Santa Clara County

CENTER FOR URBAN ANALYSIS

CRIMINAL JUSTICE DEMONSTRATIONS

CENTER FOR URBAN ANALYSIS
CRIMINAL JUSTICE DEMONSTRATIONS
FINAL REPORT

COUNTY OF SANTA CLARA
OFFICE OF THE COUNTY EXECUTIVE
70 W. HEDDING ST.
SAN JOSE, CAL. 95110

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FINAL REPORT

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CRIMINAL JUSTICE DEMONSTRATIONS

May 1973 - June 1975

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EXECUTIVE SUMMARY

On April 26, 1973, LEAA awarded a Pilot "0" Discretionary Grant to Santa Clara County to establish the Center for Urban Analysis, Criminal Justice Demonstrations. This provided $160,880 to support the development of management oriented problem-solving techniques using geographically related data. The mission of the Center was to provide new problem solving tools, serve as a resource for planning, and provide criminal justice agencies with information to increase their individual and collective abilites to:

- diagnose specific crime problems
- develop better baseline measures
- formulate better focused, more effective programs
- evaluate results.

Second year funding of $65,000 was awarded through the Regional Criminal Justice Planning Board to assist the institutionalization of the Center and to carry out demonstration projects which help criminal justice agencies make decisions and act on solutions to important problems. The Center was intended to be partially supported by non-criminal justice users so as to extend the base of potential financial support and enhance the probability of the Center to finance itself.

The projects conducted by the Center concerned the allocation of resources to prevent and control crime according to the geography and characteristics of the urban environment. The Center has the responsibility of maintaining a computerized map (called a Geographic Base File) of the County. The Geographic Base File employed is the DIME file originally established by the Bureau of the Census for the 1970 Federal Census. The DIME file was corrected, extended to countywide coverage, and maintained on a current basis. The Center provides the technology for matching address-coded records to the DIME file, so that events may be precisely located on a map and referenced to any size or shaped geographic area. The data may refer to a street address, such as "70 W. Hedding St.", a street intersection, such as "N. 1st St. and W. Hedding St.", or a place name, such as "Civic Center". Map coordinates referenced to the State Plane Coordinate System (similar to latitude-longitude), and other relevant geographic identification, are appended to the data concerning the event. The geographic referencing of event data enables criminal justice agencies to relate agency data to other relevant data of the urban environment, such as property data from the Assessor's records and demographic data from the Census.

The information may thus be displayed on maps produced by computer line printer, used for analysis that could not be performed without the geographic

reference, and established in an interactive computer graphic system data base for examination and problem-solving. The interactive computer graphic system, GADS (Geographic Analysis and Display System) is a prototype system developed under a Joint Study Agreement between IBM-Research (San Jose) and Santa Clara County. The system uses a television-like computer terminal installed in agency offices. Agency personnel were able to explore and manipulate their data with reference to a map image they specified meaningful to the problems to be resolved.

The Center provided a general purpose statistical and tabulation system, SPSS (Statistical Package for the Social Sciences), as a method to summarize agency data in more traditional forms. The combination of user-oriented, flexible and versatile techniques provided criminal justice agencies with powerful tools to assist finding solutions to operational and management problems.

The projects chosen as demonstrations were selected on the basis of need and request for assistance by user agencies. Demonstration projects included the Adult Probation Department and five different law enforcement agencies of four generally different sizes, plus a crime analysis and evaluation project serving all police agencies in the County. Several one-time jobs unrelated to a project were completed for client agencies. Most of the demonstration projects focused on the use of calls-for-service (dispatch) data with police agencies. The projects assisted the management problems related to strategic deployment, agency organization, resource allocation and activity analysis. One project concerned crime-specific program planning, monitoring and evaluation.

Center staff provided agency assistance with problem formulation, data collection, data analysis, and assistance in the problem-solving process as required. The speed and flexibility with which alternative solutions could be tried and evaluated with the GADS system plus the mininal use of a programmer/analyst to which a problem definition had to be communicated, enabled agency personnel to use their special knowledge effectively in the problem-solving process. The direct involvement of administrators, managers, supervisors and line personnel enabled the development of solutions that all levels involved in the problem could understand and support.

Data collection for agencies lacking systematic data collection and data entry procedures was identified as a significant problem in the projects. Agencies were guided to increase their data collection and analysis capabilities as a result of the projects, and recognition was made that data collection costs are rapidly amortized if the information is timely, accessible and supports the allocation of criminal justice agency resources. A general conclusion supports placing flexible analysis tools as close to decision-makers as possible. It is recommeded that the interactive graphics system be made available to agencies throughout the County with enhanced capabilities for data entry and control at the agency terminal.

PROJECT ACTIVITIES

Problem Statement :

Agencies are concerned with allocating resources to prevent and control crime. To do this, criminal justice agencies need some method for efficiently allocating their resources according to the geography and characteristics of the urban environment. The allocation of patrol or service areas, identifying where events have occurred, targeting preventive programs for certain kinds of people, places or businesses - - all of these require knowledge of where something is located on a map. In other words, there is a need to relate criminal justice data to geography and to sources of information which can describe the urban environment of that geography.

A variety of agencies collect data potentially useful for criminal justice problems. However, there are several difficulties that inhibit effective use of such information:

A. One difficulty concerns the style the geographically related information is usually transmitted. Tabulations are not easily used in map-oriented problems, and data is frequently grouped in area units that do not conform to the needs of a particular agency.

B. Geographically related data is often available in a less than timely manner for purposes to which it could have been applied.

C. Geographic data often requires the intermediation of a specialist to translate, digest, extract and manipulate the information before it becomes useful to a criminal justice professional. This process submerges the special knowledge in criminal justice offical has to bring to the problem solving process. The technician is unable to acquire the perceptions and understanding of the professional and the full effectiveness of information in decision making is lessened.

Any place on a map can be described by an address, place name or an X-Y coordinate. If criminal justice agencies have access to a geographic base file, (computerized map), any address or place identification can be located into any size or shaped geographic area. This geo-coding capability (Criminal Justice Standard No. 4.8) provides a capacity to relate crime data to other information about the urban environment and significantly improves criminal justice planning on a region wide and individual agency level.

Goals and Objectives:

There are hierarchies of goals and objectives. The goal is to reduce crime. The first intermediate goal is to develop more effective projects and programs to reduce crime. The second intermediate goal is to provide more definitive information for project and program formulation and evaluation.

The objectives of the first year grant funding were to provide criminal justice agencies with information to increase their ability to:

1. Diagnose specific criminal justice problems;

2. Develop better baseline measures by geographic area;

3. Formulate better focused and more effective projects and programs; and

4. Evaluate the results of these projects and programs.

The objectives for the second year of the project funding were to:

1. Institutionalize the Center for Urban Analysis on an interprise basis, whereby user agencies budget and pay for services rendered by the Center. The Center was intended to be partially supported by non-criminal justice users so as to extend the base of potential financial support and enhance the probability of the Center to finance itself;

2. Carry out six candidate projects which help criminal justice agencies make decisions and act on solutions to important problems.

ACTIVITIES AND FUNCTIONS

The functions of the Criminal Justice Demonstrations, were to assist criminal justice agencies in the resolution of problems that had a geographic character and to provide new problem-solving tools. Assistance was provided in problem formulation, assembling appropriate and timely data, organizing and conveying the information in a manner that agencies could easily use, and in technical assistance in the problem solving process. The approach emphasized agency involvement in order to improve the abilities of agencies to resolve problems and to retain a focus on implementation.

A primary function of the Center has been the responsibility for establishing and maintaining the geographic base referencing system. The geographic base file GBF/DIME (Dual Independent Map Encoding), was originally developed by the Bureau of the Census for conducting the mail-back part of the 1970 census. The initial version of the DIME file for Santa Clara County covered the urbanized (north) portion of the County and consisted of approximate 47,000 records. The Center extended and updated to this file to a county-wide coverage. At the end of the project period the file consisted of approximately 70,000 records and reflected the current (June, 1975) street network and corporate jurisdiction boundaries. Ability to maintain the DIME file was also achieved during the project period. DIME file updates and correction processes originally requiring a three to four week period to accomplish, were successfully completed in less than a week.

The software enabling the matching of address coded records to the GBF/DIME was also developed by the Census Bureau. The initial program, ADMATCH, was replaced by a improved program, UNIMATCH, furnishing the ability to acommodate intersection coded events as well as place name and street address coded events. The Center established and maintains a version of UNIMATCH specifically adapted for use in Santa Clara County. The Census Bureau also developed the GRIDS program, which produces computer line-printer maps from geo-coded data. The Center refined the production of GRIDS maps to a high degree for maximum effectiveness.

Center staff aided users in problem formulation, in generating and organizing data, and in assistance through the analysis process. In addition to geo-coding and the production of GRIDS maps, the basic capabilities that the Center offered in its projects were: (1) interactive computer graphic system (GADS); (2) a general purpose statistical and tabulation system (SPSS); and (3) specialized analytic and data analysis capabilities.

Interactive computer graphic system.

A prototype interactive computer graphic system, GADS (Geodata Display and Analysis System), developed by IBM-Research, San Jose, under a Joint Study Agreement with Santa Clara County, is a user-oriented system that relates a structured data base to a user specific map. The system provides opportunity for exploratory examination of the data and capacity for sophisticated manipulation of data and map features. The terminal is a relatively inexpensive, remotable device with hard copy unit attachment. The system is economical in computer utilization. The control language has been successfully operated in-house by uniformed and non-uniformed personnel of different backgrounds in a variety of police agency problems.

General purpose statistical and tabulation system.

The program package SPSS, Statistical Package for the Social Sciences, developed by the National Opinion Research Center at the University of Chicago, now diseminated and maintained by SPSS, Inc., is a flexible, coherent set of procedures for data analysis. The system is characterized as user-oriented in that users can modify procedural controls established by Center staff to produce specific desired analysis.

Specialized analytic and data analysis capabilities.

Center staff undertook special processing of certain data files such as from the Assessor's records to enable the relating of crime data to property and Census data. Center staff also developed special analytic programs for particular projects. These latter abilities were used minimally, as a focus of the work of the Center was to retain the control and the responsibility for analysis with user agencies, utilizing the tools and procedures that were generally available rather than those that were required to be developed for a specific application.

The specific tasks undertaken under the project during the last year were:

1. Provide data handling services to users. This work consisted of three major categories. The first category encompassed the capabilities of preparing, processing and geo-coding user data into user defined areas. The second category consisted of establishing data bases and map definitions meaningful for the user-defined problems. The last category concerned maintenance of basic software to produce tabulations, summaries, maps and analysis of user data.

2. Maintain Reference files. This work encompassed the maintenance of the Geographic Base File, extraction capabilities of the Property System and other data sources, and related software maintenance.

3. Provide User Support. This work focused on making the resources of the Center available and accessible to Criminal Justice agencies and to support the user-specific projects.

4. Organization and Administration. This function provided management for the undertaking of the work.

Task 1 Provide Data Handling Services to Users

Most demonstration projects undertaken by the Center, as summerized below, dealt with the use of police agency calls-for-service data (CFS). Four of the five police agencies with whom the Center worked used dispatch data as source documents. The Sheriff's Department utilized patrol officer log sheets that had already undergone data entry at the time the Center starting working with the information. The Center worked with the agencies and dispatch functions in classification methods, data capture, conventions and personnel procedures regarding data entry requirements. Mechanics were established to transmit and return source documents between the Center and agencies. Personnel at the Center scanned dispatch tickets to clarify the documents, minimize data entry errors and evaluate data capture encoding techniques. Procedures were established with data entry staff at GSA/DP for clear, efficient and cost-effective data entry. Techniques were established to perform basic editing of the data, and to process the address information so that it could be utilized in the geo-coding process.

Two alternative methods for accomplishing the geo-coding of source records were undertaken. The first method involved identifying the correct study area or beat number to each record within a portion of the Geographic Base File appropriate to each agency. In this method, the correct assignment of study area or beat was simply transfered from the appropriately matched Geographic Base File record to the dispatch record. In the second method, the correct X-Y coordinate value was transferred from the matched DIME record. The X-Y coordinate values were then located to the correct study area or beat through a procedure called "Point-in-Polygon". A principal advantage of this latter procedure is that additional geographic identifiers of beat, study area, etc., are not required to be maintained directly on the GBF/DIME. The X-Y coordinates provides sufficient identification to locate that event to any described polygon representing a study area or beat.

Considerable effort was expended in determining efficient methods for preparing the base maps representing study areas or beats. The first procedure adopted was the interactive labelling of each side of a boundary segment of a study area polygon with the correct area number. Internal segments for these polygons were then automatically coded with the correct study area number. This procedure required the use of Operations Research Analyst staff, was time consuming in interactive computer operation and required extensive elasped time. It could only be done by one individual during the course of a map development. Technical problems with polygon closrue and numbering were significant. The revised procedure uses a special data entry form to identify each segment of a polygon. Each vertex is cross-referenced to a appropriate DIME file node; new nodes are created when a study area vertex does not have a DIME file node at that location. The product is a polygon description of the study area that is then automatically numbered, with sides of the polygon edges labelled with correct area numbers by a cross-reference between user and

computer-assigned area numbers. The resulting file is simplified in that it does not include each DIME file segment that may occur along the edge of a polygon. The work can done by technical personnel rather than professional personnel, and several people were able to simutaneously code polygon boundaries for project maps. The system is batch oriented, economical, and offers technical and operational benefits in terms of closure and direct verification of polygons.

Efforts in data base loading and establishment were closely integrated with work conducted under the Joint Study Program with IBM-Research. The interactive computer graphic system includes procedures, called "Extraction", that can selectively examine individual records, and prepare a user specific data base for a particular problem. Alternatively, a staff prepared Fortran routine may be modified to prepare a data base. The Extraction procedure is extensive in computer utilization but requires minimal staff effort; adapting previously prepared Fortran loading programs requires more staff effort but is efficient in computer utilization.

