with the community to facilitate greater system efficiency and effectiveness.

2. Workload
   - person hours spent on direct outreach activity

3. Productivity
   - the number of lectures, demonstrations, presentations, and other public addresses per month, per counselor, per audience type (e.g., students, parents, public service clubs, etc.).

4. Effectiveness
   - increase community involvement and interaction with YSB as an alternative to police.

* Beats 3, 6, 7, 8, and 17 are optional

Budget Proposal 5: YSB

Performance Objectives

- to increase the rate of other referrals citywide to the YSB by 10%
- to increase the rate of other referrals to YSB in selected areas (i.e. Beats 1, 3, 12, and 15) collectively by 15%.

Measurement

1. Demand
   - increased involvement and interaction with the community to facilitate greater system efficiencies and effectiveness.

2. Workload
   - person hours spent on direct outreach activities.

3. Productivity
   - number of lectures, demonstrations, presentations, and other public addresses per week, per month, per counselor, per audience type.
   - number of community groups organized as a result of community outreach.

4. Effectiveness
   - increase other referrals to the YSB

Budget Proposal 6: YSB*

Performance Objectives

- to increase referrals in selected target areas (i.e. Beats 1, 3, and 5) that are proportionately high in refusals by 10%.

Measurement

1. Demand
   - juvenile justice system diversion counseling and referral services

2. Workload
   - hours per referral
   - cases per counselor

3. Productivity
   - cost per hour
   - cost per case

4. Effectiveness
   - increase referrals in target areas of high refusal

*Optional proposal

Budget Proposal 7: YSB and/or Public Safety

Performance Objectives

- to prevent an increase in the ratio of CHINS to juvenile population
in selected areas (i.e. Beats 8, 10, 15, 16, 23, and 24)*

Measurement

1. Demand
   - to identify potential CHINS and to subsequently affect non-CHINS
   behavioral outcomes

2. Workload
   - not applicable (incorporated with other functions associated
   with crime prevention)

3. Productivity
   - number of special community contacts (e.g., lectures, demon-
   strations etc.)

4. Effectiveness
   - prevent increases in CHINS in selected areas.

*Beats 8 and 15 are optional

Budget Proposal 8: YSB and/or Public Safety

Performance Objectives

- to prevent an increase in the referral ratio of Delinquents to CHINS in
selected target areas (i.e. Beats 8, 10, 15, 16, 23, and 24)*

Measurement

1. Demand
   - identification and utilization of dispositional and processing alternatives for Delinquents.

2. Workload
   - not applicable (incorporated with other functions associated with community outreach).

3. Productivity
   - classification ratio of Delinquents to CHINS.

4. Effectiveness
   - prevent an increase in the ratio of Delinquent to CHINS referrals.

* Beats 8 and 15 are optional

Budget Proposal 9: YSB and/or Public Safety

Performance Objectives

- to reduce the rate of custody referral classifications (i.e. increase proportion of non-custody referrals) citywide by 2%.

Measurement

1. Demand
   - identify and utilize dispositional and processing alternatives to traditional custody classifications.

2. Workload
   - not applicable (associated with existing functions)

3. Productivity
   - ratio of custody to non-custody referral cases permitting officer discretion in classification.

4. Effectiveness
   - to reduce the proportion of custody referral classifications

4. Proposals For Additional Research

Five other areas of research, not addressed in this Report, are proposed

for additional research. These research topics are identified as follows:

Research Topic 1:

The YSB data should be analyzed to determine refusal rates between

police referrals and other referrals. If a community outreach policy is im-

plemented and results in an increased proportion of other referrals, the

refusal rates by referral source could have meaningful implications for

such a policy. Its significance is associated with the increased possi-

bility of the refusal rate increasing as the other referrals increase. There

are indications of this phenomena from existing data.

Research Topic 2:

Social Services should develop a category to identify clients that re-

fuse service, which in turn would permit the type of organizational analysis

performed on YSB data.

Research Topic 3:

If low community visibility contributes to high client refusal of service,

comparative research between YSB and Social Services should be undertaken.

This could be accomplished through a classification system for client re-

fusal of service by Social Services. If agency awareness and visibility

to the community does in fact contribute to refusal rates, Social Services

data should permit a test of such an hypotheses.

Research Topic 4:

Identify areas of the City based on percentage of non-Lakewood juveniles

taken into custody or contacted for other police handling. Existing data reveal that 38% of the City's custody cases are non-residence. Differences by area of the City could have implications for crime prevention and community outreach policies, as well as other policy areas.

Research Topic 5:

One important policy change has occurred since collection and analysis of data contained in this Report. All CHINS cases coming from Public Safety are being referred to Social Services and with optional or secondary re- ferral to the YSB. Major issues to analyze associated with this policy include changes in service demand levels for YSB, duplication of services, and the ratio of diversion to non-diversion cases.

5. Conclusions

This concluding Section for Part I of the Report has identified two policy proposals (i.e. crime prevention and community outreach), with reference to selected and optional target areas. Nine budget proposals as well as five additional research topics have been identified.

PART II

POLICE PATROL SERVICES

I. OVERVIEW OF PATROL TIME DEPLOYMENT

1. Introduction

The objective of this part of the Report is to determine the factors associated with the deployment of patrol units by the Lakewood Department of Public Safety. Several identifiable issues revolve around this basic question. They are: (1) What proportion of the patrol division's time is spent in given areas of the City? (2) Does the amount of time vary across different areas of the community? (3) What factors are associated with the amount of time that is spent in each area? and (4) In particular, how are calls for service related to patrol time? The remainder of this part of the Report is devoted to answering these questions. It is divided into six sections.

Section II describes the distribution of recorded patrol time across twenty-four police beats (geographically defined sections of the city). The data contained in Section I are based on a random probability sample of Daily Field Activity Reports (DFARs) completed by patrol agents. (The process used in selecting the sample is described below). From the DFARs, the recorded time that was consumed in non-administrative activities was plotted into the appropriate beats.

Section III describes the nature of the variable factors that were correlated with the recorded patrol time. Every beat was measured along each factor. The list of factors used in the study is as follows: (1) housing units, (2) land area, (3) population size, (4) population density, (5) trip attraction, (6) aggravated assault, (7) burglary, (8) larceny, (9) auto theft,

(10) vandalism, (11) distance from station, and (12) calls for service.
These twelve factors are viewed as "demands" for the services of the
patrol units. Hence, it is important to know the demands or combina-
tion of demands to which the units are most responsive.

Section IV is a discussion of the statistical findings based on simple
correlations between the separate demand variables and the recorded
patrol time. Here a comparison is made between expected (predicted)
relationships and the actual quantitative results.

Section V is an extension of Section IV. It provides an analysis
of the combined effects of three key demand variables; housing units,
burglaries, and calls for service. The results suggest that patrol is a
function of a combination of demand variables.

Section VI gives special attention to the demand factor of calls for
service. Calls for service are described along dimensions, such as,
types of calls and source of calls.

Section VII focuses on policy issues that flow from the descriptive
analysis of the preceding sections.

II. DESCRIPTION OF PATROL TIME DEPLOYMENT

1. Introduction

Before any inferences can be drawn about the extent to which patrol activities are responsive to demands for service, it is necessary first to describe exactly how patrol time is being allocated. Descriptive information on the deployment of patrol time was obtained through a manual process of data collection and tabulation. The data were collected in order to establish two fundamental descriptive propositions about patrol time.

First, the objective was to determine the amount of time spent in individual police beats in the City of Lakewood. Second, the intent was to identify the amount of patrol time spent in each beat during different watches (time-shifts). Having determined the amount of time for each beat, it then becomes possible to make some basic comparisons about the geographic location of patrol and the amount of time during alternate shifts.

Data on patrol time were obtained through a random probability sample of Daily Field Activity Reports (DFARs) that Lakewood agents completed during August 1975. The DFARs are documents which agents complete while they are on duty. These reports provide a record of how the agent spends his or her time. Information from the DFARs concerning an agent's activities was classified according to three categories.

Administrative Activities: This category includes activities spent

by the agent on a variety of tasks associated with the gathering of in-
formation, the processing of criminal defendants, and maintenance of
equipment. On the DFAR forms, these activities are commonly coded
under the following set of headings: LDPS, Communications Center,
Jeffco Jail, and Pumps. The time that an agent spends while engaged in
these various activities is defined as administrative time.

Recorded Patrol Activities: This category includes the full range of
an agent's crime related and non-crime related activities that are spent
in one of the twenty-four defined beats. Every time that the agent responds
to a situation requiring his assistance, investigation, or intervention, the
location of the situation and the amount of time that is consumed is recor-
ded. The time spent in these activities is defined as recorded patrol time.

Unrecorded Patrol Activities: This category includes the agent's ve-
hicular patrol activities. The efforts of an agent to be in a position to
suppress crime or to offer emergency assistance through patrolling is
generally not recorded by geographic location. Hence, it is virtually im-
possible to determine exactly where the agent is patrolling. However, by
subtracting administrative time and recorded patrol time from an agent's
total watch time, we have an aggregate measure of his unrecorded patrol
time.

It is important to realize the similarities and differences between
these three categories and the working concepts of the Lakewood Depart-
ment of Public Safety. The category of recorded patrol time is very similar
to what the LDPS calls operational time. Yet, it is reasonable to expect

that the measure of recorded patrol time will be slightly less than the LDPS measure of operational time. The reason is that two types of activities which were excluded from recorded patrol time are included in operational time. First, any non-administrative activity that an agent spends outside of the twenty-four beat structures was classified as unrecorded patrol activity. This decision is dictated by the fact that data on the community characteristics of Lakewood were restricted to the twenty-four beats. Hence, while the LDPS may count time spent in sections of unincorporated Jefferson County that are adjacent to the City, it was necessary to include this time under the heading of non-recorded patrol time. Second, despite the best efforts to plot recorded patrol activities by beat in one of the twenty-four beats, sometimes this task was impossible. In some instances, the agent provided either no address or an illegible address. Here, regretably these activities had to be coded under unrecorded patrol time. Hence, it was anticipated there will be differences in our measures of an agent's time and the scheme followed by LDPS.