Software for address matching (UNIMATCH) and computer line printer maps (GRIDS) is maintained by the Census Bureau. Updated versions of this software have been installed and documented in GSA-DP computer system procedures.

The SPSS system is maintained by SPSS, Inc., which issues periodic updates and modifications. SPSS is also installed, documented and maintained on a regular basis at GSA-DP. Center staff has documented the flow of procedures and programs from data entry of calls-for-service data through standardized SPSS control language to produce several standard summaries.

Task 2 Maintain Reference Files

The main work on GBF/DIME maintenance follows procedures established by the Bureau of Census. Staff was required to develop programs prior to formal issue by the Bureau to accomplish several functions required by the GBF/DIME activities. Staff was also required to prepare programs due to deficiences in Census Bureau prepared programs.

The level of maintenance required for the GBF in Santa Clara County is identified by the Census Bureau as exceptional in the nation. A large number of corporate boundary changes occur within Santa Clara County pursuant to County policy requiring annexation of development to cities within whose sphere of influence the development occurs. The house numbering system in the County is consistent only in the Southern portion of the County. In the remainder of the County each city has its own independent and frequently conflicting house numbering system; the County numbering system often conflicts with those independent systems. The Real Property System maintained by the Assessor provides a basic reference source for determination of addresses and street names. However, no single accurate source exists in the County for address ranges on street segments. A variety of sources were thus required to correct erroneous entries or to fill in gaps, and to extend the GBF countywide. Census Bureau procedures for the DIME file are oriented to a long range, systematic,comprehensive correction, update and extension process. The Center adopted an approach directed to providing an immediately usable reference file for project purposes. Center procedures emphasized firstly, inclusion of all segments in the file with

correct node identification; secondly, addresses ranges along the segments; thirdly, accurate coordinates; fourth, corporate boundaries; and last the block number and zip code references. The Bureau has established a number of edit procedures in the CREATE and FIXDIME II programs used by the Center. Center staff also developed a number of edit programs and procedures to establish and verify the file. One of the most important files developed from the DIME file was an intersection reference file, enabling events coded to street intersections to be geocoded. The Bureau program ADDEDIT which chains along segments, identifying where numeric gaps exist along address ranges, or where address ranges are inconsistent, was not released for local operation until close to the end of the project year. An address edit performed by the Bureau on the file dated early spring, 1975, produced considerable information regarding address problems. Many real-world address range problems exist in Santa Clara County however; many of these had been previously verified, validated, and will continue to be noted as inconsistencies reflective of on-the-ground situations.

For each client agency, the Center derived from a sub-file, or Project DIME, from the master GBF/DIME. The Project DIME was examined and edited for accuracy through the interactive computer graphic system. This was particularly valuable when maintenance cycles on the DIME file were major efforts requiring months of preparation. As the maintenance cycle has become shorter, edits more comprehensive and the file more complete, this function has been reduced. The project file experience of interactively editing and correcting the DIME file continues to assist the generating of inputs to batch correction updates. A principal advantage of a Project DIME is that far fewer records are involved, providing efficient operation for geocoding and other related processing. The interactive computer graphic system was particularly helpful for displaying, validating and examining coordinate locations of the network.

The state plane coordinate system that requires 7 and 6 digits respectively for the X and Y coordinates is difficult to examine other than graphically. Plotting the file with a plotting device is time consuming, expensive and lacks direct correction capability. Interactively, the map may be economically displayed, examined for topological consistency, querried for attribute validity, and corrected as appropriate. The Center and IBM-Research are continuing work related to map and network techniques.

In addition to the GBF/DIME, the Center has made extensive use of the Assessor's files, both the Real Property system and the Unsecured Property system. Center staff participate in the Property Data Management committee that has responsibility for the system, development of additional software and output from the system. Work conducted by the Center in the process of establishing the DIME file assisted the cleaning up of multiple situs addresses in the Unsecured file and identified census tracts for parcels lacking such identification. In 1967, all parcels were identified with a state plane coordinate reference. As this process has not been maintained, only 75% of current parcels have X-Y coordinates. The Property Location Index, derived from the Property System, contains the coordinate values and was used as a reference file for matching prior to the establishment of the GBF/DIME.

The most important activity undertaken with the Assessor's Unsecured File system for project purposes dealt with selection from the 1972 Unsecured Roll

to provide baseline counts by type, by area, for the San Jose Police Department Burglary Analysis Unit. The catorgies required a crosswalk from the CAPER (Crime Analysis Program Evaluation and Research) definitions to the Unsecured Roll definitions in order to accomplish baseline measurements for the Burglaries Prevention project.

Task 3. Provide User Support

The primary function of this task was to maintain liaison with criminal justice agencies, making the Center's resources available and accessible to agencies, and assisting their analysis and problem solving. The Center was therefore required to work with agencies from the beginning of project formulation thru project conclusion. A significant tool the Center offered agencies was the interactive computer graphic system. Training in the operation and utilization of the system was provided for user agencies. A training manual based on the San Jose Police Departments Beat Analysis project was successfully used by police officers and non-uniformed personnel in the Gilroy, Mtn. View and San Jose Police Departments. The Adult Probation Dept. project required close working relationships with supervising Probation Officers to help them define potential service areas, composed of census tracts, prior to the availability of the interactive computer graphic system.

A typical sequence of user support began with the identification of the appropriate classifications, definitions for activities, facilitation of a coding system that encompassed the range of events an agency wished to work on, and identification of commonly used place names used by dispatchers and officers for familiar locations. Data collection, for a period of 2-3 months, was initiated with Center liaison for that process. Procedures for statistical summarization of the data thru SPSS and other programs were then established to produce desired analysis. Map areas were defined consistent with patrol personnel and management perceptions. Area units, or "atomic" zones, were designed to reflect the smallest area meaningful for the purposes of the project. After data entry, editing and geocoding, a data base was established that could respond to specific questions agencies wished to examine. Extraction capabilities provided opportunity to examine the full range of the data for crime-specific or management-specific events; area examination capabilities for beat development, etc. were available under the general CADS system. As agencies began to work on a specific problem or examine specific attributes, staff was available to provide assistance with the analysis. Terminals were installed in police agency offices for a period of two to four weeks, to facilitate data analysis and problem solving. Due to the extensive use of the system by the San Jose Police Department, a terminal was installed in the Research and Development Section for the period October 1974 - June 1975.

The processing of CAPER data focused on geocoding and production of computer line printer maps (GRIDS maps), for the client agencies of the CAPER program. As data turnaround was deemed very important by CAPER staff, overnight processing and expedited GRIDS map was accomplished for that project. Detailed cost analysis and estimates for CAPER processing were also developed.

Task 4. Organization and Management.

Research designs for the evaluation of the interactive computer graphic system with-IBM Research and user agencies were developed. Technical aspects of

installation of teleprocessing equipment including modems, terminals and telephone installation were also part of this task. The management of resources throughout the project, coordination with other governmental agencies, committee participation, arrangements for data processing and other services were also accomplished under this portion of the work program. Staff prepared and gave many demonstrations and presentations of the work of the Center to various local groups as well as visiting representatives of agencies elsewhere in the country.

Agencies Utilizing the Services of the Center

San Jose Police Department

Gilroy Police Department

Campbell Police Department

Mt. View Police Department

Sheriff's Department

Countywide CAPER

Adult Probation Department

Criminal Justice Pilot Program

Agencies Whose Services were Utilized by Project

Bureau of the Census

Census Use Study

County Data Processing

Assessors Department

Communications Department

IBM Research thru Joint Study Agreement

RECAP (Regional Educational Center for Automated Processing), of the County Office of Education

The first year grant funding permitted the undertaking of one project with a non-criminal justice agency user. The Center began work with the East Side (San Jose) Union High School District data committee representing all the elementary districts tributary to that high school district, and did further detailed work in the first project year with the Mt. Pleasant Elementary school district.

EVALUATION OF REPORTS

The criminal justice demonstrations of the Center were not intended to generate reports authorized by the Center. Individual agencies were responsible for the analysis they were conducting and their work was internalized. Few reports were produced by user agencies. Lt. Robert Bradshaw and JoAnn Moore of the San Jose Police Department presented a paper at the 1974 URISA conference, "Man-Machine Interaction for Police Field Manpower Deployment", describing the use of the GADS system in the San Jose Beat alignment work. The Final Report of the San Jose Police Department Burglary Analysis Unit, where Center resources were

used extensively, was not completed at the time of this writing. Technical reports describing the interactive computer graphic system, GADS, produced by IBM-Research staff are listed in the Appendix. Methods and procedures adopted by the Census Bureau for DIME file processes are well-documented by Census publication. SPSS is documented in a handbook for that system (2nd Edition issued 1975). The projects generated insights for the participating agencies into their problem solving techniques. The direct involvement of administrators, supervisors and line personnel in the solution process produced if not an optimum solution, at least a solution that all levels involved in problem could understand and could support. The speed and flexibility with which alternative solutions could be generated and evaluated, plus the minimal use of a programmer/analyst to whom a problem definition had to be communicated, encouraged a re-evaluation of the factors and criteria used in the methodology. Users with prior ideas about which factors were important in determining how to redistribute service areas often found, during the course of solution development, that some factors were not as critical as hypothesized and that other factors needed to be examined more carefully.

PROJECT ACCOMPLISHMENT AND ANALYSIS

Project Results and Anticipated Results: The anticipated results of the project were to provide information to user agencies as a basis for decision-making and this result was achieved. There is, however, a difference between the decisions that were anticipated to flow from the information and those that, in fact, resulted. In the Countywide CAPER project, the decisions were administrative in nature (e.g. costs for certain services performed by the Center); operational decisions with CAPER data were to be made by the participating law enforcement agencies. Where specific agency problems were identified and worked on, decisions were assisted by information developed through the demonstration project; such as in the Adult Probation Department, San Jose Police Department Beat Development and Burglary Analysis projects. Virtually all agencies discovered serendipitous uses for the data to facilitate decisions on problems that had not been anticipated. Some police agencies began the work with an initial focus on possible beat re-alignment. During the course of the project, however, their interests became more involved with analysis of administrative activities and allocation of agency resources, of which the geographic assignment was only a portion. Project information was used as a variety of agency functions, especially in budget development.

There were several factors that led to results of different decision-making than anticipated. Some agencies wanted to use calls-for-service information as a basis for tactical resource deployment. This use of the CFS data was inappropriate in the project context as there was, necessarily, a significant time lag between the occurence of the event and the establishment of the data base for the system. The delay was necessitated due to data collection and entry methods, and technical difficulties attendant to prototype development. An intersection reference file from the GBF/DIME was not available for use in the geocoding process until January, 1975, necessarily delaying the geocoding of intersection-coded events, some of which were dated July, 1974.

In several cases project management at the agency level changed during the course of the project , and the particular interests of the original understanding were modified by these personnel changes. During the course of the Gilroy Police Department project, the Deputy Chief accepted a position as Chief of a

police agency out of the County. Responsibility for project cordination in the Campbell Police Department was shifted several times during the course of that project. Lack of identified day-to-day responsibility, discontinuity of interests and personnel shifts occured in the course of the Sheriff's Department project. Successful accomplishment of project objectives occured when agency continuity of personnel and interests existed throughout the project. A major project contemplated under second year funding was expedited processing of calls-for-service data. This was anticipated to have been accomplished with the San Jose Police Department using the daily log tape from the computer-assisted dispatch system anticipated to be operational during the project year. The computer-assisted dispatch system was delayed significantly and will not be operational until early 1976. It was thus not feasible to undertake a project with expedited data entry due to non-automated data collection systems.

Work contemplated with the proposed Juvenile Information System was not realized when that system was aborted.

The demonstration projects have had different levels of impact on different agencies. In most agencies there seems an increased committment to data collection activities and in the analysis of data to support a variety of applications. The San Jose Police Department Burglary Analysis Unit utilized the demonstration project to refine and identify high risk burglary target areas for crime-specific programs, and to develop baseline measures for pre- and post program evaluation. BAU staff believe that this assistance was of considerable utility for the work of that program.

It is not believed that the results could have obtained more efficiently by a different allocation of resources or of project activities. Given the state of technology and the technical resources of the Center, the project proceeded in an expeditious and efficient manner to deliver information to user agencies as rapidly as possible and in forms that made it convenient for agencies to utilize the information. The results of the project compare favorably with other projects using a similar approach and with projects using different approaches and methods. This project focused on removing an intermediary between the agency and the information base. It was distinguished from projects where a consulting group would externally manipulate agency data and provide a solution arrived at by non-criminal justice professionals, or at least non-agency personnel. Such solutions are frequently inappropriate for agency implementation because of the difficulty of transfering full information from the agency to the consulting group. This project also attempted to respond precisely, with limited but focused information, to questions raised by agency personnel rather than producing voluminous data hypothesized to be useful for agency purposes. The intent was to deliver only the desired data analysis to user agencies. Agencies were not overwhelmed with information, but received responses to specific questions. Information available through the GADS system was available interactively and was readily communicable because of the graphic medium.

The results which might have been expected in the absence of the demonstrations vary from project to project. In the burglary analysis project, previous work identified a rectangular area approximately 1 mile by 3 miles as the candidate target area for burglary prevention programs. The use of the detailed geo-coded information enabled considerably refined area identification, leading

to a much more efficient use of resources with greater control on the particular programs. The San Jose Police Department had manually prepared a revised beat pattern prior to working with the interactive computer graphic system. The solution generated with the interactive system was superior in several measures, was able to be comminicated to other city officials, and was able to be rapidly manipulated by the officers in accordance with different resource requirements. Agencies that undertook focused work on administrative activities were able to determine actual workloads, and improve their programming for allocating resources.