These differences are likely to be greater in the case of unrecorded patrol time than in the case of recorded patrol time. In a real sense, the significance of measurement differences is minimized for two basic reasons. First, it is known that differences are likely to emerge. As a result of their predictability, they are less confounding. Second, and more importantly, because the focus of this part of the Report is on the correlates of recorded patrol time, the analysis focuses on the activity category which is most similar to the working concepts of the LDPS. Hence, it is anticipated that only

marginal differences between the sample measure of recorded patrol time

and the LDPS notion of operational time. And these differences are likely

to be the partial result of sampling error, not because of fundamental con-

ceptual differences between the definitions of recorded patrol time and

operational time. Thus, with these caveats, let us proceed to examine

more specifically the distribution of recorded patrol time across beats.

2. Sampling Methodology and Other Considerations

In order to obtain a valid and reliable estimate of recorded patrol

time, a random probability sample of agents within each of three watches

(time shifts) during the month of August was drawn. The sample included

four agents from Watch I, six officers from Watch II and four officers

from Watch III. After having selected the agents randomly, a search was

made to locate all of the DFARs that an agent completed during his as-

signed watch. (It is important to note that this search process was

limited to each agent's respective watch. As a result, if an agent assig-

ned to Watch I, according to the August duty roster, spent some time on

a certain day working in Watch II, the DFAR form that he filled out on Watch

II was not included in the sample). The total number of DFARs included in

August sample was 149.

From these 149 DFARs, every instance of a recorded patrol activity

was plotted against the beat structure. There were approximately 1500

activities listed on the 149 DFARs that were plotted in this manner.

Frequently, it was impossible to assign recorded patrol time to a

beat because of the lack of specific information on the DFARs. In order

to make the proper assignment, it was necessary to know the street number of the address where an agent spent his time. However, agents sometimes recorded only general addresses, such as, 6th and Wadsworth, 10th and Sheridan, and Alameda and Kipling. Because many of these general locations were on the border between two beats or at the intersection of three or four beats, there was no way to know what beat should receive the recorded patrol time. The frequency of these multiple beat locations of patrol time was considerable. The following information indicates the number of times two, three, or four beats were located at the point of a recorded activity.

	Doubles	Triples	Quadruples
Watch I	83	11	22
Watch II	101	13	26
Watch III	72	14	15

In order to cope with this problem, a randomization process was devised to assign the occurrence of multiple beat locations to specific beats. Essentially, the process assumed that it was equally probable that a multiple beat location took place in each of the beats involved. For example, if an activity was recorded to have taken place at the intersection of Beats 12, 13, 17, and 19, it was assumed that the probability of it occurring in each of the four beats was .25, .25, .25, and .25, respectively. The randomization process permitted us to integrate the recorded patrol time of the multiple beat activities with those that could be assigned, with no difficulty, to individual beats. While we are reasonably satisfied with the procedure of adjusting for multiple beat locations, the actual incidence

of multiple beat locations may raise policy questions both about the accuracy
of the DFAR data and the utility of the beat configurations. Those questions
are addressed in Section VII of this part of the Report.

In order to place recorded patrol time in some perspective, it is impor-
tant to view recorded patrol time in context of the total time worked by the
agents. Table II-1 provides a general breakdown of the total working time
by each of the three previously mentioned categories - - administrative time,
recorded patrol time, and non-recorded patrol time. Within each cell in the
table are two percentage figures. The first figure is based on the August
sample of DFARs. And the proportions in parentheses are based on the cal-
culations made by the Lakewood Department of Public Safety for every patrol
agent during the month of August.

PATROL DIVISION TIME BY WATCH
ACTIVITIES

TABLE II-1

Watch	Administrative Time	Recorded Patrol Time	Non-Recorded Patrol Time	Total Time
I	26% (34.5)	35% (38.1)	39% (27.0)	100%=37570 Minutes
II	22% (34.1)	42% (41.2)	36% (24.7)	100%=25770 Minutes
III	35% (35.1)	35% (42.1)	30% (22.9)	100% 30840 Minutes

As expected, a comparison between the sample percentage figures and the figures supplied by LDPS for recorded patrol time are reasonably close. For example, during Watch I, the sample percentage is 42% and the corresponding LDPS figure is 41.2%. In addition to this anticipated close correspondence, a predictable difference emerges for non-recorded patrol time. For each watch, the sample data indicate a greater percentage figure than the LDPS figures. Because of the close correspondence between the two sets of percentages for recorded patrol time, however, it is reasonable to examine this time category in greater detail. Specifically, the total amount of recorded time spent by each agent in a given beat during a single watch was computed. As a result, it is possible to determine the distribution of recorded patrol time by watch. This information is displayed in Table II-2.

3.   Recorded Patrol Time by Geographic Location

There are four major findings to emerge from the data contained in Table II-2. First, the most obvious fact is the unequal distribution of time spent in the twenty-four beats. The last row in the table reveals the percentage of the total amount of recorded patrol time for all three watches that is spent in each beat. Here the range is from 0% for Beat 22 to 7.2% for Beat 3.

Second, there appears to be more time spent in the northeastern quadrant of the City than in the other general geographic areas. This is seen by noting the percentage figures for Beats 2, 3, 4, 5, and 8. Together these beats account for 28.6% of the total recorded patrol time. The other section of Lakewood that seems to receive a considerable amount of patrol time is near the City's western border. Beats 10, 15, and 16 account for 14.7%

RECORDED PATROL TIME BY POLICE BEAT AND TIME SHIFT, AUGUST 1975 (MINUTES)
TABLE II-2

Watch Units	Time Shift	1	2	3	4	5	6	7	8	9	10	11	12
I	0600-1500	254	520	649	395	610	676	298	498	510	677	340	832
II	1400-2300	379	879	160	637	836	334	220	311	294	875	139	544
III	2200-0700	377	302	1719	1033	420	284	191	1026	361	451	118	328
Total Minutes By Beat		1010	1701	2528	2065	1866	1294	709	1835	1165	2003	597	1704
Percentage Distribution By Beat		2.9	4.9	7.2	5.9	5.3	3.7	2.0	5.3	3.3	5.8	1.7	4.9

Watch Units	Time Shift	13	14	15	16	17	18	19	20	21	22	23	24	Total for Watch
I	0600-1500	846	861	1113	500	213	321	1000	807	487	0	483	193	13083
II	1400-2300	318	394	472	760	780	348	164	795	680	0	498	128	10945
III	2200-0700	562	304	292	134	707	316	264	108	712	0	262	582	10853
Total Minutes By Beat		1726	1559	1877	1394	1700	985	1428	1710	1879	0	1243	903	34881
Percentage Distribution By Beat		4.9	4.5	5.4	4.0	4.9	2.8	4.1	4.9	5.4	0	3.6	2.6	100%

of the total recorded patrol time.

Third, there appear to be definite differences in the distribution of recorded patrol time by watch. For example, compare the time spent in Beats 8 and 20. During Watch I, the time spent in Beat 20 (807 minutes) is nearly twice the amount spent in Beat 8 (498 minutes). This difference is magnified during Watch II. Here Beat 20 (795 minutes) registers more than twice the level of patrol time in Beat 8 (311 minutes). And in Watch III, the situation is completely reversed. Now Beat 8 (1026 minutes) is credited with ten times the amount allocated to Beat 20 (108 minutes). If these differences between Beats 8 and 20 are not isolated cases, they suggest that as each watch changes, the distribution of recorded patrol time changes. In a real sense, then, the differences in the distribution of recorded patrol time are like day and night. (For a systematic investigation of the distribution of recorded patrol time, consult Appendix III).

Fourth, the distribution of recorded patrol time varies not only across beats, but within certain given beats by watch. For example, consider Beat 19, which is essentially the Villa Italia shopping area. Here the total amount of recorded patrol time is 1428 minutes. Yet, this time is not equally divided by watch. For example, 70% (1000/1428) is consumed during Watch I. Only 11% (164/1428) is absorbed by Watch II. And 19% (264/1428) is consumed during Watch III.

While this pattern of unequal distributions of recorded patrol time exists in some patterns, other beats demonstrate a near perfect equal distribution. As an illustration, consider Beat 18. Here the total re-

corded patrol time is 985 minutes. A breakdown of this time by watch reveals the following distribution: Watch I 33% (321/985); Watch II 35% (348/985); and Watch III 32% (316/985).

These illustrative comparisons of Beats 18 and 19 suggest the deployment of patrol time by beat is a very complex phenomenon. Beats which border one another not only exhibit different total amounts of recorded patrol time, some of them demonstrate significant differences by watch while others are unaffected by watch changes.

The research challenge posed by these differences can be put simply: What factors may account for the different allocations of recorded patrol time? In other words, what gives rise to the differential time spent in the various beats? For a systematic examination of this question, let us turn to the next portion of the Report.

III. POSSIBLE FACTORS AFFECTING RECORDED PATROL TIME

1. Introduction

The information contained in the preceding section demonstrates

the lack of uniformity in the distribution of recorded patrol time. Simply

stated, some beats receive more time than other beats. A basic research

task is to determine if there is some pattern to the relative differences

in the amount of recorded patrol time in individual beats. That is, are

the differences in patrol time the result of other identifiable factors.

Clearly, it is important to know whether or not the beats that are relatively

high in recorded patrol are the very same beats that are high on some

measurable social factor. This type of correspondence would suggest

that there is a rational basis for the observed differences in the dis-

tribution of recorded patrol time.

In order to explain the observed differences in the distribution of

recorded patrol time, it is necessary first to compile a list of variables

that are likely to be related to these differences. The selection of

variables is guided by two basic criteria. First, it is important to examine

variables that reflect basic characteristics of the City, e.g., population

density, housing patterns, and activity levels. City officials need to

know the extent to which "natural environmental" factors place demands

on the LDPS. If, for example, there is a strong positive association

between some of the environmental demands e.g. population density, and

patrol time, it suggests that as the City develops, e.g. population density increases, more demands will be placed on LDPS. Hence, more agents may be needed to cope simply with the natural growth pattern of the City.

Second, it is equally important to choose variables that are, in a real sense, more within the responsibility of the LDPS. That is, one needs to know the extent to which demand factors such as, crime and calls for service, affect the deployment of patrol time. Because the Lakewood Department of Public Safety has designed a system for allocating patrol resources to meet these types of demands, LDPS has considerable knowledge on this topic. As a result, this section may provide confirmation of prior LDPS research. Such confirmation would serve to strengthen the validity of the LDPS findings.

From the infinite set of factors that possibly contribute to the distribution of patrol time, we have selected twelve variables that meet one or both of our criteria have been selected. Each beat was measured along every variable. The list of variables is as follows:

> Number of Housing Units
> Land Area in Acres
> Population Size
> Population Density
> Trip Attraction
> Number of Aggravated Assaults
> Number of Burglaries
> Number of Larcenies
> Number of Auto Thefts
> Number of Vandalisms
> Miles from the LDPS Headquarters
> Number of Calls for Service

Before analyzing the statistical relationships between the demand variables and recorded patrol time, it is necessary to discuss briefly the rationale behind the selection of each variable. This review should suggest the statistical outcomes that might be expected to occur through a correlation of patrol time and the demand variables. The rationale surrounding the inclusion is described briefly.

2. Description and Definition of Selected Demand Variables

Housing Units: The number of housing units in a given beat is one indicator of potential crime, especially burglaries. As a result, the deployment of patrol time may be the greatest where the potential is greatest, i.e., the number of housing units is the greatest. Data on this variable were provided by the Long Range Planning Section of the City of Lakewood. They reflect the number of units in 1975.

Land Area: The size of a beat is one indicator of the time and effort required to provide minimal service to the area. Other things being equal, one expects the time devoted to a beat to increase as the beat size increases. Data on this variable were provided by the Long Range Planning Section of the City of Lakewood. They are representative of the City during 1975.

Population: The total number of persons in a beat measures a key source of demands on police agencies for all types of assistance. For this reason, as the sheer size of the population increases, the level of demands will increase. If that is the case, more patrol time will be spent in beats encompassing larger populations. Data on this variable were pro-

vided by the Long Range Planning Section of the City of Lakewood. They

are based on the size of the City in 1975.

Population Density: One possible indicator of anti-social behavior,

such as crime, is the density of population in a given beat. As the den-

sity increases, anti-social behavior often increases. Because patrol

activities are intended to respond to situations of criminal behavior it is

reasonable to expect greater time being spent in areas with greater popu-

lation densities. This variable was measured by dividing the land area

in each beat by its population size.

Trip Attraction: This variable measures the number of trips to places

of employment and business. Trips include traffic by both pedestrians

and all types of vehicular units. It is assumed that because trip attrac-

tions are the greatest in commercial areas, they place demands for both

traffic assistance and crime related activities. Hence, the greater the

level of trip attraction, the greater the expected level of patrol time.

Data on this variable were obtained from the Transportation Division of

the Denver Regional Council of Governments. This Division has designed

an elaborate mathematical model to calculate trip attractions. The figures

provided by the Transportation Division represent estimated activity levels

during 1975.

The Number of Aggravated Assaults, Burglaries, Larcenies, Auto Thefts,

and Vandalisms: It is commonly assumed that the police are responsible

for preventing and detecting criminal offenses. On the basis of this as-

sumption, one expects the greater the volume of crime in a beat, the greater

the level of patrol time. However, there are two distinct reasons for expecting only a moderate relationship between patrol time and the incidence of crime. First, extremely high or low relationships suggest a misallocation of patrol time. A very high association between patrol time and crime levels may suggest a certain degree of police ineffectiveness. That is, despite the great amount of patrol time in an area, the crime rate remains high instead of being reduced. On the other hand, a very low correlation indicates that the allocation of patrol activities does not take crime factors into account. Here the police would be neglecting to devote adequate resources to meet visible demands. Second, because other units of a police department, besides the patrol division, are charged with crime prevention and detection, a one to one correspondence between the level of crime and the level of patrol time is unlikely.

Rather than treating each type of crime separately, all of the crimes are grouped together under the general hypothesis that they will be moderately related to patrol time. Obviously, there will be differences in the exact magnitudes of the actual correlations between patrol time and each of the variables. However, these differences are likely to be marginal.

Data on these variables were obtained from the Lakewood Department of Public Safety. Because the LDPS identifies the location of offenses by the Police Reporting Grid (PRG) in which they occur, the data had to be recorded into the format of the twenty-four beats. The data reflect crimes that occurred during April and August 1975.

Distance of Police Beat From Station: The inclusion of this variable

is to obtain a measure of the effects of the distance of beats from the older, more commercialized areas of the City where the headquarters is located. Because the older commercialized areas place more demands for police services than the newer, residential areas which are located away from the inner city, it is reasonable to hypothesize a negative relation between distance from the station and patrol time.

This variable was measured by the DRCOG Criminal Justice staff. The distance was from the headquarters of the Lakewood Department of Public Safety to the midpoint of each beat.

Calls for Service: A key indicator of the demands for police services is the number of calls for service in each beat. While there is likely to be a positive relationship between patrol time and the number of calls for service, the relationship will be less than perfect. The reason is that every call does not require the same amount of service time by the agent who responds to the call. Hence, the beats with the greatest number of calls are not necessarily the ones with the greatest amount of recorded patrol time.

Data on this variable were obtained through a systematic sample of 293 Radio Call Cards. These Cards are stored on microfilm in the Records Section of the Lakewood Department of Public Safety. The data were drawn from the Cards for April and August 1975.

While these twelve variables measure the general demands for patrol services, there are more refined measures of these demands. For example, the factor of "crowding" is, perhaps, a more superior measure of the effects

of the concentration of population than population density.

Because of admitted measurement limitations, this research effort is basically exploratory in nature. The twelve variables permit us to probe the general problem of determining the factors affecting patrol time. With this perspective in mind, let us examine the empirical relationships between the distribution of patrol time across the twenty-four beats and each of the general demand factors.

IV. THE RELATIONSHIP BETWEEN PATROL TIME DEPLOYMENT AND IN-
DIVIDUAL DEMAND FACTORS

1. Introduction

Section II of this part of the Report described the magnitude and lo-

cation of recorded police patrol time by beat. It is believed that deploy-

ment might be affected by certain demand factors, which are enumerated

in Section III. This third section presents an analysis of the statistical

relationships between recorded patrol time and the demand variables.

The purpose of the statistical analysis is to test intuitive, subjective

explanations about the distribution of recorded patrol time through stan-

dardized, objective procedures. By comparing expected outcomes with

actual, statistical outcomes, intuitive hunches are confronted with syste-

matic evidence. In order to understand how the hunches are actually

tested, it is necessary to review briefly some basic statistical terminology.

2. The Nature of the Correlational Analysis

In the jargon, the demand variables are considered to be independent

variables. Independent variables are factors which are believed to affect

some other factor, called the dependent variable. For this Report, recorded

patrol time is the dependent variable. And the basic question is: to what

extent is the dependent variable of recorded patrol time a function of one or

more independent demand variables? To answer this question, correlational

analysis was undertaken.

Each demand variable was correlated with patrol time. The particular

correlational technique used is called Spearman's rho. Spearman's rho

is a rank-order measure of association. (The formula for this measure

is found in Appendix IV).

In order to apply this particular technique, the beats were arranged

according to their relative position on the twelve selected demand variables.

The resulting rankings are displayed in Table II-3. As an illustration, con-

sider Beat 1.

Reading across the table, it can be observed that Beat 1 is ranked 19th

on the variable of patrol time. This means that Beat 1 had a level of patrol

time that was less than eighteen of the twenty-four beats and more patrol

time than five of the beats. In terms of the variable of housing units, Beat

1 is ranked 6th. Accordingly, this means that Beat 1 had fewer housing

units than five of the beats and more housing units than eighteen of the

beats.

Spearman's correlation measures the degree to which the rank-ordering

of the beats on one variable, e.g., patrol time, is associated with the rank-

ordering of the beats on another variable, e.g., housing units. If there is

a perfect positive association between the two rank orderings, this means

that the rank-ordering of every beat on one variable is exactly the same as

it is on the other variable. Alternatively, if there is a perfect negative as-

sociation, the rank ordered position of every beat on one variable, e.g.,

first position, is just the opposite on the other variable, e.g., twenty-fourth

position. And if there is no association between two rank-orderings, this

means that some of the beats that ranked high on one variable are ranked low

MAGNITUDE AND RANK OF PATROL TIME AND DEMAND VARIABLES

TABLE II-3

Police Beat	Patrol Time Minutes	R	Housing Units Number	R	Land Area Acres	R	Population Number	R	Density P/AC.	R	Trip Attraction Number	R
1	1010	19	2044	6	1133	5	7300	5	6.4	17	33873	10
2	1701	11	641	22	320	22	2300	21	11	2	38102	4
3	2528	1	2350	5	960	8	7100	6	7.4	9	39412	2
4	2065	2	1837	8	562	17	4900	13	8.7	7	37541	7
5	1866	6	2384	4	1104	7	7700	4	6.8	15	35869	8
6	1294	16	1536	13	480	18	4600	14	9.6	4	18737	19
7	709	22	1063	7	480	18	3050	19	6.4	17	20375	17
8	1835	7	1114	17	480	18	3550	17	7.4	9	25578	15
9	1165	18	999	19	480	18	3200	18	6.7	16	16368	9
10	2003	3	1799	11	2181	1	6100	9	2.8	22	27307	13
11	597	23	0	24	715	13	0	24	0	24	39633	1
12	1704	9	1803	9	960	8	6600	8	6.9	13	26220	14
13	1726	8	1859	7	640	15	6000	10	9.4	6	30190	11
14	1559	13	934	20	320	22	3050	19	9.5	5	11424	23
15	1877	5	3075	1	1137	4	12100	1	10.6	2	35148	9
16	1394	15	1467	14	704	14	5850	11	8.3	8	19751	18
17	1700	12	1569	12	833	12	5800	12	7.0	12	17379	21
18	985	20	2846	18	1114	6	10950	2	9.8	3	38035	5
19	1428	14	724	21	320	22	2200	22	6.9	13	38690	3
20	1710	9	1316	16	640	15	4050	16	6.3	19	17499	20
21	1879	4	2830	3	960	8	10650	3	11.1	1	37999	6
22	0	24	163	23	1760	2	650	23	.36	23	7324	24
23	1243	17	1802	10	1453	3	6800	7	4.7	20	27666	12
24	903	21	1418	15	875	11	4150	15	4.7	20	21728	16