One of the major findings of the demonstration projects was the difficulty of data collection efforts with agencies with non-automated data collection procedures. Computer-assisted dispatch is programmed for implementation by the San Jose Police Department and has an objective of eventually becoming county-wide in its application. There are political and technical obstacles to the realization of this intent. At the present time many police agencies maintain their own communications and dispatch functions. For non-automated agencies, the project demonstrated the importance of establishing a data collection process. The manner in which the demonstrations undertook data collection, processing dispatch tickets through a batch data entry method, is not efficient for systematic data collection. This method was the least expensive and most efficient manner in which to handle that task during the demonstration projects. On a continuing basis however, the batch keypunch, (or key-to-tape or key-to-disk) process can not accomplish the objective of rapid data entry into a system. External batch data entry does not minimize editing requirements and has an indirect feedback to improve data recording. It is desireable to have agency personnel directly accomplish data entry in a system enabling easy and rapid retrieval in order to respond to questions that periodically occur with recent dispatch data. The system should have a capability of providing basic summaries of the data. As project experiences have encouraged agencies to undertake data collection efforts, the Center is currently examining the data entry question to develop alternative solutions to this project-identified problem area.

The demonstration projects have led to the development of processes, procedures and methods that are highly cost-effective for analysis of criminal justice agency data. The project benefited considerably from the resources of the Census Use Study personnel who worked closely with Center staff during the early part of the demonstrations. The demonstrations could not have been conducted without the Census Bureau's work on the DIME file, methodologies developed by the Bureau, and the procedures available in the SPSS programs. Major contributions were made by IBM-Research staff under the Joint Study Agreement. In addition to hosting and refining the interactive computer graphic system, IBM-Research staff also provided valuable assistance in evaluation of work performed by agencies and staff, and assisted in the accomplishment of several projects. The actual resources dedicated to the grant were thus significantly larger than the direct grant costs.

One result of the project is the capability of the Center to offer services to aid criminal justice agencies on an extremely economical basis. Geo-coding, is being accomplished for less than a penny per record on the County-wide file. The current DIME file is producing match rates exceeding 88% for County-wide CAPER. This minimizes the necessary manual geocoding that would otherwise have to be performed for non-matched records, and is timely in that the work can be accomplished on an overnight basis. GRIDS map production has also

been refined for user agencies, is fully installed at County data processing, and is an economical producer of varying scale hard copy maps of geo-coded events.

GADS, the interactive computer graphic system, has been demonstrated as a highly efficient system for problem-solving purposes. The system requires low utilization of computer resources and has high effectiveness as a communications device. Terminal facilities are easily installed in agency offices. Police department personnel can be efficiently trained to use the system for operational purposes.

The GADS system has been benchmarked at three commerical installations using two lessons in the training manual developed in the San Jose Police Department Beat Analysis project. Commerical rates are in the range of $15 -$25 per connect hour for computer utilization, depending on the kind and pace of work. Hardware costs for modems, terminal and hard copy unit are approximately $3.50/hour. GADS operating costs are thus modest relative to system benefits. It would be appropriate for the existing version of GADS to be installed at County GSA-Data Processing and made available to criminal justice and other governmental agencies in Santa Clara County.

It is recognized that GADS is a prototype system, not a documented production product. Additional resources should be made available to develop and implement desirable modifications to the system. The interactive computer graphic system underwent several modifications during the course of the project. These changes were responsive to demonstration project experience with client agencies; the prototype system would benefit by additional tailoring to police agencies specifications and enhancement of user manipulation capabilities.

A forthcoming version of the SPSS will be interactive, rather than batch oriented, computer processing. It will be desirable to revise the batch procedures developed under the demonstration projects in a more convenient form for direct agency utilization on remote terminals.

The Center is undertaking preliminary work concerning the problem of data entry for smaller jurisdictions. Batch data entry of dispatch data costs approximately $.10 per record simply to establish machine readable card images. These costs should be able to be reduced and the information made more accessable to agencies through recent technology. Additional resources should be made available to support this effort. Many Census Bureau procedures for the maintenance and use of the GBF/DIME required modification and special development efforts by the Center. This work, as well as basic maintenance of the GBF/DIME, is necessary to be continued and supported.

In order to achieve the objective of the second project year, to institutionalize the Center on a self supporting basis, project expenditures were fundamentally necessary to develop establish techniques that would serve client agencies. The opportunity to serve one non-criminal justice client in the first project year has been fruitful in producing a number of users from the non-criminal justice area. These users improve the probability that the Center will be able to be self supporting in forthcoming years by spreading the costs of DIME file maintenance among different interest areas. The Center has experienced successful transferal of techniques and methods in a variety of projects with local government agencies, such as school and fire applications. To the extent that development

costs can be underwritten by a variety of users, no single interest area is unfairly burdened and the benefits are distributed to the community of users.

FINDINGS AND RECOMMENDATIONS

The projects chosen as demonstrations were selected on the basis of need and request for assistance by the user agency. Agencies represented included Adult Probation and five different law enforcement agencies of four generally different sizes plus a crime analysis and evaluation project serving all police agencies in the County. In addition, several one-time jobs unrelated to a project were completed for client agencies. A total of eight (8) demonstration projects were undertaken and are described in the following section. One non-criminal justice agency project supported under the first year funding is not summarized.

Project objectives were achieved in terms of accomplishing the number of projects anticipated, and in institutionalizing the Center within County government. Project experience in terms of achieving the objectives of assisting agencies to make decisions and act on solutions to important criminal justice problems were uneven. One agency (Campbell Police Department) has made only slight use of the information developed in their project. The Sheriff's Department project was unable to accomplish project objectives for a variety of reasons, including place identification problems and lack of staff continuity. Other agencies utilized the information and tools provided to a greater extent and fulfilled the intent of the demonstrations. The San Jose Police Department Burglary Analysis Unit project exemplified the full range of the objective "to assist the diagnosis of specific problems, develop better baseline measures by geographic area, formulate more effective programs, and evaluate results."

In general, the demonstration projects focused on using calls-for-service (dispatch) data to assist in the mangement problem-solving tasks related to strategic deployment, agency organization, resource allocation, activity analysis; and crime-specific program planning, monitoring and evaluation. Two basic methods of organizing and presenting the data have enabled agencies to successfully operate in a mode that places the decision-maker in direct contact with data relevant to a current problem. They are:

1. An interactive computer graphic system.

   A prototype interactive computer system, GADS (Geo-data Analysis and Display System), developed by IBM-Research, San Jose, under a joint study agreement with Santa Clara County, is a user-oriented system that relates a structured data base to a user-specific map. The system provides opportunity for exploratory examination of the data and capacity for sophisticated manipulation of data and map features. The terminal is a relatively inexpensive, remotable device with hard copy attachment. The system is economical in computer utilization. The control language has been successfully operated in-house by uniformed and non-uniformed personnel of diverse backgrounds in a variety of police agency problems.

2. A general purpose statistical and tabulation system.

   The program package SPSS (Statistical Package for the Social Sciences), developed by the National Opinion Research Center at the University of Chicago, now disseminated and maintained by SPSS, Inc., is a flexible, coherent set of procedures for data analysis. The system is characterized as user-oriented in that users can readily modify previously developed procedural controls to produce the desired analysis.

The necessary conditions for either of these systems to be employed are:

1. Systematic data collection and data entry;

2. Geographic coding of data; (The Center performs the "geo-coding" functions of identifying X-Y coordinates and user zones (beat, study areas, etc.) with event data, using Census developed methods (DIME file and the program UNIMATCH), and additional procedures developed by IBM-Research and the Center)

3. Data base loading, maintenance and assistance in problem solving. (Functions also performed by Center staff.)

Summary and Conclusions

The police agency projects undertaken under the previous limited funding have been restricted in duration and scope; e.g. data collection of two or three months, 1/12 sample data, etc. These demonstration projects have generated valuable insights and modifications to the GADS system, initialized the DIME file and refined its use in police applications, and demonstrated the versatility and transferrability of SPSS procedures in the calls-for-service analysis. In addition, the projects generated insights for the participating agencies into their problem solving techniques. The direct involvement of administrators, managers, supervisors, and line personnel in the solution process produced - if not the optimum solution - at least a solution that all levels involved in the problem could understand and could support. The speed and flexibility with which alternative solutions could be tried and evaluated, plus the minimal use of a programmer/analyst to which a problem definition had to be communicated, encouraged a re-evaluation of the factors and criteria used in the methodology. Users with preconceived ideas about which factors were important in deciding how to redistribute service areas often found, during the course of solution development, that some factors were not as critical as hypothesized and that other factors needed to be examined more carefully.

The projects accomplished under the LEAA grants have demonstrated the combination of a user-oriented, flexible and versatile interactive graphics computer system plus traditional statistical analysis techniques provide law enforcement administrators with powerful tools to assist in finding solutions to operational and management problems.

Recommendations

1. It is recommended that the interactive computer graphic system, GADS, be developed beyond the current prototype stage into a documented production version, installed at the Santa Clara County Data Processing Center and made available to criminal justice and other governmental agencies within the County. Several important modifications to the prototype should be accomplished. The most significant change concerns an adaptation of the system architecture to a configuration less dependent on a mainframe computer, with greater emphasis on establishing capabilities at the distributed end of the system. The distributed end of the current prototype is a terminal, connected by telephone line to a host computer where the data management occurs and the program is executed. The revised system should utilize either minicomputers or intelligent terminals at the distributed end, to achieve economies in operation, reduce mainframe contention, improve analysis capabilities through supplementary software, and provide opportunity for less costly and more efficient data entry. The distributed architecture should utilize mainframe capabilities for data management and certain program economies, but should provide users with maximum cost-effective capabilities at the remote end. The intelligent terminal/minicomputer offers smaller agencies a means to retain control over data entry while providing the necessary capability to review and summarize the data in a timely manner. The connection to a mainframe would enable large scale data base establishment and manipulation capabilities in an appropriate environment.

2. It is recommended that the interactive version of SPSS, when available, be installed at County Data Processing and made available to criminal justice agency users throughout the County. This recommendation is consistent with the findings from the projects undertaken by the Center supportive of placing flexible analysis tools as close to decision-makers as possible.

3. It is recognized that user agencies will be required to maintain systematic data collection efforts as the basis for analysis. Project experience supports a conclusion that data collection costs and efforts are rapidly amortized if the information is used in decisions regarding the allocation of criminal justice agency resources. The use of information in such decision-making is dependent on the ability of the system to respond in a timely, appropriate and communicable manner to selective inquiries.

SUMMARY PROJECT DESCRIPTIONS

1. Adult Probation Department Case Assignment Project

A. Objectives: Assist a determination for geographic assignment of supervising probation officers.

B. Methodology: In order to analyze the mobility of probationers over a two year period, the residences of a sample of approximately 630 probationers (10% of males and 20% of females), previously drawn for a Probationer Needs Study by the Criminal Justice Pilot Program, was obtained from Departmental records. If probationers move a great deal, case assignment by geographic area could require a large number of transfers among probation officers. Probationer moves were analyzed to shed some light on the potential magnitude of this problem. It was determined that almost 51% of the cases did not move in this period, 26% moved only once, and 23% moved 2 to 4 times. A second sample of 1973 probationers was drawn to determine if the then-current distribution of probationers was similar to the 1972 pattern. Both samples listed sex and type of offense for each probationer. Offense types were classified as felony, misdemanor-drunk driving, misdemeanor-drugs, or misdemeanor-other; the most serious offense was identified when the probationer was paroled for more than one offense. The proportion of males and females was almost the same in the two samples, however the proportion of probationers by offense type showed increases in misdemeanor-drunk driving (from 7 to 11%) and misdemeanor-drugs (from 3 to 10%), with a decline in felony (from 54 to 42%). From 1972 to 1973, the number of cases appeared to have increased somewhat in the north county and south San Jose areas, and decreased slightly in the mid-county areas.

Supervising Probation Officers identified alternative groupings of census tracts as potential service areas by indicating boundaries on plastic overlays over a census tract map base. Computer line printer (GRIDS) maps at the same scale as the census tract base maps, indicating the residences of probationers, by type, for the samples, graphically represented the distributions. A computer program developed by Center staff analyzed the number of moves made by probationers (1972 sample) into, out from, and within each grouping of census tracts.

C. Results:

Probationer moves over the two year period prior to May 1972 were tested against configurations of 5,6, and 9 service areas. The numbers of transfers increased, as expected, with the number of service areas. Up to 5 areas, each additional service area caused about 200 additional transfers per year. When the county was divided into five test service areas, about 47% of the moves occured within the test areas, while 26% of the moves which crossed service area boundaries were into or out of the county and would require a case transfer whether or not service areas were established. Analysis of the number of actual cases involved in the moves indicated that about 7.7% of the caseload would be involved in interzonal moves every year if the system of 5 service areas were instituted.

This analysis formed a significant part of Departmental consideration regarding the establishment of service area assignments. Qualitative factors were also an integral part of the decision-making by departmental personnel. It was reported that misdemeanor-drunk driving cases were to be assigned on a service area basis as a test of the geographic case assignment concept.

Exhibits A-C illustrate portions of the analysis. Exhibit A illustrates a grouping of 6 service areas with the case distribution for both samples. Exhibit B illustrates residence change summaries for the 6 service area example. Exhibit C summarizes the moves by probationers for a 5 service example.

2. San Jose Police Department "Beat Design Project"

A. Objectives: To redesign the service area (beat) structure in order to equalize workload while maintaining a prescribed level of available patrol time.

B. Methodology: The first phase of this project was implemented and executed by means of a joint study between IBM-Research and SJPD, during which time 12500 call-for-service (CFS) records were collected, categorized and aggregated to a computer-based map of San Jose divided into 273 beat building blocks (BBB's) (Exhibit 1). Teams of SJPD personnel were trained and used IBM's Geo-data Analysis and Display System (GADS) to aggregate BBB's into larger geographic service areas (beats).

The data was comprised of a sample of 30 days of data selected from throughout 1972 and balanced for proportional weekends/week days, holidays/non-holidays and seasons of the year. Variables measured in the BBB and beat aggregation process were Total CFS, Multiple Unit CFS, In-Progress CFS (priority) and Consumed Time in minutes (from call received to event cleared). Each variable was aggregated to 4-hour spans of the day as well as totaled for each day and totaled for all days. No attempt was made to capture the type of event because, for San Jose's resource allocation problem, any priority call would be treated the same regardless of type or nature.

The second phase of this project was executed through a joint study agreement between IBM-Research, SJPD and Santa Clara County. The Center assumed responsibility for providing all hardware exclusive of the host computer, all data preparation services and technical assistance as required. For this phase a second set of data of 13,677 CFS records was sampled from 1974 activity and loaded into GADS. This data was aggregated similar to the 1972 data except that Multiple Unit CFS were not used and variables were aggregated by 1-hour time span instead of 4-hour spans. The 1972 data was reloaded into GADS by 1-hour time span to be compatible with the 1974 data.

Again, SJPD personnel used GADS to aggregate BBB's into beats based on the variables available and criteria as defined by the agency. The primary difference between the two phases was that, during the first phase all GADS usage was performed at IBM's Research facility while during phase 2, SJPD was provided with an on-site terminal, located in the office of Research and Statistics.

C. Results: Phase 1 actually had 2 ending points. Upon reaching the first, SJPD personnel determined that the existing structure of 34 beats (Exhibit 2) should be expanded to 43 beats. City budgetary limitations then imposed a constraint of 40 beats and the problem was re-executed. A 40 beat solution (Exhibit 3) was rapidly developed which conformed to all constraints and objectives for number of beats, equal workload between beats and preservation of minimum preventive patrol time. Exhibit 4 is a 2-dimensional scattergram displaying the value of total consumed time for each of the old 34 beats, and Exhibit 5 is a scattergram displaying the same data for each of the new 40 beats. The new beat structure provided a significantly more equitable distribution of workload between beats in terms of consumed time.

The phase 2 work involved re-examining the old beat structure with regard to a finer breakdown of the data and to validate the new beat structure with data sampled subsequent to its implementation. With very few exceptions the new beat structure proved to be as workable as the data indicated it would be. The exceptions were easily accounted for in terms of known shifts in the make-up of the city and adjustments to the beat plan were readily formulated.

3. San Jose Police Department "Burglary Prevention" Project

A. Objectives: To assist the Burglary Analysis Unit (BAU) of the San Jose Police Department in its Tactical Research Approach Concept by providing specialized data processing services; specifically, by providing data bases of selected offense report data, geo-coding the data, producing graphic and tabular displays of the data and providing technical assistance as required.

B. Methodology: From SJPD's offense reporting system all burglaries for 1973 and 1974 were extracted, corresponding to the periods before and after several of the BAU's programs had been implemented in selected target areas. These records were then geo-coded to x-y coordinates, Census Tract and Beat Building Blocks (BBB's) as defined by SJPD in their calls-for-service study. The data was then used to prepare statistical tables of burglaries by Census Tract, Month and Year, and "GRIDS" maps (Exhibit 7) of Total Burglaries and Private Residence Burglaries by year.

The County Assessor's Unsecured Master File was geo-coded, categorized and tabulated to produce a listing of the number of businesses by category by Census Tract by year (Exhibit 8). This set of tables, in conjunction with the count of burglaries by Census Tract, provided the BAU with the key factors needed to produce a "risk factor" for commercial burglary. It should be noted here that this use of the Assessor's data was the first attempt by a local law enforcement agency to incorporate another agency's non-law enforcement type data into their analysis through the Center's capabilities.

In addition to the GRIDS maps and statistical tables, the data was loaded into GADS and BAU personnel were trained in the use of the system. BAU personnel were able to use the unique area definition and aggregation capabilities of GADS on the terminal installed at SJPD for the calls-for-service study, in their own environment at their own schedule and pace. It should be noted that while the calls-for-service study was concerned with data as aggregated by BBB, the BAU study was concerned with viewing and listing the data by event and aggregating the data by target areas unique to their work; the capabilities were directly available through the GADS system (Exhibit 6).

C. Results: Formal evaluation of the Burglary Prevention Study has not yet been completed, consequently the final results and conclusions of this project have not yet been determined. However, BAU personnel have found GADS extremely useful for defining target areas and extracting pre-and post-program implementation control data. The ability to integrate demographic, census and land use data into the problem analysis phase enabled BAU personnel to develop new and useful measurement functions.

4. Santa Clara County Sheriff "Patrol Analysis" Project

A. Objectives: To determine the feasibility of providing geo-coding capability for the Sheriff's patrol activity report data, to reference Census and property use data to the Sheriff' reporting areas and to demonstrate graphical and tabular output of the data.

B. Methodology: A variety of GRIDS maps of Fiscal 1973/74 data from the Sheriff's patrol activity reporting system (COPANA) were produced. Because of the volume of data collected in the Sheriff's patrol activity reporting system (over 131,000 events in fiscal 1973-74) a sample of data was selected for further detailed analysis. This sample consisted of all events during the last 2 weeks of June, 1974 and totaled 5,701 events.

One of the unique features of the Sheriff's reporting system was the assignment by each reporting officer of an event location in terms of a grid code. This grid code provides for a maximum resolution of 6,250,000 square feet (each grid is a square 2,500 on a side); therefore, one of the first problems was to provide geo-coding capability to a finer resolution so that the data could later be aggregated into more meaningful analysis areas (e.g. census tract, beat, traffic zone, grids of smaller dimensions, etc.). As a baseline for this effort, an example set of GRIDS maps displaying Total Events, Total Part 1 Events, Total Felony Events, Total Minutes Consumed on Felony Events, Felony Events as a Per Centage of Total Events and Time Consumed on Felony Events as a Per Centage of Total Consumed Time was produced (Exhibits 9-11) by assigning the location of each event to the centroid of the grid cell it was reported to be in. The plan was then to geo-code the data to x-y coordinates and to re-execute the GRIDS maps to the finer resolution thus provided.

Unfortunately, while several powerful programs and many techniques are available for unscrambling free-field address data, the quality of address data in the Sheriff's reporting system had degraded so severely as to almost preclude the mechanical geo-coding process (Exhibit 12). Many attempts were made to convert street and place names to consistent values and to standardize the address part of each record into the identifiable components of direction, name, type, city and house number. After expending over 200 man-hours on the geo-coding process, the best match of data to reference files was less than 50%.

The additional amount of resources required to complete the geo-coding process was deemed too extensive due to the quality of source data. Because of pressing requirements of other agencies, this project was administratively assigned a relatively low priority and little effort was subsequently expended.

C. Results: The geo-coding process is critical to the analysis of geographically related data. The difficulties encountered in geo-coding the Sheriff's data precluded the accomplishment of most project objectives. The feasibility of producing hard copy GRIDS maps of selected data was proven and demonstrated. It was determined that, until such time as the Sheriff's Office can implement increased discipline in their location data collection, geographic analysis of their data will be limited in resolution to that provided by their manual grid coding system.

5. Mt. View Police Department "Calls-for-Service" Project

A. Objectives: To determine and demonstrate the feasibility and usefulness of displaying MVPD CFS data in graphical and tabular forms as aids to management and operational information systems.

B. Methodology: A 100% sample of MVPD dispatch data from July, August and September, 1974 (22,808 events) was selected, edited and used as input to produce SPSS reports and input to GADS. The source documents of dispatch data were edited manually by an intern provided by the Regional Criminal Justice Planning Board (RCJPB). Missing data elements and consistency of addresses and activity codes were resolved in this process. The data was then keypunched and machine edited for missing data elements and consistency.

Statistical tables produced included a count of the number of events by emergency/routine code, time of day (2-hour spans), day of the week and by month; a count of the response time and total time expended by event category and month; and several different combinations (crosstabulations) of these factors (Exhibits 13 and 14).

The data was also geo-coded to x-y coordinates and loaded into a GADS system, using a map defined by MVPD personnel of 251 BBB's (Exhibits 15 and 16). A terminal was installed at MVPD headquarters for the analysis phase of the project and MVPD personnel were trained to use the system. The powerful selection, extraction and aggregation capabilities of GADS were then used to analyze the data for a wide variety of factors (Exhibits 16 and 17).

C. Results: MVPD did not pursue a clearly defined management problem through GADS, however, they found GADS to be an easy and versatile system to use in responding to a variety of management and operational questions. Of particular interest to Mt. View management was the availability of data on administrative calls and the time spent on

them. For the first time, MVPD administrators were able to count and comprehend the time spent on meals, personal breaks, training, court appearances, vehicle maintenance, public relations, and similar activities.

One of the key factors in the relative success of this project was the manual screening of the source data prior to data entry. Inconsistencies in source data, similar to those described with the Sheriff's patrol analysis report data neccessitate a form of screening or manual intervention.

6. Campbell Police Department "Call-for-Service" Project

A. Objectives: To demonstrate the feasibility and usefulness of displaying CPD dispatch data in graphical and tabular forms as aids to management and operational information systems.

B. Methodology: A 100% sample of CPD dispatch data from September and October, 1974 (13,350 events) was collected and edited for input to produce SPSS reports and input to GADS. Source documents were screened manually by an intern provided by the RCJPB for missing data elements and consistency of codes. The data was then keypunched and machine edited for consistency and validity.

A total of 19 statistical tables were produced using SPSS (Exhibit 18). As for Mt. View, CPD management was particularly interested in analysing data relevant to consumed time for administrative functions and low priority calls (e.g. "barking dog" calls, motorist assist calls, etc.).

The data was also geo-coded to x-y coordinates with the intention of loading it into a GADS system. With this in mind, CPD defined a set of 42 BBB's which were translated into a GADS map (Exhibit 19).

Subsequent to geo-coding the data but prior to actually installing a terminal or training CPD personnel to use GADS, CPD management decided that the age of data precluded its use for tactical resource deployment problems. CPD also concluded that relevant management policy data had been produced through the earlier tabulations and the project was terminated.

C. Results: Tactical resource deployment depends on the use of essentially current data in a continuous flow. The costs of generating this kind of data from non-automated data systems are relatively high and time lags are difficult to overcome. CPD objectives to use project collected data for operational deployment were inappropriate given the nature of data capture, data entry and data validation. Traditional forms of data collection are feasible for providing input to long range strategic and management problem solving analysis programs.

The concept of using calls-for-service data to capture management information relative to the administrative chores of the police function remains a viable approach. Even without the geographical capabilities of GADS, CPD management was able to document, using SPSS, the amount of field officer time lost to non-patrol activities.

7. Gilroy Police Department "Calls-for-Service" Project

A. Objectives: To demonstrate the feasibility and usefulness of displaying GPD dispatch data in graphical and tabular forms as aids to management and operational information systems.

B. Methodology: A 100% sample of GPD dispatch data from July, August and September, 1974 (14,655 events) was collected, screened, edited and input to SPSS and GADS. The source documents were screened manually by a RCJPB intern for missing data elements and consistency of codes. The data was keypunched and machine edited.

A set of statistical tables, similar to those produced for CPD and MVPD, were produced. GPD was particularly interested in analysing the data relevant to consumed time for administrative functions (e.g. vehicle service, court appearances, transportation of prisoners/evidence, etc.). Summary graphs of total events (less administrative calls) by day of week and time of day are presented as Exhibits 20 and 21.

In addition to the SPSS tables, the data was geo-coded to x-y coordinates and loaded into a GADS system. GPD personnel were trained to use the system, a terminal was installed at GPD headquarters, and GPD personnel then used GADS to analyse their data. Exhibits 22-25 are representative of the type of analysis presentations available to GPD management in GADS.

C. Results: GPD management, staff and line personnel reported considerable utility and efficiency with the types of analysis provided through the combination of hard copy statistical reports and interactive graphical inquiry/retrieval systems. Without being buried by volumes of paper they were quickly and easily able to extract precisely the data needed to answer specific questions.

8. Countywide CAPER Project

A. Objectives: To demonstrate and subsequently to provide geo-coding and GRIDS map services.

B. Methodology: Countywide CAPER (Crime Analysis - Project Evaluation-Research) is an LEAA grant funded project designed to collect and process offense report data for all law enforcement agencies in the county. The Center processed CAPER data previous to and including calendar year 1974 as projects under grant funds. CAPER has subsequently sub-contracted with the Center to geo-code the data and then to produce GRIDS maps from the geo-coded data.

In practice, CAPER personnel regularly visit each agency and transcribe offense data onto coding sheets from which two files on magnetic tape are produced. One file is used as input to CAPER's own SPSS routines and the other file is hand carried to the Center for geo-coding. After the file has been geo-coded it is returned to CAPER where the rejects from the geo-coding process are coded by hand. The completed file is then returned to the Center where a variety of different GRIDS maps are produced depending on the requests from each agency.

C. Results: From January 1974 to June 1975 the Center has processed 175,769 CAPER records and geo-coded a total of 131,340, or 74.7% overall. The Center's target for geo-coding is a 90% match rate and is currently running with better than an 88% rate, with the target rate expected to be achieved before the end of this calendar year. Current geo-code processing consumes less than 3/100 second per record (on the County's IBM S370/158 computer) and about 1 man-hour per batch of data - regardless of the number of records. As an example, at current rates geo-coding a batch of 30,000 records would cost about $110 or about $0.0036 per record. The current agreement with CAPER provides for a turnaround of their data in one working day, and no problems have been encountered meeting this commitment.