RANK COEFFICIENTS		+.56		+.19		+.47		+.54		+.36

MAGNITUDE AND RANK OF PATROL TIME AND DEMAND VARIABLES

(continued)

TABLE II-3

Police Beat	Aggravated Assaults Number	R	Burglaries Number	R	Larcenies Number	R	Auto Thefts Number	R	Vandalisms Number	R	Distance from Station Miles	R	Calls for Service Number	R
1	2	21	12	15	26	14	1	16	22	9	4.6	12	9	11
2	5	12	11	16	105	2	2	12	26	4	3	16	8	14
3	14	2	26	4	50	6	9	3	28	3	2	23	29	3
4	10	6	18	8	77	3	12	1	20	11	2.5	20	38	1
5	11	5	29	2	39	10	5	6	10	18	3	16	8	14
6	2	21	14	13	39	10	9	3	20	11	1.6	24	22	4
7	3	18	16	11	18	20	2	12	9	19	2.3	21	5	20
8	16	1	22	7	45	7	11	2	16	14	2.1	22	38	1
9	9	7	9	17	18	20	5	6	6	22	2.7	19	7	18
10	9	7	18	8	23	17	0	20	24	8	10.3	2	10	10
11	5	12	2	23	6	23	1	16	2	23	6	10	0	23
12	6	10	13	14	28	13	2	12	16	14	3	16	7	18
13	14	2	23	6	44	9	8	5	18	13	3.5	14	13	7
14	4	16	18	8	24	16	1	16	14	17	3.5	14	18	5
15	13	4	25	5	45	7	0	20	25	7	9.3	3	8	14
16	5	12	5	22	38	12	3	9	26	4	6.5	7	4	21
17	2	21	8	18	22	18	0	20	21	10	6.1	9	4	21
18	4	16	28	3	54	5	2	12	40	1	6.3	8	14	6
19	3	18	8	18	158	1	3	9	15	16	4.5	13	12	9
20	5	12	8	18	25	15	5	6	8	21	5.2	11	13	7
21	6	10	31	1	55	4	3	9	26	4	7.8	5	9	11
22	0	24	0	24	1	24	0	20	0	24	12.2	1	0	23
23	3	18	25	12	19	19	1	16	37	2	7.4	6	8	14
24	9	9	6	21	13	22	0	20	9	19	9	4	9	11

RANK COEFFICIENTS +.66   +.61   +.57   +.44   +.40   -.15   +.52

on the other variable while others are ranked near the bottom. In other words, the rank ordering on the one variable bears no resemblance to how the beats are ranked on the other variable.

From the application of the Spearman's rho, a number called a rank-order correlation coefficient is generated. The value of this number can range from +1.0 to -1.0. There are two important properties of a rank-order correlation coefficient. First, the sign of the coefficient reveals the direction of the relationship between the variables. A plus sign (+) indicates that there is a positive relationship. A minus sign (-) indicates that there is a negative relationship between the variables.

Second, the magnitude of the coefficient indicates the strength of the relationship between the variables. The magnitude can be interpreted as follows:

+1.0 = a perfect (very strong) positive association.

0 = no association

-1.0 = a perfect (very strong) negative association.

Because it is unlikely that actual correlation coefficients approach the extreme values of +1.00 - -1.00, a rule of thumb is helpful in interpreting the results. Generally speaking, a coefficient value between 0 and +.30 (or -.30) indicates a weak relationship between the two rankings. Values between +.31 and +.60 (or between -.31 and -.61) are deemed to express moderate statistical associations. And correlation coefficients between +.61 and +1.0 (or -.61 and -1.0) are considered to reflect strong associations. With this overview of the statistical technique being applied,

let us consider the actual results which are presented in Table II-3. At the bottom of the table, the rank order correlations between recorded patrol time and the respective demand variables are listed. The significance of both the *direction* and the *magnitude* of the results are discussed in turn.

3. Quantitative Relationships Between Patrol Time and Twelve Separate Demand Variables

Recorded Patrol Time and Housing Units: A positive correlation of (+.56) is found to exist between recorded patrol time and housing units. This means that if a beat has a relatively larger number of housing units than the other beats, it is likely to have a relatively high level of recorded patrol time. Moreover, a correlation of (+.56) is a modest finding, which is to be expected. Because some individual beats are mixtures of multiple dwelling units and single family units, there is no perfect correspondence between the number of residents, who may demand police services, and the number of housing units. Hence, the actual moderate correlation is consistent with the expected moderate value.

Recorded Patrol Time and Land Area: Here the correlation of (+.19) suggests that there is a very weak relationship between recorded patrol time and the size of the beats. This means that some large beats receive a relatively high level of patrol time while others receive low levels of patrol time. Similarly, some beats that are relatively small receive a relatively high level of patrol time and others receive relatively little time.

This statistical outcome is not totally unexpected. The sheer geographic size of a beat does not necessarily reveal very much about the composition of its residents or its crime-related factors. Because size

would appear to be an unlikely predictor of demands for service, the actual correlation of (+.19) is consistent with that expectation.

Recorded Patrol Time and Population: It can be observed from the table that there is a positive correlation of (+.47) between recorded patrol time and population. This signifies that the beats that rank high in population rank high in patrol time. Clearly, the direction, i.e., a positive association, of the actual correlation is as expected. That is, the more persons residing in a beat, the greater the demand for police services. Hence, more patrol time is expected to be devoted to beats with the greater populations.

Moreover, one would expect the magnitude of this correlation to be somewhat moderate. Population size does not indicate the level of population concentration. As a result, a beat with slightly less population, but with a greater concentration of population, may very well demand more time from patrol units than beats with larger populations. Hence, we find the modest level of the correlation as expected.

However, it follows from the reasoning above, that the correlation of recorded patrol time with a measure of population concentration will be higher than one with absolute population size. A test of this expectation is provided below.

Recorded Patrol Time and Population Density: For reasons stated above, the positive correlation of (+.54) between recorded patrol time and population density is as expected. Moreover, as predicted, this indicator is more highly related to recorded patrol time than is the factor of population size.

It is possible that with a more refined measure of population concentration, i.e., a measure of crowding, the correlation would be even higher. However, this idea remains untested because of a lack of data on the crowding factor.

Recorded Patrol Time and Trip Attraction: The positive correlation of (+.36) between recorded patrol time and trip attraction is in the expected direction, but the magnitude is somewhat less than anticipated. The weak association implies that trip attraction is a poor predictor of the deployment of patrol time.

The marginal association between trip attraction, which reaches its highest levels in non-residential areas, and patrol time is explained in part by the previously mentioned correlation between housing units and recorded patrol time. The (+.56) correlation between housing and recorded patrol time suggests that agents tend to spend more time in areas with more housing units. It follows then that there should be a weak association between non-residential units and recorded patrol time. Thus, the unexpected correlation of (+.36) between business activity levels, as measured by trip attraction, and patrol time becomes somewhat more understandable.

Recorded Patrol Time and Selected Criminal Offenses (Aggravated Assaults, Burglaries, Auto Thefts, and Vandalisms): All of the observed correlations between recorded patrol time and criminal offenses are in the expected

direction. That is, they are all positive findings. In addition, the magnitudes of the coefficients, with one exception, are as predicted. It was projected that the values of the correlations would be moderately high. And it can be observed that the correlations between recorded patrol time and aggravated assaults (+.66); burglaries (+.61); larcenies (+.57); and auto thefts (+.44) are moderately high. Only the relationship between recorded patrol time and vandalisms (+.40) is less than anticipated.

Recorded Patrol Time and Calls for Service: The actual positive correlation of (+.52) between recorded patrol time and calls for service is definitely in the anticipated direction. It might be expected that the results would be somewhat greater in magnitude, however. In other words, there should be a more perfect match up between the number of calls for service and the time that agents spend in the beats.

Yet, we believe that the time spent on calls for service varies considerably. For example, although the number of calls in Beat 19 (Villa Italia) is somewhat lower than most other beats, the time consumed in responding to these calls is somewhat greater than in the other beats. Because of differences in the time consumed in responding to calls, the amount of recorded patrol time will not strictly be a function of the sheer number of calls for service.

Recorded Patrol Time and Distance of the Beats from the LDPS Headquarters: The observed negative correlation of (-.15) between recorded patrol time and distance from station is in the expected direction. The location of the LDPS headquarters at 7860 W. 16th Avenue puts it in relatively

close proximity to beats which rank high on many of the demand variables.
For example, the beats close to the headquarters, i.e., 2, 3, 4, 5, 6, 7,
8, and 9, are relatively dense in population, relatively high in selected
crime occurrences, and relatively high in traffic flow. Simultaneously,
beats which are relatively far from the LDPS headquarters, i.e., 22, 23,
and 24, are relatively low in population density, crime occurrences, and
traffic flow. Hence, it is not unreasonable to find that as the distance
of the beat from the LDPS headquarters increases, the amount of recorded
patrol time in the beat decreases.

The immediate conclusion of the preceding analysis is that the existing
Lakewood patrol system functions in a reasonable and a responsive manner.
Support for this observation is based on the fact that the selected demand
variables were found to be related in the expected directions. In fact, the
magnitudes of the correlation coefficients generally were in the anticipated
ranges.

Yet, while the empirical findings imply that the deployment of patrol
time is responsive, in part, to the various demand variables, a complete
explanation of patrol time is lacking. Even though the individual demand
variables can reasonably be expected to be moderately associated with
patrol time, this still leaves open the question of what variable(s) actually
are more highly related to the distribution of recorded patrol time. While
this Report does not purport to have the definitive answer, this problem is
explored in the materials below.