The GRIDS processing is a much less "production" type job than the geo-coding because of the varied requests for maps. However, one of the most powerful aspects of GRIDS is its ability to produce an almost endless variety of maps without limiting the user to a set number of maps produced on a regular basis which may not be of interest at any particular point-in-time. Currently, a typical GRIDS job consists of one map displaying total events and total burglaries for each of the thirteen county agencies, plus maps showing the same data for two of the Sheriff's contract cities, plus three special interest maps (one for each of three of the 13 agencies)- each calendar quarter.

Because of the custom nature of each GRIDS job the maps are produced in two steps, with the output of the first step being verified before the maps are printed on vellum paper in step 2. For this reason a maximum of three working days are required for completion of each job, assuming that no significant changes have been requested. If significant changes have been requested then the job turnaround will depend on the complexity of the changes and staff resources available to implement them; no jobs have been delayed more than 1-2 days for this reason.

9. Miscellaneous Short Projects

A. Land Use Changes and Reported Offenses

The San Jose Police Department in conjunction with the Stanford Research Institute requested the Center's assistance in determining whether the change from fraternity/sorority residences to day care

centers and half-way houses, in the vacinity of San Jose State College, had any effect on crime rates in that area.

The predominant change in land use occurred during 1972-73 and, consequently, two samples of data were selected from SJPD's offense reporting system. Each sample consisted of all records for the first half of each year used in the study. The data was then geo-coded and used to prepare GRIDS maps (one for each year) displaying events in the campus area (Exhibits 26 and 27).

Analysis of the data and the results, conclusions and recommendations of the study have not been made available to the Center as of the date of this report.

B. Campbell Police Department Burglary Study

In 1973, prior to the advent of Countywide CAPER, the Campbell Police Department sponsored a study of burglaries in their city. As part of this study, they collected data for all burglaries from 1971 thru 1973, manually geo-coded this data and commissioned the Center to produce 11 GRIDS maps. The maps displayed data values as follows:

1971 Burglaries
1972 Burglaries
1973 Burglaries
Burglaries of Public Places
Burglaries of Commerical Places
Burglaries of Residential Places
Burglaries of Autos
Burglaries from 8 A.M. - 4 P.M.
Burglaries from 4 P.M. - 12 A.M.
Burglaries from 12 A.M. - 8 A.M.
Total Burglaries

Exhibits 28 and 29 are two of the GRIDS maps that were produced.

Analysis of the data and the results, conclusions and recommendations of the study have not been made available to the Center as of the date of this report.

C. Criminal Justice Pilot Program

The Criminal Justice Pilot Program (CJPP) has been involved in many aspects of law enforcement information analysis. One of the in-house studies performed by CJPP involved an in-depth analysis of robberies in San Jose. As part of this study CJPP sampled and prepared offense report data for robberies in San Jose during 1971-1973 and, among other things, requested the Center to prepare the following GRIDS maps from the data:

Total Commercial Robberies	Total Non-Commerical Robberies
Cleared Commercial Robberies	Cleared Non-Commerical Robberies

Residences of Adult Robbery Offenders
Residences of Juvenile Robbery Offenders
Residences of All Robbery Offenders
Average Travel Distance Between Event and Suspect Residences and Number of Events

Some of these maps were produced several times to display the data at different scales and resolutions. Exhibit 30 is an example of one of these maps.

APPENDIX A

G A D S

TECHNICAL CAPABILITIES AND ASSUMPTIONS

SYSTEM SUMMARY

The Geo-Data Analysis and Display System (GADS) is an on-line interactive graphics system which provides users with a set of generalized capabilities to select, display, manipulate, and interpret data in a sequence which they determine during interaction with the system. GADS consists of two subsystems:

1. Extraction

   This subsystem provides a set of interactive functions for selecting, aggregating and subsetting geo-coded data from multiple "event" files, to form an on-line "extracted data base".

2. Analysis and Display

   This subsystem provides a set of interactive functions for conversational problem exploration and solution through the display and manipulation of maps and map-related data.

SYSTEM DESCRIPTION

GADS, as previously mentioned, consists of two subsystems: (1) Extraction and (2) Analysis and Display. The components of each of these subsystems are shown in Figure 1. Note that the "build and maintain" functions which are not part of GADS are shown as being separate from the GADS components.

Each of the GADS subsystems shown in Figure 4 are now described:

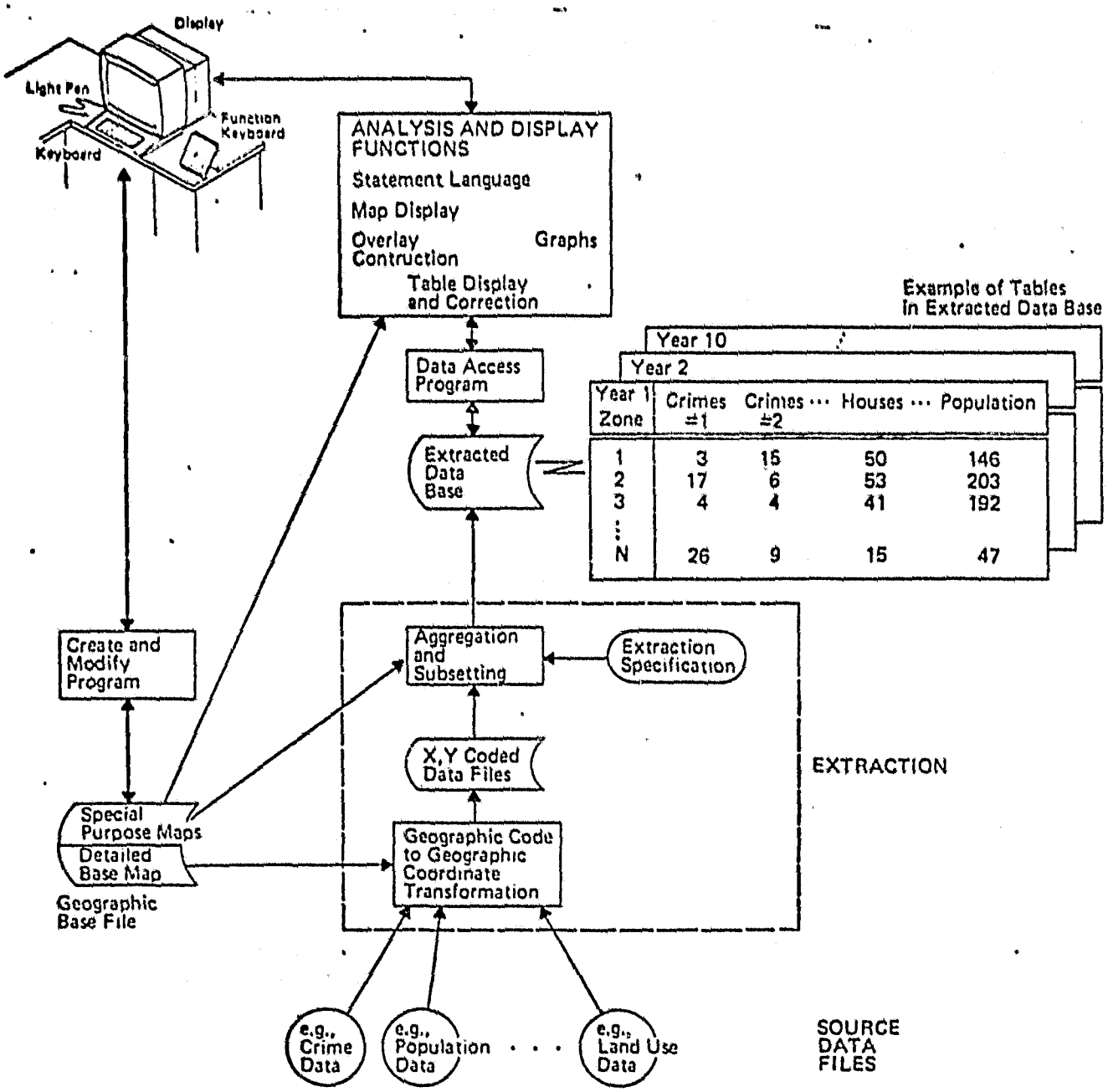
1. Extraction

The GADS extraction subsystem performs the extraaction of data from multiple event files. The inputs to extraction are the event files; a base map, and a selection, aggregation and subsetting specification; the output is an on-line extracted data base. These components are described below:

a. Event File

The event files (created using the Census Bureau's UNIMATCH or ADMATCH programs) contain an x-y coordinate in each of its records, so that extracted data can be related to points, lines, or polygons on the computerized base map.

There must be record definitions for each event file; these are supplied by the user to GADS and are stored in the computer.



~~GADS architecture~~

GADS ARCHITECTURE FIGURE 1

~~FIGURE 4~~

APPENDIX A

APPENDIX A
G A D S

b. Map Display and Overlay Construction

The map display functions support the display of the symbols created with GADS statements. The user can display one or more maps, with one or more sets of symbols, either simultaneously or consecutively. Maps may be expanded around any zone, and lines between zones containing the same symbol may be eliminated to form a sub-map of areas with similar data values. The user may point to a symbol in a zone to get a display of data values for that zone. A typical display would contain 1000 lines and over 250 symbols. During use of these functions, several displays might be requested (e.g., change scale, change symbols, change map).

The overlay construction functions are used to create, alter, retrieve and save maps. These overlay maps must be formed from combinations of the basic zones in the base map. To identify zones, one can display statement-created symbols, dots, or numbers in each zone. By pointing to the identifiers, existing zones can be extended or new zones created from combinations of basic zones. All maps can be enlarged to facilitate overlay construction. Because overlay maps can be saved in a map library, they can be referred to in the statement language to form map displays or new variables based on data values aggregrated according to an overlay map. Use of the overlay construction functions will usually require frequent map redrawing to reflect changes.

c. Graph Display

Scatter diagrams are a familiar mode of data presentation and are the second data display mode in GADS. With these functions the user may create one, two, or three dimensional scatter diagrams. Each point (or line in 3-D) on the scatter represents one zone. The zone number for any point is displayed if the point is pointed to, and any zone number can be entered and the appropriate point on the graph will be flagged. The scatter diagrams are automatically scaled, unless the user enters specific scales on each axis. The user may request a cumulative summation of the y-axis variable.

d. Table Display and Manipulation

The third data display mode in GADS is Tables. The Table based functions can be used to: display any Table in the extracted data base (either any n-tuple in a Table or the values of all variables for any basic zone), alter values in a Table and log the changes, and print hard copies of the Tables. This dictionary can be used as a reference in constructing statements. As a data protection mechanism, the user may create one or two working Tables in the extracted data base and move data between these Tables and other Tables in the extracted data base.

APPENIDX A

G A D S

Reference to Exhibits Displaying GADS Functions

Exhibit 1	Maps and Symbols	San Jose CFS Study
Exhibit 2	" "	" " " "
Exhibit 3	" "	" " " "
Exhibit 4	2-Dimensional Histogram	" " " "
Exhibit 5	" " "	" " " "
Exhibit 15	Maps,	Mt View CFS Study
Exhibit 16	Maps and Symbols	" " " "
Exhibit 17	3-Dimensional Histogram	" " " "
Exhibit 19	Maps and Symbols	Campbell CFS Study
Exhibit 22	3-Dimensional Histogram	Gilroy CFS Study
Exhibit 23	Maps and Symbols	" " "
Exhibit 24	" "	" " "
Exhibit 25	Maps and Extracted Data	" " "

County of Santa Clara
General Services Agency: Data Processing Center

BY		SECTION
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Advanced Analysis/Mathematical Library
SPSS
Introduction

1.0 Introduction

SPSS, Statistical Package for the Social Sciences, is installed and maintained by GSA DPC. The primary purpose of this Report is to document the Procedures adopted by GSA DPC for the use of SPSS. This Report is written to be used as a supplement to the regular SPSS manual by documenting Installation dependent operational conventions.

It is the Users responsiblity to procure SPSS manuals. However, GSA DPC will make available a limited number of SPSS manuals on a loan basis. A SPSS manual will so be available at GSA DPC to be used as a reference manual when using the facilities at the Center.

2.0 General Program Description

The Statistical Package for the Social Sciences (SPSS) is an integrated system of computer programs for the analysis of social science data. The system has been designed to provide the social scientist with a unified and comprehensive package enabling him to perform many different types of data analysis in a simple and convenient manner. SPSS allows a great deal of flexibility in the format of data. It provides the user with a comprehensive set of procedures for data transformation and file manipulation, and it offers the researcher a large number of statistical routines commonly used in the social sciences.

In addition to the usual descriptive statistics, simple frequency distributions, and crosstabulations, SPSS contains procedures for simple correlation (for both ordinal and interval data), partial correlation, multiple regression, factor analysis, and Guttman scaling. The data-management facilities can be used to modify a file of data permanently and can also be used in conjunction with any of the statistical procedures. These facilities enable the user to generate variable transformations, to recode variables, sample, select, or weight specified cases, and to add to or alter the data or the file-defining information. SPSS enables the social scientist to perform his analysis through the use of natural-language control statements and requires no programming experience on the part of the user.

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——— Advanced Analysis/Mathematical Library
——————— SPSS
——————————— Program Reliability/Maintainability

3.0 Program Reliability/Maintainability

3.1 Overview

SPSS is distributed by NORC (National Opinion Research Center) located at the University of Chicago. This group is responsible for upgrading and documenting the capabilities of SPSS. We have made a formal request to NORC for information about their general Reliability/Maintainability policy for SPSS. Their response will be documented as a revision to this section. Presently there is no formal commitment by NORC to guarantee the performance of SPSS.

3.2 Program Reliability

SPSS has been an operational system since 1967. Studies conducted at Stanford University have shown that the SPSS procedures are very reliable. SPSS has been sucessfully implemented in over 200 facilities. These facilities include major Universities and government agencies. Various Santa Clara County departments and agencies have successfully used SPSS.