V. COMBINED EFFECTS OF CERTAIN DEMAND VARIABLES ON PATROL TIME

1. Introduction

Although none of the individual demand variables, including calls for service, are highly related to recorded patrol time, it is reasonable to assume that some combination of factors might better explain patrol time. The preceding analysis has involved the calculation of simple rank order correlation coefficients. (Simple here means that only two variables, i.e., one independent and one dependent, are being examined). Yet, it is possible through the application of a multiple rank-order correlation coefficient to ascertain the combined effects of two or more independent variables, e.g., calls for service and burglary, on a single dependent variable, e.g., patrol time. (The formula for this measure of association is found in Appendix IV).

2. Quantitative Relationships Between Recorded Patrol Time and Certain Combinations of Demand Variables

Clearly, if a combination of factors is more highly related to patrol time than any single factor, the multiple correlation coefficient must be significantly greater than the simple coefficients. If, for example, a simple correlation is (+.54) and the multiple is (+.60), we know the additional independent variable(s) did very little to explain the distribution of the dependent variable above and beyond the original independent variable. With this in mind, let us consider the results of combining calls for service with two other demand factors - housing units and burglary. These two variables are chosen because, individually, they are highly related to patrol time. The correlation coefficients between patrol time and housing units is (+.56).

And the correlation between patrol time and burglaries is (+.61). (Burglary
was chosen as a demand variable instead of aggravated assault despite the
higher correlation of (+.56) between assaults and recorded patrol time. Theo-
retically, it can be argued that patrol activities are more likely to impact
burglaries than aggravated assaults. Hence, it seemed reasonable to look
at the combined effect of variables that are expected to be more highly re-
lated to recorded patrol time). The findings are summarized below.

<div align="center">

COMBINED EFFECT OF CALLS FOR SERVICE
AND SELECTED DEMAND VARIABLES

</div>

Independent Variables	Dependent Variable	Multiple Rank-Order Correlation Coefficient
Calls for Service and Housing Units	Patrol Time	+.70
Calls for Service and Burglary	Patrol Time	+.74

Interestingly, both combinations yield multiple correlation coefficients
that are greater than the simple correlation coefficients. For example, where-
as the simple correlation between calls for service and patrol time is (+.52),
and whereas the correlation between burglary and patrol time is (+.61), the
combination of calls for service and burglary yields a correlation of (+.74).
In other words, if we take both the incidence of burglary and calls for service
into account, then we can explain more of the variation in patrol time across
the twenty-four beats. Hence, although the calls for service variable, by
itself, is not the most powerful predictor of patrol time, the results of the
multiple correlational analysis indicate that calls for service in conjunction

with the incidence of burglary provide a high degree of statistical explanation.

The immediate conclusion of the multiple correlational analysis is that the Lakewood Department of Public Safety's system for allocating patrol time is clearly responsive to two key demands - burglaries and calls for service. Because the LDPS, as an agency of government, is assigned primary responsibility for dealing with these demands, the quantitative results indicate that they respond to these demands accordingly.

In addition, the combined effects of calls for service and housing units suggest that increases in both of these variables will place greater demands on the LDPS. Assuming that increases in the City's population will lead to increases in both housing units and calls for service, in the future, as the City of Lakewood grows, there will be a natural tendency for the Department of Public Safety to experience greater demands for its time and services.

The critical role that calls for service play in accounting for patrol time suggests the need for a closer look at this variable. Until now, there has been no indication of the make-up of these calls. Hence, a series of questions emerge concerning basic features of this variable. What are the different types of calls for service? Are most calls agent-initiated or initiated by citizens? Do agent-initiated calls for service differ from non-agent-initiated calls?

VI DIMENSIONS OF CALLS FOR SERVICE

1. Introduction

Calls for service are important ingredients in the distribution of recorded patrol time. However, to gain a clearer picture of this critical factor, some of its component parts need to be examined. A basic feature is the type of call that is being placed. Here it is important to know whether all, most, some, or none of the calls are calls for investigation of some criminal matter.

2. Calls for Service by Types of Calls and Sources of Calls

Data on types of calls for service are presented below in Table II-4.

Types of Calls For Service

TABLE II-4

1.	Crime related (e.g. burglary, theft, suspicious person, suspicious vehicle, open doors, prowler)	39%
2.	Non-crime, non-emergency (e.g. barking dog, neighbor problem, walk away, domestic disputes, fight, nuisance).	16%
3.	Non-crime, fire	0%
4.	Non-crime, medical	8%
5.	Traffic (e.g. motor assist, abandoned vehicle, traffic stop, traffic hazard)	<u>37%</u>

100% = 293

Calls for service are classified according to five basic categories. They are: crime related; non-crime, non-emergency; non-crime, fire;

non-crime, medical; and traffic. The table reveals what specific items fall
into each of the categories. For example, a call by a citizen reporting a
suspicious person or vehicle, is considered crime related.

The data displayed in the table indicate that most calls for service are
not crime related. From a sample of 293 calls, 39% were found to involve
some criminal matter, 37% were traffic calls, and the remaining 24% dealt
with some non-crime related problem. Hence, it appears that the Lakewood
Department of Public Safety is responding to demands that go beyond the
realm of crime. This situation is not unusual or unexpected, however. Prior
studies of other police agencies have shown that the agents are confronted
with demands for services in non-criminal problem areas. The data in Table
II-4, however, are based on all calls for service. This raises the question,
are there differences in the calls for service depending on the source of the
calls? In Table II-5, calls for service are separated into two groups - Agent
Initiated and Non-Agent Initiated.

TABLE II-5

Agent Initiated

Calls for Service by Types of Calls

1.	Crime related	18%
2.	Non-crime, non-emergency	4%
3.	Non-crime, fire	0%
4.	Non-crime, medical	3%
5.	Traffic	75%

100%=129

TABLE II-5

(continued)

Non-Agent Initiated

Calls for Service by Types of Calls

1.	Crime related	55%
2.	Non-crime related, non-emergency	24%
3.	Non-crime, fire	0%
4.	Non-crime, medical	12%
5.	Traffic	9%

100% = 167

Interestingly, there are differences in the types of calls initiated by agents as compared with those initiated by others, i.e., an agent's supervisor or citizens. For example, whereas 18% of the agent initiated calls are crime related, 55% of the non-agent initiated calls are crime related. An even more dramatic difference emerges with the proportion of traffic calls for each source. Of the agent initiated calls for service, 75% focus on traffic matters. Yet, only 9% of the non-agent initiated calls fall into this same category.

TYPES OF CALLS FOR SERVICE BY SOURCE OF CALL

TABLE II-6

Types of Calls

Source	Crime Related	Non-Crime Non-emergency	Non-crime Fire	Non-crime medical	Traffic
Agent Initiated Calls	20%	10%	0%	16%	86%
Non-Agent Initiated Calls	80%	90%	0%	84%	14%
Totals	100%=114	100%=47	100%=0	100%=23	100%=109

These differences in the types of calls for service being initiated by agents as compared with those intitated by non-agents are explored further in Table II-6. Here the data indicate what proportion of a given type of call for service are initiated by agents as compared with non-agents. These data serve to reveal whether a certain type of call is primarily agent initiated or non-agent initiated.

The information in Table II-6 suggests that, with the exception of traffic calls, calls for service are essentially non-agent initiated. This means that it is the agent's supervisor or a citizen who is requesting him to respond to crime-related calls; non-crime, non-emergency calls; non-crime, fire calls; and non-crime, medical calls. This pattern does not hold for traffic calls for service. If there is a traffic call, it is most likely to be agent initiated.

This table sheds more light on the fact that many of the calls for service are non-crime related. The bulk of the traffic calls, which constitute 39% of all calls for service, are the result of an agent's decision to respond to a given situation. Clearly, this finding is intuitively sound. Because the agents spend time patrolling major thoroughfares in Lakewood, e.g., Sheridan, Wadsworth, Colfax, Kipling, Alameda, and so forth, they are in a prime position to detect traffic problems.

VII. POLICY ANALYSIS

1. Introduction

The preceding six sections provide an account of the existing system of patrol time deployment. Sections I and II indicate how recorded patrol time is distributed across geographic areas of the City. In Sections IV and V, the distribution of recorded patrol time is correlated with a set of demand variables. And in Section VI, a selected demand variable (i.e., calls for service), is examined along certain basic dimensions. Basically, the findings presented in Sections I-VI confirm expected results. Virtually without exception, the actual correlations between recorded patrol time and the demand variables are both in the predicted direction and in the predicted range of magnitude. Because of the correspondence between expected and actual outcomes, the quantitative results suggest that, overall, the distribution of patrol time in Lakewood is responsive to key demand factors.

Despite the general similarity between the expected and the actual statistical results, certain policy questions emerge from the preceding analyses. The research effort has illuminated possible ways in which the deployment of patrol time might be made more productive. In order to develop a clearer picture of how the productivity of patrol time may be increased, this section focuses on a set of four issue areas. Within each issue area, a means of improving patrol time productivity is developed. The four specific issue areas are as follows: (1) refinements in the record keeping system maintained by the LDPS on Police Reporting Grids (PRGs), (2) redesigning of

existing beat configurations, (3) evaluation of the impact of unrecorded patrol time, and (4) an extended analysis of the relationship between patrol time and demand variables for individual watches.

2. Refinements in the Collection of Data Related to the Deployment of Patrol Time

Currently, the LDPS collects data on numerous factors associated with the distribution of patrol time. Three of these factors have been discussed in this part of the Report. They include (1) calls for service, (2) reported criminal offenses, and (3) recorded patrol activities. Each factor is identified by both the time and location of its occurrence. The time of occurrence associated with each factor is measured along commonly used dimensions, such as, time of day, date of month, and so forth. In regard to the location of calls for service, criminal offenses, and recorded patrol activities, the LDPS uses Police Reporting Grids (PRGs) as the units of analysis. That is, every type of recorded activity is identified by the PRG in which it takes place. (PRGs are subsections of the City. According to the map contained in Appendix I of this Report, there are 221 PRGs).

The output derived from the input data described above is essentially a summary of recorded patrol time within each watch by functional category. For example, the amount of time devoted to activities, such as, crime prevention and supression by patrol, administration, information center, and so forth, are tabulated for each watch on a monthly basis. Very clearly, this type of output information is of considerable importance in determining how the agents might best allocate their time. Despite the benefits derived from the knowledge produced on functional activities, however, there appear to be three limitations to this body of information.

The first limitation is that summary figures on the number of calls for service, reported criminal offenses, and recorded patrol activities are not readily available by PRG. For example, instead of receiving summary statistics on the relative frequency of types of calls for service for individual PRGs or combinations of PRGs, calls for service are listed individually on computer printout sheets. The printout sheets list the calls for service in the temporal sequence that they were received beginning with the first day of every month. However, the calls for service are intermingled with other specific data elements, such as, reported criminal offenses. In order to determine how many calls for service, how many criminal offenses, and how much recorded patrol time, occurred in a given PRG (or group of PRGs), a manual search must be conducted. The time involved in such a search is somewhat lengthy. For example, it took two COG staff members two working days to determine the relative frequency of six offenses (robbery, aggravated assault, burglary, larceny, auto theft, and vandalism) from a two month period for twenty-four combinations of PRGs. Presumably, it would take longer to identify the frequency of calls for service by PRG because of their greater volume.

The essential point here is that, despite the fact that data are inputed by PRG, basic summary statistics on calls for service, reported criminal offenses, and recorded patrol activities, by PRG are not immediately accessible. Because it is important to know the activity levels in each PRG, the lack of this type of output data needs to be corrected. The LDPS may want to consider making appropriate computer program changes in order to obtain

the basic summary data.

The second limitation to the data collection system currently employed

by the LDPS is the lack of specificity in location of key data elements. On

the basis of a manual search of past Daily Field Activity Reports (DFARs) and

Radio Control Cards, numerous addresses of recorded patrol activities could

not be identified by beat. As an illustration, if an agent recorded a call for

service to "6th and Wadsworth", there was no way of knowing if it occurred

at Beat 7, 9, 12, or 13. Similarly, it would be at least as difficult for the

LDPS to identify this same call for service by PRG. The LDPS would not,

presumably, know whether the call was to PRG 0506, 0406, 0507, or 0407.

The frequency of imprecise addresses is somewhat greater than might

be expected. The proportions of recorded patrol time activities and calls

for service that had one or more possible beat locations are listed below

(All of the figures are based on sample data, which have been previously

described).

MULTIPLE LOCATIONS OF RECORDED PATROL ACTIVITIES

Watch	Doubles	Triples	Quadruples	Total Activities
Watch I	83 14%	11 2%	22 4%	566 100%
Watch II	101 17%	13 2%	26 4%	606 100%
Watch III	72 16%	14 3%	15 3%	459 100%

MULTIPLE LOCATIONS OF CALLS FOR SERVICE

	Doubles	Triples	Quadruples	Total Calls
All Watches Combined	77 26%	3 1%	16 5%	293 100%

Interestingly, the percentage of multiple beat locations of recorded patrol activities is nearly identical across Watches I, II, and III. For example, the relative frequency of an activity possibly taking place in one of two adjoining beats is 14% during Watch I. It occurs 17% of the time during Watch II. And it occurs in 16% of the cases in Watch III.

Combining all three watches together, about 22% (357/1631) of the recorded patrol activities can not be directly assigned to an individual beat. (As mentioned , a method was designed to assign these activities on a random basis).

The incidence of multiple beat locations for calls for service is somewhat greater. Here 33% (96/293) of the calls could not be assigned directly to an individual beat.

While the imprecise nature of the addresses posed problems for the research effort of this Report in the assignment of patrol activities and calls for service to the twenty-four beats, this ambiguity would seemingly pose greater problems for the LDPS. Because PRGs are considerably smaller than the beats employed in this Report, four PRGs could meet on the border of two beats. For example, suppose that a call for service was listed at "Wadsworth and Florida". On the basis of this address, there is no way of knowing whether the call

was to Beat 18 or 21. However, this same location is at the intersection
of four PRGs, namely, 0511, 0411, 0512, and 0412. Hence, the LDPS
would not know which of four geographic units to assign the call.

In order to obtain more valid and reliable data on the location of calls
for service and recorded patrol activities, greater specificity in the re-
cording of addresses should be encouraged. Unless some steps are taken
to ensure greater accuracy in the recording of addresses, the PRG data will
have limited validity. And, of course, any results which flow from the analy-
sis of unreliable data will likewise be unreliable. However, if there is greater
accuracy in the recording of addresses, this problem can be reduced signifi-
cantly.

The third limitation of the existing data collection system is the lack
of data on community characteristics. On the basis of results discussed
in Sections IV and V, it seems reasonable to include factors, such as,
housing units, population, and population density, into the data base that
is used for making rational planning decisions about the allocation of re-
sources for patrol activities. An analysis of selected demographic factors
may be useful in making both short-run and long-run estimates of future
demands for patrol services. For example, if the analysis of demographic
data indicate that some types of activity sites e.g. shopping centers, de-
mand a certain percentage of patrol time, it may be possible to anticipate
that the construction of an additional activity center will lead to a certain

increased level of demands for patrol time and services. Presumably, both the LDPS and other City officials would want to know the likely effects of increased commercial activity on demands for police services because of the costs and other factors associated in providing these services. The LDPS would gain a better idea of how the impact of an increase in commercial activity may affect their future operations. And City officials may obtain a clearer picture of how an additional commercial activity site may affect their spending decisions. Obviously, it would be equally important to know that the activity centers are not sources of high demands for patrol services. This information would suggest, other things being equal, that an increase in activity centers may not necessarily lead to significantly greater demands for police services. If this is the case, the budgetary implications are quite clear. An additional activity center would not, by itself, justify increasing the allocation of resources for patrol activities. For these reasons, it seems worthwhile for the data elements currently being collected by the LDPS to be supplemented with other demand variables. Moreover, if crime-related and demographic data are brought together for the purpose of systematic analysis, the value of both data sets will be increased appreciably. Presumably, a system for integrating data collection efforts is in the City's interest.

3. Redesign of Existing Beat Configurations

One of the interesting unanticipated findings of this Report is the sizable number of calls for service and recorded patrol activities that occur on either the border of two beats or at the intersection of either three

or four beats. On the basis of the data presented above, 20% of.
the recorded patrol activities and 33% of the calls for service occurred
where two or more beats come together. Actually, the incidence of activity
on the boundaries of two or more beats is somewhat higher. In addition to
the activities that could not be assigned directly to an individual beat,
there were other activities that occurred on the border of two or more beats,
but which were assigned to a single beat. This assignment was made pos-
sible by the fact these activities were identified by a specific address, e.
g., 7200 Alameda, instead of a general address, e.g., 14th and Colfax.
As a result, it is reasonable to infer that more than 20% of recorded patrol
activities and more than 33% of all calls for service were on the boundaries
of two or more beats.

The observed level of activity on beat boundaries raises a question
about the design of beat areas. Simply stated, the high level of beat boun-
dary activity suggests the need for not using thoroughfares as beat boundaries.
If major arterials in the City, e.g., Colfax, 6th Avenue, Wadsworth, Kipling,
Alameda, Mississippi, and Union, etc., are used as boundaries, there may
be an inefficient allocation of patrol resources.

In theory, two criteria need to be taken into account when designing
beat boundaries. First, it is important to minimize the distance that an
agent must travel to respond to areas of highest demand. Second, it is
important to minimize overlapping responsibilities, i.e., two agents
should not be responsible for the same geographic area.

These criteria suggest that rather than having two agents from adjoining beats patrol different sides of the same thoroughfare, one agent should have single responsibility for the thoroughfare and the areas on both sides of it. Obviously, it is not being suggested that a single agent patrol the entire length of a major arterial. The point being made is that beats should capture the areas of high activity by including sections of major arterials within their boundaries instead of having the arterials on the perimeter of the beats.

An examination of the boundaries established by the LDPS reveals an attempt to incorporate some arterials within beats and the use of others as boundaries. For example, in the fourteen car plan, the beats are designed to incorporate Sections of Colfax and Wadsworth within beats. (A map of this plan which is used by the LDPS is provided below).

It can be seen from the map that the stretch along Colfax from Sheridan to Reed is contained in Beat 22 instead of being a boundary between Beats 22 and 24. Similarly, the section of Wadsworth between 26th Avenue and 6th Avenue are included in Beats 21 and 23.