3.3 Program Maintainability

A Support Agreement can be purchased from NORC for the maintenance of SPSS. The Agreement entitles GSA DPC to all new releases, program fixes and subscription to the SPSS Newsletter. The newsletter documents known errors and bypasses available.

3.4 Problem Handling

Should problems occur during the execution of SPSS, the problem description and associated run documentation should be submitted to GSA DPC for resolution.

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Advanced Analysis/Mathematical Library
SPSS
Detailed Operational Description

4.0. General Operational Description

SPSS is an extremely flexible Statistical Package. It not only has the ability to perform various statistical routines for data analysis, it also has fairly extensive input/output capabilities. Unfortunately such capabilities require the user to have not only knowledge of SPSS Procedures but also a very extensive knowledge of IBM JCL (Job Control Language).

Additionally there are GSA DPC constraints that must be considered when using SPSS. The most significant GSA DPC constraint is the limited availability of permanent on-line disk storage areas for SPSS generated System Files.

GSA DPC has designed several SPSS Catalogued Procedures which will minimize the amount of JCL knowledge required by the User. If the User cannot conform to the constraints specified for the use of these Procedures, he must code his own JCL. All JCL must conform to GSA DPC Standards documented in the Facility User Guide for GSA DPC.

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_____ Advanced Analysis/Mathematical Library
_____ SPSS
_____ Detailed Operational Description

5.0 Detailed Operational Description

5.1 Overview

This section will describe the SPSS Catalogued Procedures installed at GSA DPC. The use of these Procedures will minimize the amount of JCL that the User is required to code in order to make an SPSS computer run. However, the User is cautioned to observe the limitations imposed by the Catalogued Procedures.

5.2 Catalogued Procedure Limitations

The Catalogued Procedures are extremely useful when the User is creating and/or retreiving SPSS generated System Files. The Catalogued Procedures will automatically store User's SPSS System Files on a permanently resident Disk File(TEST.JAA.PRMUS). Subsequent processing can be accomplished without any additional Operater intervention. Hence, these subsequent runs should experience better response times(turn-around).

The amount of disk space presently allocated for TEST.JAA.PRMUS is twenty(20) cylinders. Assuming an average sample size(# of cases) of 1,000 observations, there is sufficient space available for approximately sixty(60) System Files. Should the capacity of this disk area be exceeded, SPSS runs will terminate abnormally. SPSS System Files must be purged from TEST.JAA.PRMUS before any subsequent processing commences.

5.3 SPSS System File Management

5.3.1 TEST.JAA.PRMUS Usage

The following rules governing the use of this disk area should be observed:

(1) Individual System Files should not contain more than 1,000 observations. However, should space be available and approval is granted, the User may exeeed this limit. Requests should be directed to Mary Wiggers at ext. 4161.

(2) Individual System Files should not be kept longer than a period of two weeks. Requests for a longer period will require approval from Mary Wiggers.

5.3.2 TEST.JAA.PRMUS Purging Policy - GSA DPC will be responsible for the purging of SPSS System Files.

(1) The purging of individual SPSS System Files should be directed to Mary Wiggers.

(2) Periodically, GSA DPC will purge all SPSS System Files residing on TEST.JAA.PRMUS. GSA DPC will create a magnetic tape back-up copy of all the SPSS System Files before purging. SPSS System Files on this back-up tape will be available upon request for a period of four weeks.

Presently, the purging of all SPSS System Files will on the first and third Monday of each month.

5.3.3 TEST.JAA.PRMUS Back-up Capability - GSA DPC has installed several Catalogued Procedures to aid the User in "backing-up" their System Files onto Magnetic Tape. This capability allows the User to save his SPSS System File beyond the two week period. The Users are encouraged to use this capabilty for SPSS System File of significant size. The Procedures are documented in Section 5.5.

APPENDIX B

SPSS

REFERENCE TO EXHIBITS

Exhibit 8	Crosstabulation	San Jose Burglary Study
Exhibit 13	One-way frequency histogram	Mt View CFS Study
Exhibit 14	Aggregation of Variables	" " " "

Advanced Analysis /Mathematical Library
GRIDS
General Program Description

1.0 General Program Description

1.1 Background

The Census Use Study, a small-area research study sponsered by the Bureau of the Census, was established in New Haven, Conn., in September 1966. It was established to explore the current uses and future needs of small-area data and data handling and display techniques in local, State and Federal agencies.

The Grid-Related Information Display System (GRIDS) was designed and written by the Census Use Study staff to provide a flexible, easy-to-use computer mapping system.

1.2 General function

GRIDS can map files whose data characteristics are unknown to provide a quick view of the data for analysis and can also map files where complicated data manipulation is required.

GRIDS produces three types of maps: (1) shaded mapes where the printed symbols vary with the value level, (2) density maps where the number of printed symbols varies with the value level (e.g. one symbol for every 10,000 units), and (3) value maps where the mapping values themselves are printed.

The input to GRIDS consists of one or more data values to be mapped and a pair of coordinates associated with each set of data values. The coordinates determine the location of the data values on the maps and must be supplied to GRIDS by an external routine (i.e. manually, UNIMATCH or ADMATCH).

GRIDS reads the data file to be mapped and manipulates the data values or coordinates if desired. A special programming language may be executed by GRIDS to perform most data processing tasks. This language is very simple and the user need not be a programmer to operate the system.

There is no limit to the number of data records in the file, and a grid cell (from 1 to 55X55 characters) may cover almost any mapping area desired. Up to five(5) completely independant maps may be produced for each run, and the system will only need to read the data file once.

A complete diagnostic editing system is included in the program logic. The program will scan all control cards for errors and does not stop after the first error is encountered.

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_____ Advanced Analysis/Mathematical Library
_____ GRIDS
_____ Program Reliability/Maintainability

2.0 Program Reliability/Maintainability

2.1 General Policy

The Census Use Study Group does not assume the responsibility or updataing the GRIDS programs. The local chapter(San Francisco) has assured us that they will aid Users in the successful implementation of the programs as they have done in the past. However, there is no binding agreement between the User and the local chapter of the Census Use Study Group which obligates them to provide this service. The Census Use Study Group does make available program documentation material to aid in the use and maintenance of the programs.

2.2 Program Reliability

The Census Use Study Group makes the GRIDS programs available for use by local, State and Federal agencies. Santa Clara County's Planning Department has used GRIDS successfully for past three years. Other Agencies outside the County has had similar success with GRIDS.

2.3 Program Maintainability

GSA DPC has the high-level language version(Fortran) of the GRIDS programs. Thus it is possible for GSA DPC to maintain the programs. GSA DPC will maintain GRIDS on its Computer Supported Mathematical Library.

2.4 Problem Handling

Should problems occur during the execution of GRIDS, the problem description and associated run documentation should be submitted to GSA DPC for resolution.

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Advanced Analysis/Mathematical Library
GRIDS
General Operational Description

3.0 General Operational Description

GRIDS, as installed at GSA DPC, is normally executed in two phases.

3.1 Phase I

During the execution of this phase, GRIDS will produce a magnetic tape copy of the resultant maps, the maps themselves printed on stack paper and the routine GRIDS control card listings and diagnostics. The listings, diagnostics, hard-copy maps and the job set-up will be returned to the user. The job set-up will be annotated with the number of the tape containing the copy of the maps. The user has ten days beginning upon completion of Phase I in which to inspect the results of the run and advise GSA DPC to initiate Phase II. If, at the end of ten days, GSA DPC has not been so informed, the tape containing the maps will be released for use by other jobs.

3.2 Phase II

The execution of this phase does not actually use GRIDS, but rather, causes the magnetic tape copy of the maps produced in Phase I to be printed on unlined vellum paper(U012). The maps thus produced can be combined with a mylar overlay of the analysis area showing streets, blocks, zones or areas and this resulting sandwich can be used to make inexpensive "blue-line" prints or higher quality photographic negatives and prints.

The procurement of the vellum paper, mylar overlays and finished prints are the user's responsibility. However, technical support may be obtained from the Center for Urban Analysis. They may contacted at (408) 299-3285.

Advanced Analysis/Mathematical Library
GRIDS
PHASE I - Detailed Operational Description

4.1 Phase-I - Detailed Operational Description

4.1.1 Input Requirements

A. Grids control cards - These controls are used by GRIDS to determine the input format of the incoming data, to specify any special processing required, and to specify the type of map desired.

B. Grids Data File - This file contains the value and location data. It is normally the output of an external geo-coding routine, UNIMATCH, but can be generated manually. The medium for this file can be punched cards, magnetic tape or disk. If the medium is other than punched cards, a control card specifying the location of the Data File must be included. See DATAUNIT keyword parameter for control cards. It is suggested that the DATAUNIT value be set to 10 when using this keyword parameter.

4.1.2 Outputs Generated

A. GRIDS Map Pool Tape - This tape contains the necessary data to print the required maps. It is automatically pooled to magnetic tape so that maps can be reprinted without re-executing Phase I. The user can reprint his maps (Phase II) for a duration of 10 days. After that time period the pool tape will not be available.

B. GRIDS Maps - Phase I will automatically print a copy of the required map on standard computer output forms. i.e. 11 x 14 one-part paper six liner per inch.

County of Santa Clara
General Services Agency, Data Processing Center

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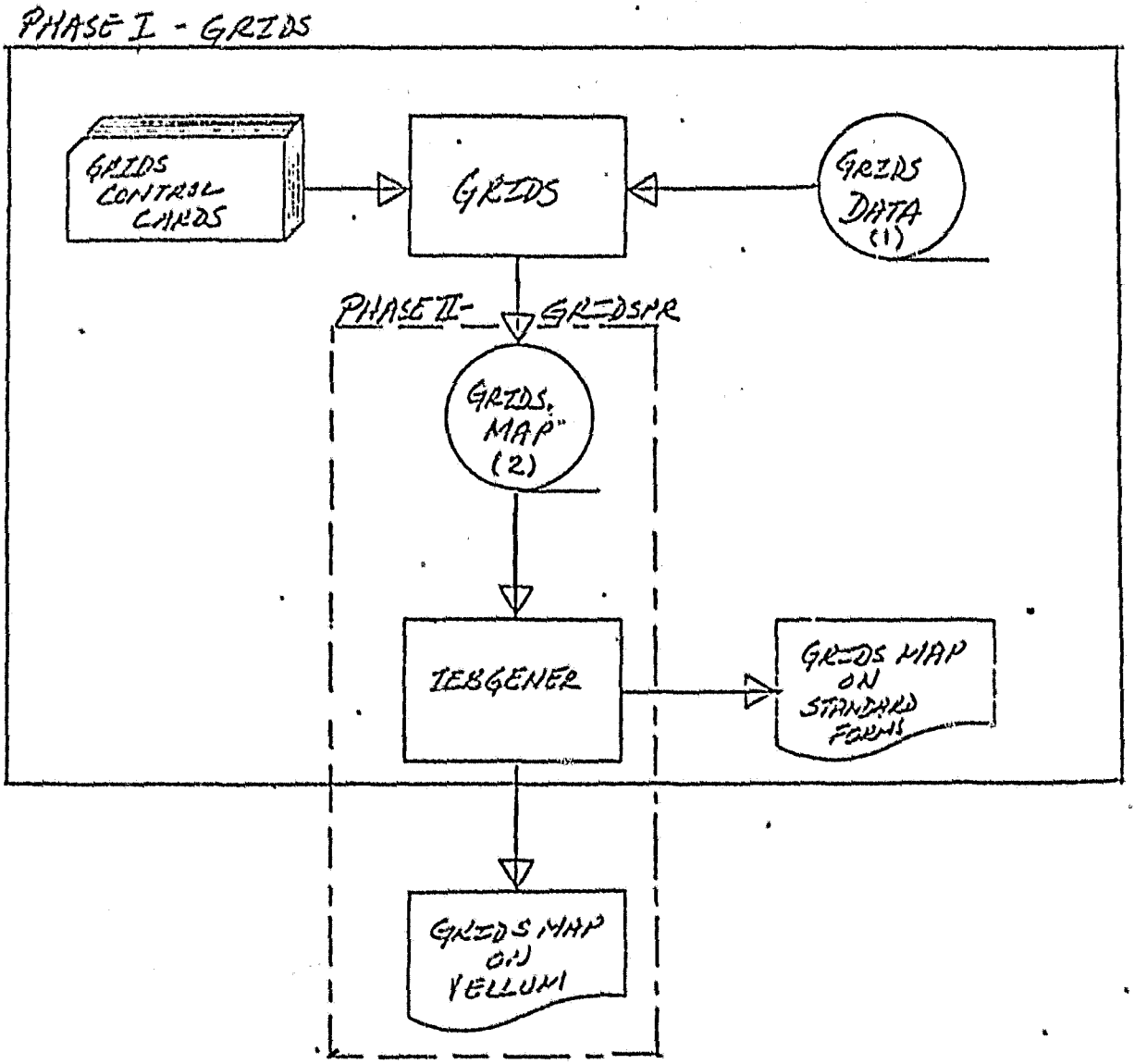
Advanced Analysis/Mathematical Library
GRIDS

SYSTEM FLOW CHART



(1) GRIDS DATA - CAN BE CARDS, TAPES, DISK ETC

(2) GRIDS MAP POOL TAPE - AUTOMATIC RETENTION PERIOD OF 10 DAYS

APPENDIX C

GRIDS

Reference to Exhibits Using GRIDS Functions

Exhibit 7	Double Value Map	San Jose Burglary Study
Exhibit 9	Single Value Map	Sheriff's Patrol Analysis Study
Exhibit 10	Shaded Map	" " " "
Exhibit 11	Single Value Map	" " " "
Exhibit 26	" " "	San Jose Land Use Study
Exhibit 27	" " "	" " " " "
Exhibit 28	" " "	Campbell Burglary Study
Exhibit 29	" " "	" " "
Exhibit 30	Shaded Map	CJPP Robbery Study

APPENDIX D

GEO-CODING

The process by which an event whose location is known by address or place name is referenced to service area (e.g. school district, census tract, police beat, etc.) is known as geo-coding. The Center performs geo-coding by means of its DIME file and the program UNIMATCH. Figure 5 depicts the problem of overlapping service areas; and each of the elements in the geo-coding process are described below.

A. DIME File (Dual Independent Map Encoding):

The Census Bureau's DIME File concept, which is required in the creation of event files, is a geographic base file which describes an area in terms of line segments, nodes and enclosed areas (blocks). Each street, river, canal, railroad track, municipal boundary, or other map feature can be considered as one or more straight line segments. Curved lines can be divided into a series of straight line segments. When features intersect or when straight line segments change direction, nodes are formed. The area enclosed by a set of line segments are called blocks. Using street names and address ranges, the state plane coordinate system and other identifier; each segment, node, and block is uniquely identified along with its geographic characteristics (Figures 6,7, and 8). The DIME file is built and maintained using programs provided by the Census Bureau and programs developed and maintained by the Center for Urban Analysis.

B. UNIMATCH:

UNIMATCH is a generalized record linkage system. The linking process involves two input files. The first, the data file, is the file to which information is to be attached. The second file, the reference file (usually extracted from the DIME File), is the file that supplies the information to be linked. A data file record is said to be matched if a unique reference file record exists that satisfies the criteria of the matching application.

Geo-coding then is a specialized form of record linkage application whereby house numbers, directions, street names and types, and city jurisdiction codes are the matching criteria and x-y coordinates, census tracts and user service area codes are the transferred or linked data.

As was GRIDS, UNIMATCH was designed and written by the Census Use Study staff to provide a flexible, easy to use computerized record linkage system.

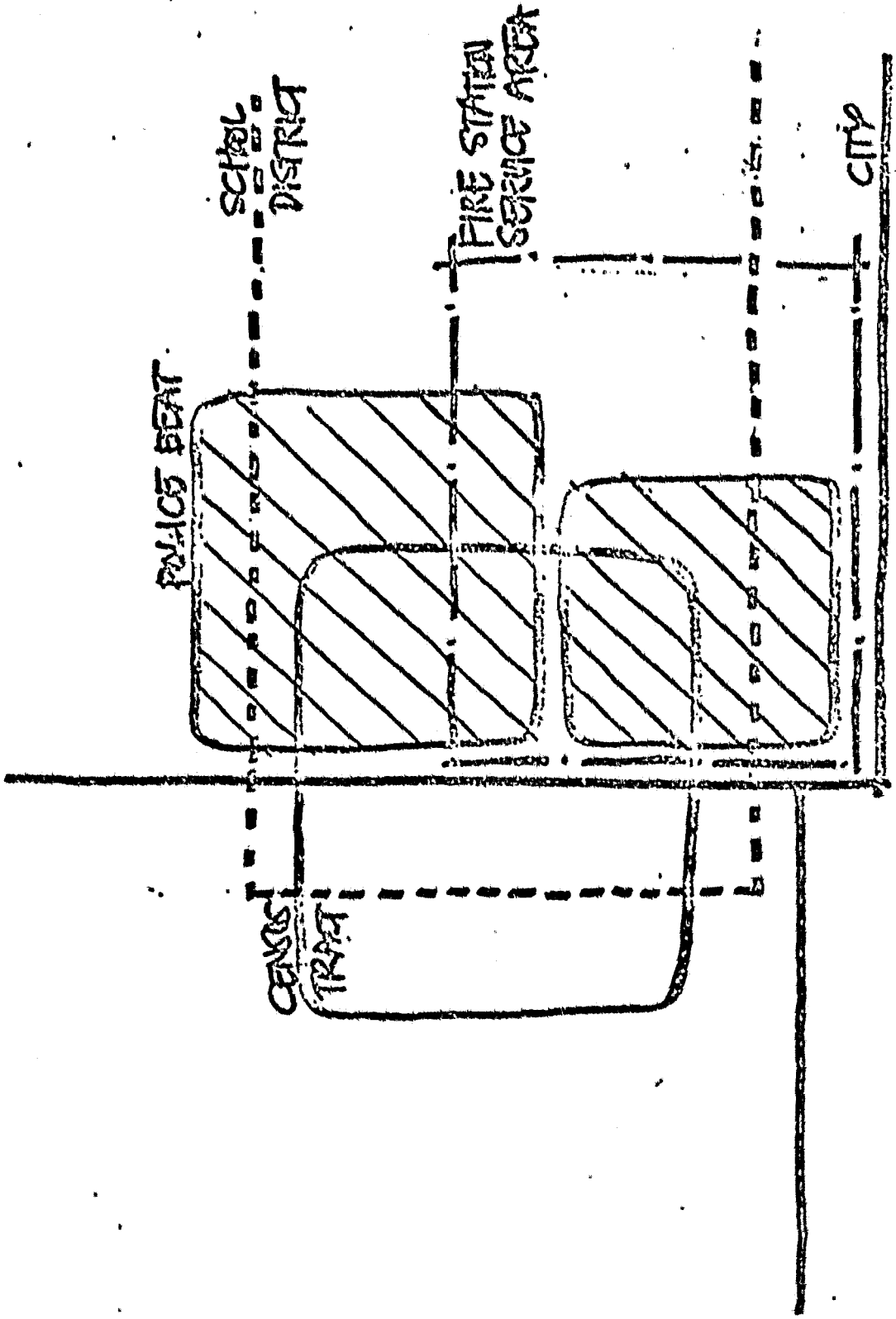

OVERLAPPING SERVICE AREAS
CITY BOUNDARY
FIRE STATION SERVICE AREA
SCHOOL DISTRICT
POLICE BEAT
CENSUS TRACT

Figure 5

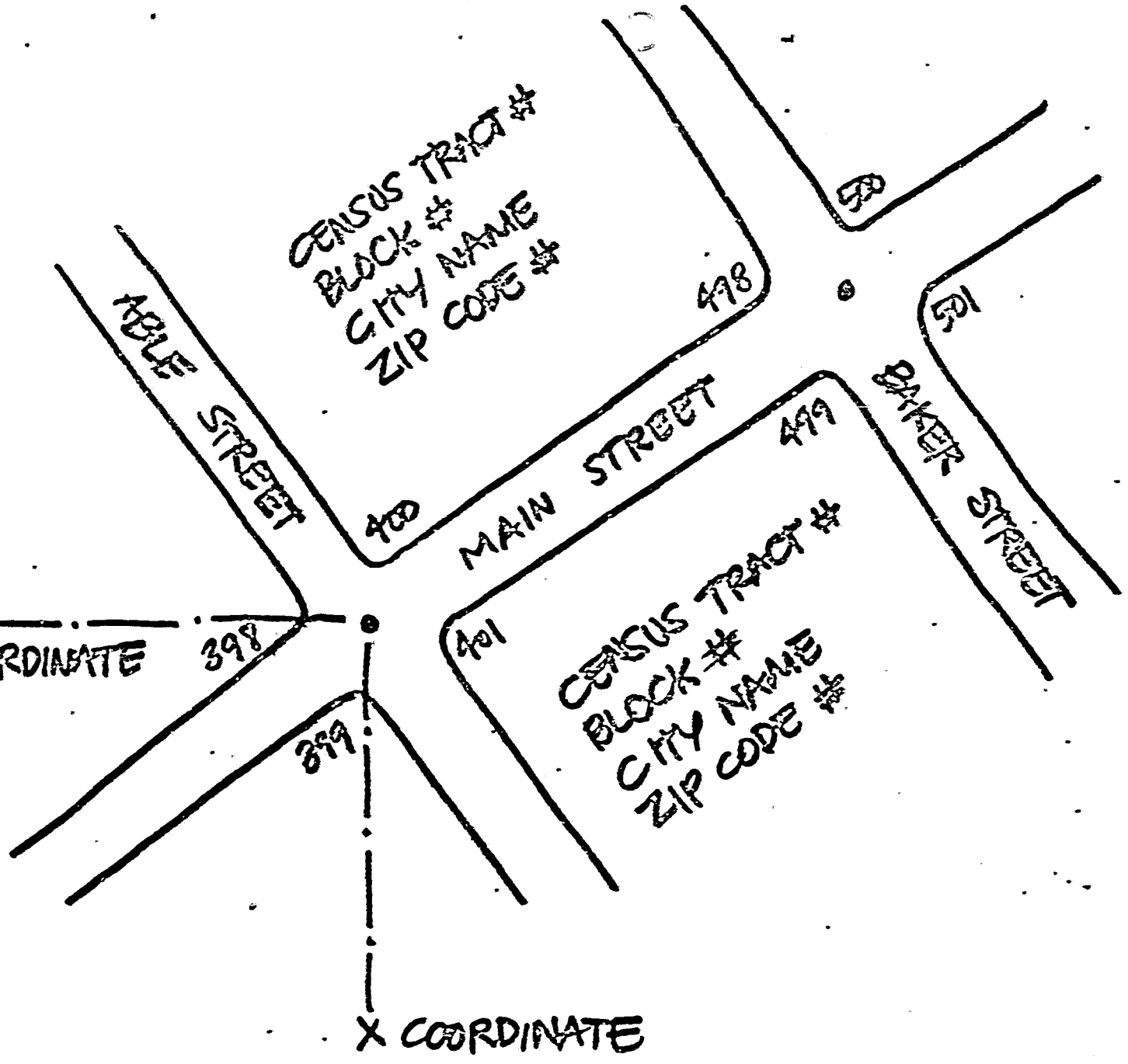


Figure 6

GEOGRAPHIC BASE FILE

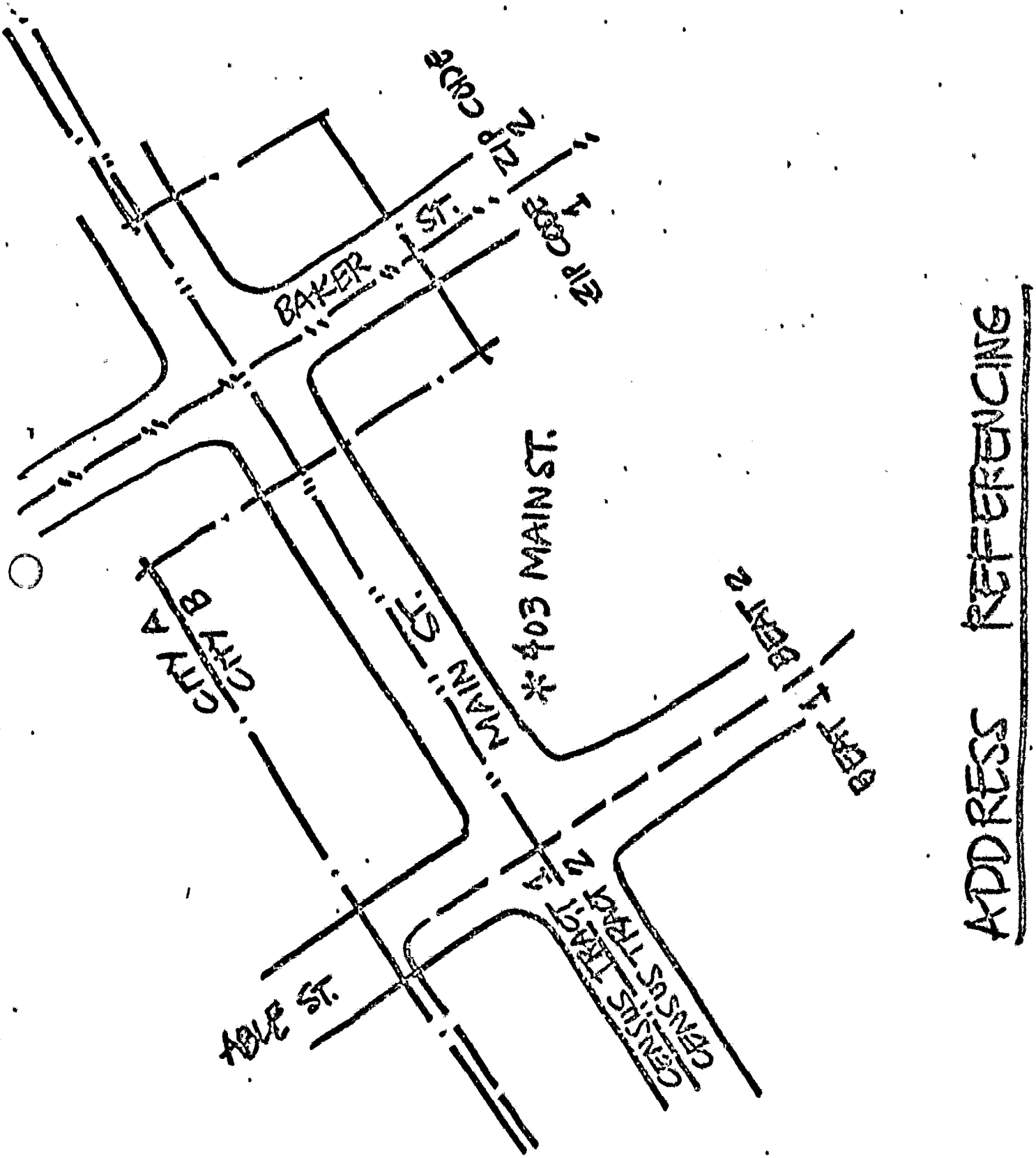

ADDRESS REFERENCING
BAKER ST.
21st CIR
22nd CIR
MAIN ST.
403 MAIN ST.
CITY A
CITY B
ABLE ST.
CENSUS TRAIL
CENSUS TRAIL
BOAT
BOAT