Despite these and other examples, the 14 car plan retains many arterials, or at least major sections of them, as beat boundaries. Perhaps, more importantly, beats still come together at the intersection of major thoroughfares. For example, Beats 23, 36, and 25 meet at the intersection of Wadsworth and Sixth Avenue. In addition, Beats 33, 34, 35, and 36, meet at the intersection of Kipling and Sixth Avenue. Hence, the existing beat configuration as used by the LDPS is a mixture of desirable and less than desirable features.
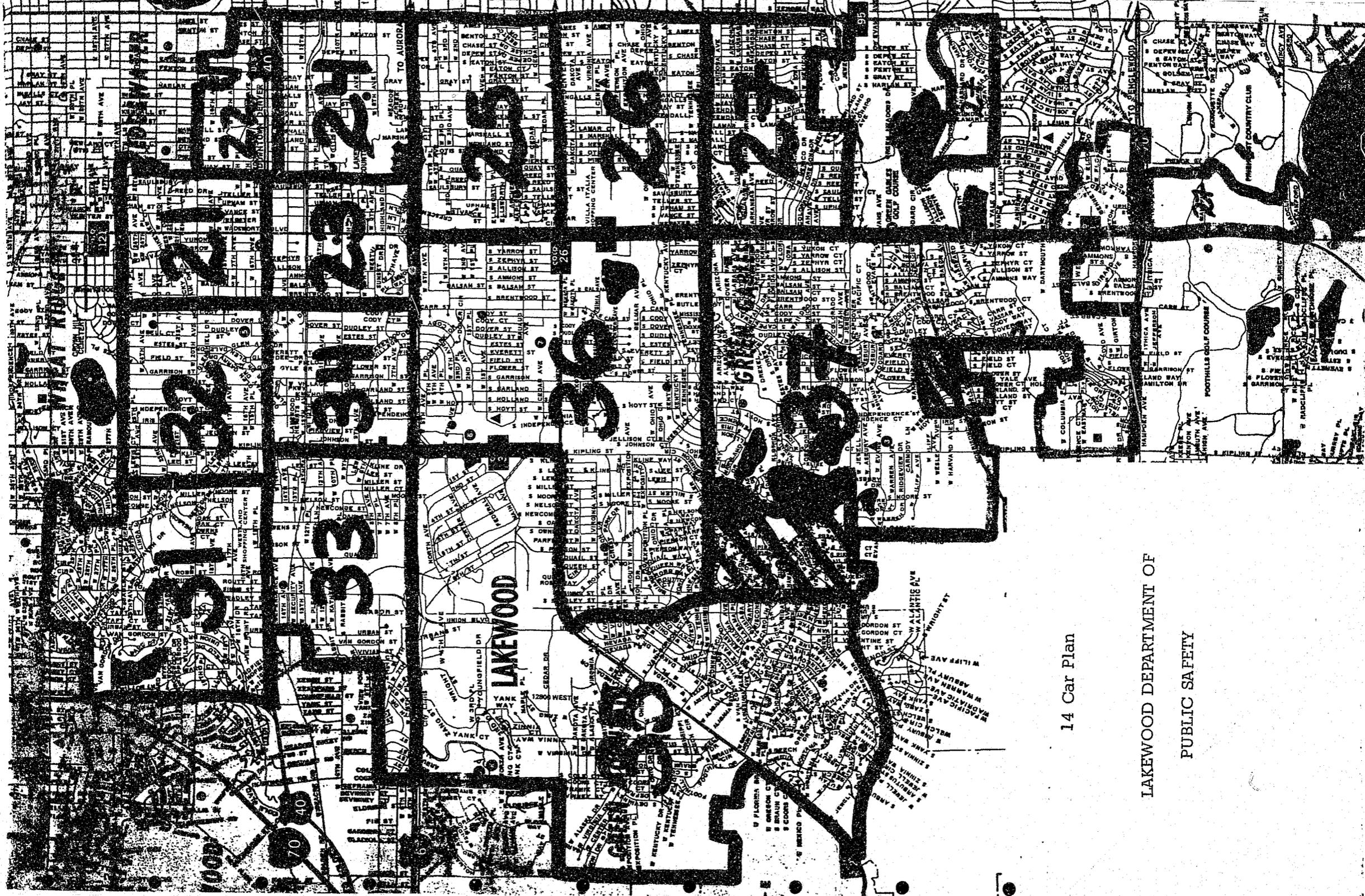
14 Car Plan

LAKEWOOD DEPARTMENT OF

PUBLIC SAFETY

Consequently, it may be fruitful to explore the possibilities of re-designing the configuration of existing car plans developed by the LDPS. The possible desirable consequences of making planned changes in certain boundaries include, among others, reducing the response time on calls for service, reducing the time and distance that an agent travels between calls for service, and so forth. Obviously, any change must be based on information about the incidence of boundary activity associated with the existing car plans.

4. Evaluation of Crime Prevention and Suppression by Patrol

In this Report, the primary object of analysis has been recorded patrol time. The distribution of recorded patrol time by beat has been plotted. And the correlates of this distribution have been identified.

While the demands for patrol services can be seen through an examination of recorded patrol time, the full impact of patrol activities requires an examination of both recorded patrol time and unrecorded patrol time. Because there has been no previous analysis of unrecorded patrol time, the purpose of this section is to raise some questions about possible measures of unrecorded patrol time effectiveness.

According to the classification scheme used by the Lakewood Department of Public Safety, unrecorded patrol time falls into the category of crime prevention. (On a Daily Field Activity Report, an agent enters un-recorded patrol time into the code labeled "Crime Prevention and Suppression By Patrol"). While this code aptly captures the intended objective of un-recorded patrol time, i.e., crime prevention, it is important to know whether

or not this key objective is <u>achieved</u>.

Admittedly, there are difficulties in measuring the impact of unrecorded patrol time because, by definition, it is not identified by either specific location or specific activity. Unless agents document exactly where they are patrolling and what they are patrolling, it is not possible to measure directly the factor that allegedly is preventing crime. Hence, it is problematic to attribute observed changes in crime patterns to patrol activities without specific measures of the activities. For this reason, two possible strategies are proposed to test for the effectiveness and efficiency of unrecorded patrol time.

The first is to conduct an experimental study of alternative methods of patrol. Here the different methods would be randomly assigned to defined sections of the City. The random assignment is the most rigorous way of screening out the effects of contaminating variables. Contaminating variables are factors extraneous to patrol activities, such as, the size of area being patrolled, the population density and composition of the patrolled area, the residential nature of the area, and so forth. A well known study of this genre is the Kansas City Preventive Patrol Experiment. (While the Kansas City study contains a solid evaluation component, this Report does not intend to pass judgment on the merits and limitations of the actual experimental techniques and statistical findings). While this approach is appealing, it is virtually impossible to achieve ideal experimental conditions in real world settings. For example, the simple placement of agents in an experimental category may induce them to act in certain ways. As a result, the induced behavior rather than the experimental method of patrol may account for observed out-

comes. Hence, while the experimental technique is attractive, the experimental results often lack complete validity and reliability.

The second strategy is to evaluate unrecorded patrol time by measuring the degree of citizen satisfaction with patrol services. Recently, the performance of police agencies has been determined through systematic interviews with citizens concerning their attitudes toward the delivery of crime related services.* While these surveys have demonstrated the fact that citizens believe even professional police agencies to be deficient in intervening in serious crimes, they have not taken the role of police agencies in non-criminal activities into account. This is a significant ommission because as has been demonstrated in Section V, most of the calls for service are non-crime related. Moreover, these surveys have sampled the general citizenry rather than only those persons who have had contact with the police. Presumably, the persons who have had contact with the police are more direct consumers of police services. Hence, an improved study of patrol activities would be to measure the perceptions of citizens, who have had contact with the police, concerning the effectiveness and efficiency of police operations in both criminal and non-criminal matters.

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* A considerable portion of the research in this area has been conducted by Elinor Ostrom and others in three cities and their adjoining suburbs. They are Indianapolis, Chicago, and St. Louis. The results of these investigations are available in the following publications: Elinor Ostrom et al, Community Organization and the Provision of Police Services (Beverly Hills: Sage Professional Papers in Administrative and Policy Studies, 03-001, 1973): Elinor Ostrom and Gordon Whitaker, "Community Control and Governmental Responsiveness" in Improving the Quality of Urban Management (Beverly Hills: Sage Publications, 1974), pp 303-334: Elinor Ostrom, "The Design of Institutional Arrangements and the Responsiveness of the Police" in People Versus Government (ed.) LeRoy Reiselbach (Bloomington: Indiana University Press, 1974): Elinor Ostrom and Roger Parks, "Suburban Police Departments", in The Urbanization of the Suburbs (eds) Louis Masotti and Jeffrey Hadden (Beverly Hills: Sage Publications, 1973), pp 367-402.

The basic thrust of a productivity survey would be to determine the perceptions that consumers of police services have of the speed, demeanor, and effectiveness of patrol activities. Measures of effectiveness would vary according to whether the contact with police was crime related or non-crime related. Crime related measures would include matters, such as, ability to resolve disputes, recover stolen property, and so forth. Non-crime related measures would stress the quality of emergency assistance, the reduction curtailment of public nuisances, and so forth.

With the consumers' attitudes as dependent variables, the amount of recorded and unrecorded patrol time could be used as independent variables. Here the major questions would include the following: Does the level of citizen satisfaction with police performance in crime related matters (or non-crime related) increase (or decrease) as the amount of recorded (or unrecorded) patrol time increases? Is the evaluation of police performance in crime related matters higher (or lower) than their perceived performance level in non-crime related matters? Because this type of analysis involves the matching of the level of actual patrol time allocations with the perceptions of the consumers of police services, the policy implications are rather striking. Evidence of a positive association between the amount of time being spent and satisfaction levels would suggest that the patrol activities are effective operations. And the lack of a positive relationship would indicate that specific action needs to be taken to improve police productivity.

5. Future Analyses of Patrol Time and Demand Variables

One of the limitations of the data contained in this part of the Report

is the lack of time-specific information on certain variables. Although recorded patrol time has been measured by individual watches, none of the crime-related demand variables are measured in this manner. The figures on the occurrence of crime, i.e., aggravated assault, burglary, larceny, auto theft, and vandalism, are monthly totals. And the information on calls for service is a two month sample. Hence, both the crime and the calls for service data are total monthly estimates for each of the twenty-four beats rather than estimates for each beat during a given watch.

The limitation here is that if patrol time varies considerably by watch, it is reasonable to assume that the crime related demand variables also vary by watch. With the data that have been collected, a test of this assumption is not possible. However, the information that the LDPS has on these variables does indicate the watch in which certain events, i.e. a call for service or a criminal offense, occur. Hence, it may be profitable to determine the relationship between the distribution of patrol time for each watch with both criminal offense and calls for service by watch.

6. Conclusion

The objective of this section has been to suggest policy related issues concerning patrol services for consideration by the LDPS and other City officials. On the basis of the analysis of the current system of patrol activities, four policy topics were identified. Within each topical area, ideas were presented on how some aspect of patrol services might be

better understood and/or improved.

In addition to the four topics discussed above, an analysis was also undertaken of the disparities between the distribution of recorded patrol time by beat and the occurrence of burglaries. The attempt was made to determine if any beats exhibited a maldistribution, i.e., a high level of recorded patrol time and a low level of reported burglaries, or, a low level of recorded patrol time and a high level of burglaries. (A high level was defined as a beat ranking between 1 through 8, a medium level was one ranking 9 through 16, and a low level was defined as a beat ranking between 17 through 24). Interestingly, only Beat 18 displayed a pattern of maldistribution. Because most beats had a reasonable distribution of reported patrol time and reported burglaries, the policy implications of a maldistribution was not developed. In fact, the available evidence reflects positively on the existing patrol system of the LDPS.

APPENDICES

APPENDIX I
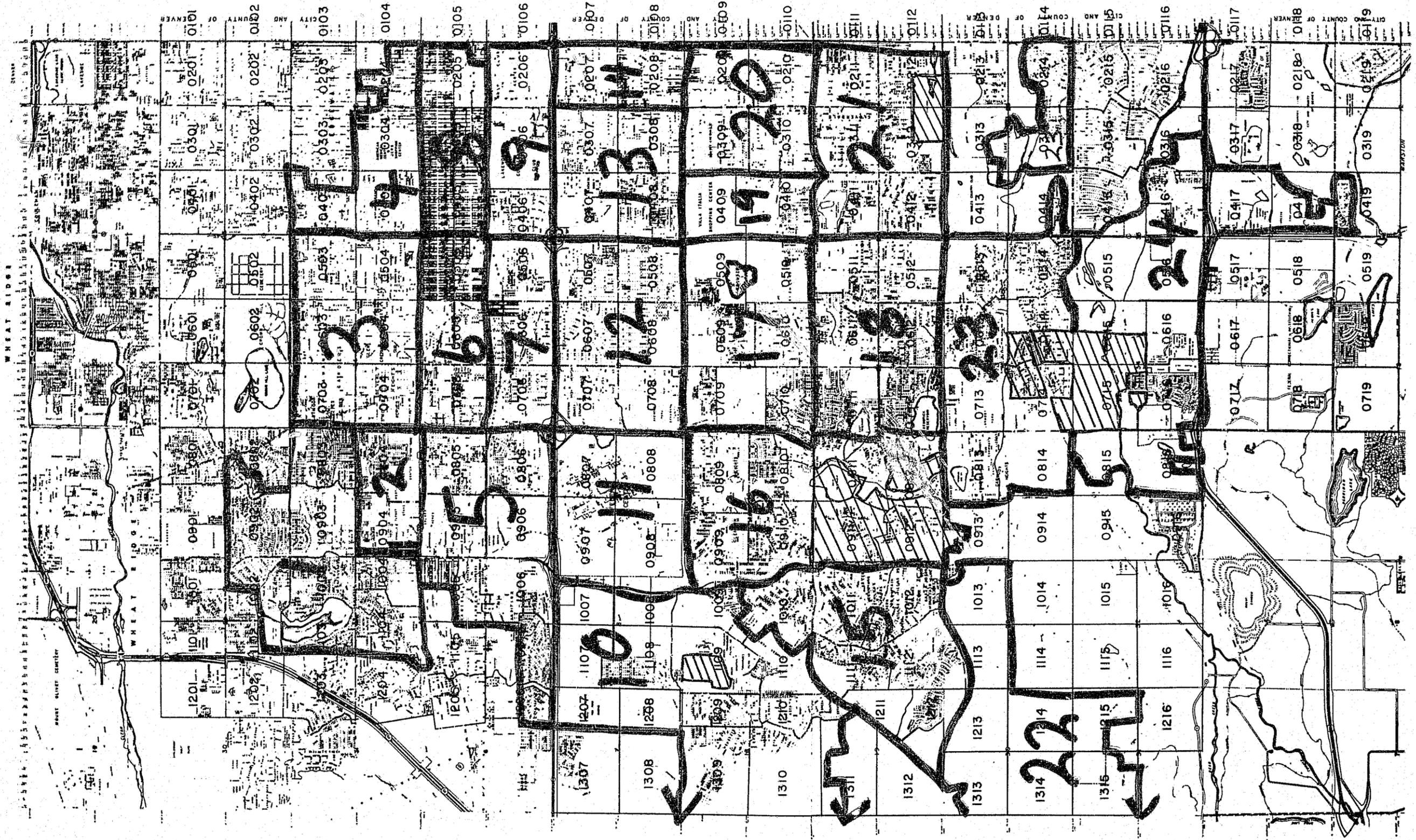
CITY MAP
CITY OF LAKEWOOD
JEFFERSON COUNTY, COLORADO

APPENDIX II

1. Lakewood Youth Services Bureau:

This project, with a total budget of approximately $78,500, became

operational in October of 1975. The project is designed to divert juveniles

who have been charged with first time and/or minor offenses. Juveniles

are referred to the project by the police and other sources. After an evalua-

tion is conducted by a youth counselor, needs of the youth are identified.

The youth is then provided with counseling or referred to another agency or

agencies offering the needed services.

OBJECTIVES

Efficiency Objectives:

(1)   Over a 12 month period, provide evaluation services to 800
      juveniles referred to the Youth Service Bureau from any source.

(2)   Over a 12 month period, provide referral and/or counseling
      services to 400 juveniles referred to the Youth Service Bureau.

Effectiveness Objective:

(1)   Over a 12 month period, maintain a rate of rearrest on all new
      clients receiving referral and/or counseling services of 20%
      or less.

2. Jefferson County Department of Social Services:

In November of 1975, a project was instituted by the Jefferson County

Department of Social Services to address problems of predelinquent and

delinquent youth. The total project budget is approximately $138,500.

The project provides a comprehensive intervention service for problem

children who have come to the attention of different institutions within the

community. Referrals come from police and other sources.

OBJECTIVES:

(1) Reduce Youth Center population by 20%.

(2) Reduce police time by 10% on initial contacts and repeat contacts with previously identified predelinquent and delinquent youths.

(3) Reduce number of Court filings regarding predelinquent and delinquent children by 20%.

(4) Reduce number of children sentenced to the Department of Institutions by 10%.

(5) Reduce number of Detention Hearings by 20%.

(6) Reduce truancy filings as identified through the Juvenile Court System by 20%.

(7) Reduce number of children in shelter and long-term placement facilities by 10%.

(8) Reduce rates of predelinquent/delinquent behavior by 11% as defined by criteria set forth in the Grant proposal.

APPENDIX III

As illustrated in an earlier discussion of the distribution of recorded patrol time by geographic location, there seems to be a different pattern of patrol time by watch. That is, the beats that receive a considerable amount of time during one watch receive relatively little time during the next watch. And conversely, beats that receive small amounts of time during a watch may experience relatively large amounts of time in the subsequent watch. In order to determine whether or not these apparent differences are, in fact, systematic, the amount of recorded patrol time is divided by watch and then rank-ordered by beat. The rank-orderings are displayed below.

Recorded Patrol Time By
Beat By Watch

Police Beat	Watch I	Watch II	Watch III
1	21	13	10
2	11	1	15
3	9	21	1
4	17	8	2
5	10	3	9
6	8	15	17
7	20	19	20
8	14	17	3
9	12	18	11
10	7	2	8
11	18	22	22
12	5	9	12
13	4	16	7
14	3	12	14
15	1	11	16
16	13	6	21
17	22	5	5
18	19	14	13
19	2	20	18
20	6	4	23
21	15	7	4
22	24	24	24
23	16	10	19
24	23	23	6

Spearman's Rank-order correlation coefficients were computed between all pair-wise combinations of the watches. The results are summarized as follows:

Watch I and Watch II = +.26

Watch II and Watch III = +.08

Watch I and Watch III = -.03

These very low correlations indicate that the distribution of patrol time varies considerably by watch. In fact, the near zero correlation between watches I and III imply that one can not predict the distribution of time for Watch III even on the basis of the known distribution in Watch I.

These results are, perhaps, consistent with the efforts by the Lakewood Department of Public Safety to allocate resources in the most effective and efficient manner possible. If it can be assumed that the social complexion of the City changes throughout the day, e.g., certain commercial areas become sources of demands during the daytime hours, and certain residential areas become the focus of demands during the early evening hours, the LDPS may be forced to adjust its resource commitments accordingly. Unfortunately, the data do not permit a test of this supposition because the demand variables, are not measured by watch. As a result, we propose that this topic be placed on the agenda for future research and analysis.

APPENDIX IV

The formula for a <u>simple rank-order correlation coefficient</u> (Spearman's

rho) is as follows:

$$r_{s12} = 1 - \frac{6 \times \sum_{i=1}^{n} d_i^2}{n(n^2-1)}$$

d_i^2 is the squared difference between a beat's position on two variables.
n is the total number of beats, and $r_{s\,12}$ signifies the rank-order correlation
between variables 1 and 2.

In order to calculate a <u>multiple correlation coefficient</u>, it is necessary

to first compute a <u>partial correlation coefficient</u>. The formula for a partial

correlation coefficient is as follows:

$$r_{s12 \cdot 3} = \frac{r_{s12} - (r_{s13})(r_{s23})}{\sqrt{1 - r_{s13}^2}\sqrt{1 - r_{s23}^2}}$$

($r_{s12.3}$ signifies the correlation between variables 1 and 2 controlling for the effects of variable 3).

Given the correlations from Table II-3:

$r_{s12} = +.52$ where   1 = Patrol Time
$r_{s13} = +.61$ 2 = Calls for Service
$r_{s23} = +.62$ 3 = Burglaries

$$r_{s12 \cdot 3} = \frac{.52 - (.61)(.62)}{\sqrt{1 - (.61)^2}\sqrt{1 - (.62)^2}}$$

Hence $r_{s12 \cdot 3} = +.23$

The formula for a multiple correlation coefficient is as follows:

$$R_{s\,1.23}^2 = r_{s13}^2 + r_{s12.3}^2 (1 - r_{s13}^2)$$

Substituting, $R_{s\,1.23}^2 = (.61)^2 + (.23)^2 (1 - (.61)^2)$

and, $R_{s\,1.23}^2 = +.55$

Hence, $R_{s\,1.23} = +.74$

($R_{s1.23}$ signifies the combined effects of variables 2 and 3 on variable 1).

Using the same formulas, the results change as the variables change.

For the second application, we have

$r_{s12} = +.52$ where 1 = Patrol Time
                            2 = Calls for Service
$r_{s13} = +.56$ 3 = Housing Units

$r_{s23} = +.19$

The partial correlation coefficient is:

$$r_{s12.3} = +.51 = \frac{+.52 - (+.56)(+.19)}{\sqrt{1 - .56^2}\sqrt{1 - .19^2}}$$

Then the multiple correlation coefficient is:

$$R_{s\,1.23}^{\,2} = (.56)^2 + (.51)^2(1 - (.56)^2)$$

$$R_{s\,1.23}^{\,2} = +.49$$

$$R_{s\,1.23} = +.70$$

END