Figure 7

LOCATION	TRACT	BLOCK	X-COORD.	Y-COORD.	USER AREA #
1202 S. EDGEWARE RD.					
ALMADEN CENTER					
FIRST & SANTA CLARA					

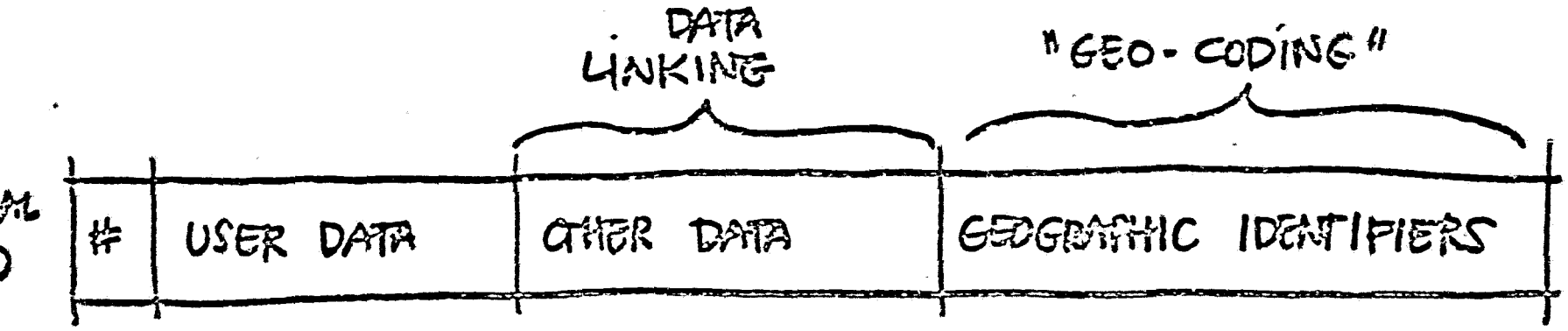
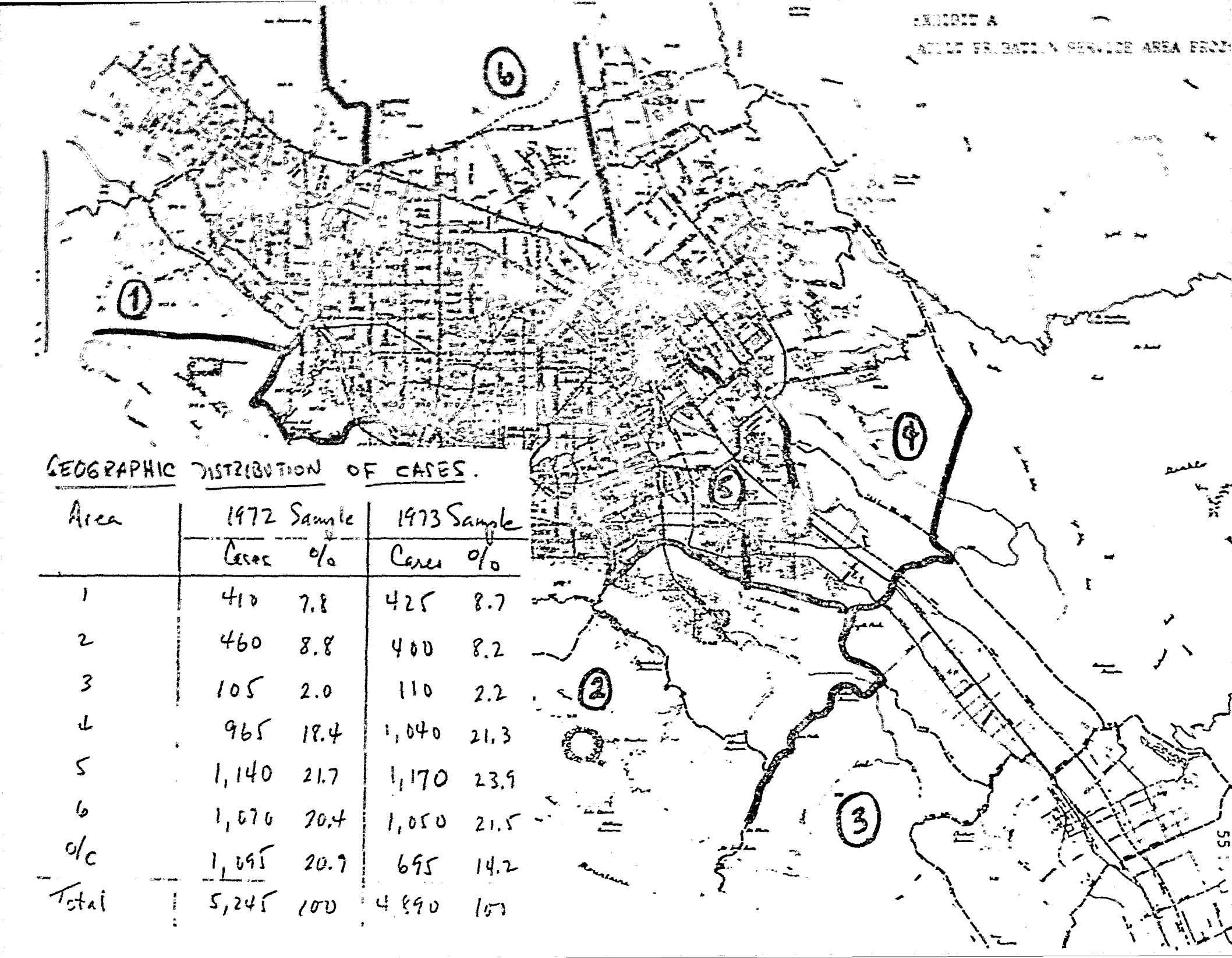


Figure 8

GEOGRAPHIC REFERENCING

APPENDIX E

EXHIBITS



GEOGRAPHIC DISTRIBUTION OF CASES.

Area	1972 Sample		1973 Sample	
	Cases	%	Cases	%
1	410	7.8	425	8.7
2	460	8.8	400	8.2
3	105	2.0	110	2.2
4	965	18.4	1,040	21.3
5	1,140	21.7	1,170	23.9
6	1,070	20.4	1,050	21.5
O/C	1,095	20.9	695	14.2
Total	5,245	100	4,890	100

EXHIBIT B

ADULT PROBATION SERVICE AREA PROJECT

PROBATION CASE ADDRESS BY SERVICE AREA / 1972 Sample

6 Areas

NUMBER OF CASES BY SEX

AREA	TOTAL CASES				MALES				FEMALES			
	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN
1	49	24	30	12	33	12	17	7	16	12	13	5
2	54	25	30	12	38	14	19	8	16	11	11	4
3	12	5	4	4	9	2	2	3	3	3	2	1
4	114	54	42	31	79	36	24	28	35	18	18	3
5	131	55	63	65	97	38	40	45	34	17	23	20
6	130	57	59	37	84	31	35	27	46	26	24	10
O/C	139	76	68	58	80	43	39	24	59	33	29	34
TOTAL	629	296	296	219	420	176	176	142	209	120	120	77

NUMBER OF CASES BY TYPE OF OFFENSE (MOST SERIOUS CONVICTION)

AREA	FELONY				MISD/DRUNK DRIVING				MISD/DRUGS				MISD/OTHER			
	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN	LAST ADDRESS	CHANGE IN	CHANGE OUT	ADDRESS WITHIN
1	24	16	15	7	2	2	4	0	4	3	0	2	19	3	11	3
2	25	20	22	8	2	1	1	0	3	0	0	0	24	4	7	4
3	4	3	1	0	1	1	1	1	1	1	1	0	6	0	1	3
4	65	33	28	19	12	4	1	2	0	0	0	0	37	17	13	10
5	72	34	38	46	11	3	3	4	3	0	0	2	45	18	22	13
6	77	40	38	20	9	2	5	1	4	1	3	1	40	14	13	15
O/C	73	42	46	37	8	4	2	1	2	2	3	3	56	28	17	17
TOTAL	340	188	188	137	45	17	17	9	17	7	7	8	227	84	84	65

EXHIBIT C

ADULT PROBATION SERVICE AREA PROJECT

Moves by Probationers
(1972 Sample)

	Moves per Case					
	0	1	2	3	4	Total
Number of Cases	330	160	83	42	14	629
Number of Moves *						
-within zones		55	62	50	19	136
-between zones		40	34	35	15	124
-out of county		65	70	41	22	198
Total		160	166	126	56	508
Case Involved in each type of move *						
-within zone		55	45	27	9	136
-between zones		40	26	22	9	97
-out of county		65	44	20	8	137

* Computed for case of five service areas

Inter zone transfers per year $= \frac{1}{2}\left(\frac{97}{629}\right) = 7.7\%$

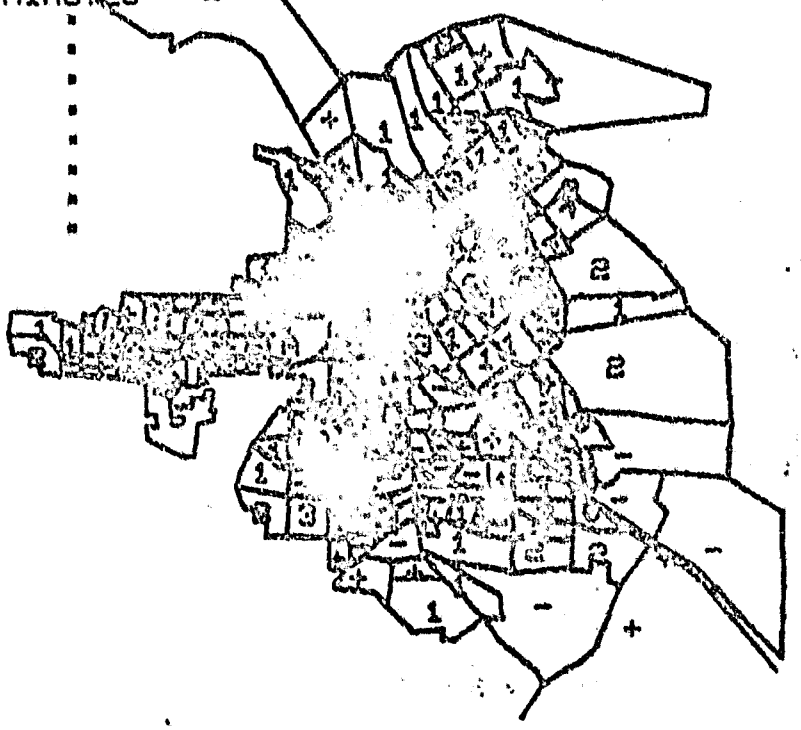
Exhibit 1

SAN JOSE POLICE DEPARTMENT MAPS BEAT STUDY

GADS BASIC ZONE MAP(273 BBBs) WITH SYMBOLS REPRESENTING TOTAL CONSUMED TIME FOR EACH ZONE IN 1972 SAMPLE DATA.

ZONES
0

7 = 7000 MINUTES OR MORE
6 = 6000-7000 MINUTES
5 = 5000-6000
4 = 4000-5000
3 = 3000-4000
2 = 2000-3000
1 = 1000-2000
+ = 500-1000
- = 0- 500
@ = 0



ZONE-VALUES STATEMENTS SSMODE FIND ZONE

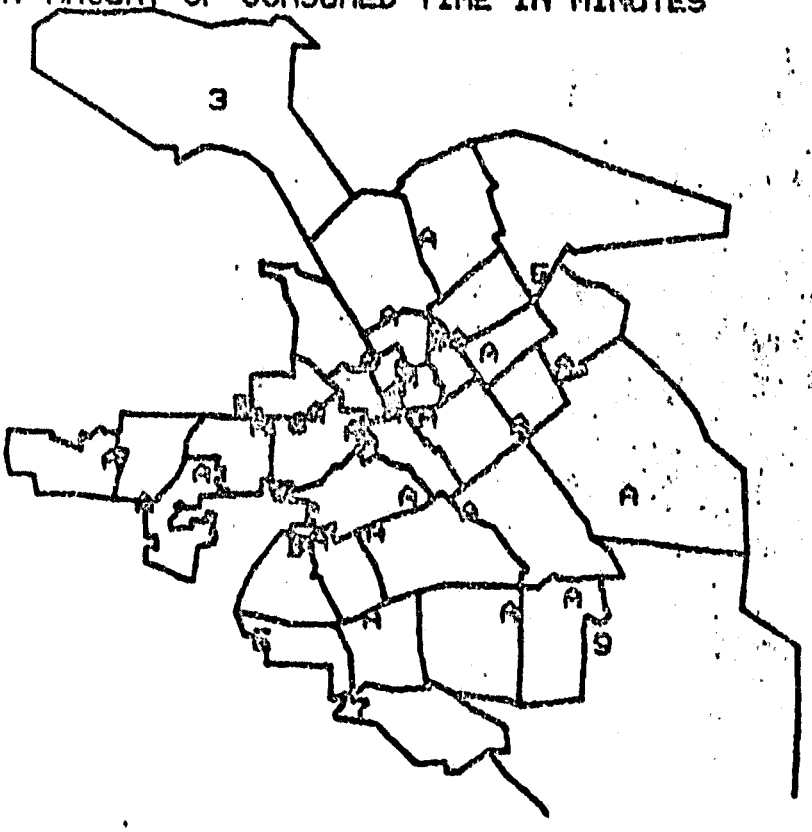
ZONESYMB 33 SUBMAP EXPAND SHRINK NORMAL CLEAR RETURN

NEW MAP 0

Exhibit 2

SAN JOSE P.D. CURRENT SUPERZONES. BEAT STUDY
EXISTING BEATS..BRAD 8-20-73 ADJUSTED 273BBB'S 34BEATS
SYMBOLS REPRESENT AMOUNT OF CONSUMED TIME IN MINUTES

A > 14000
B > 13000
C > 12000
D > 11000
E > 10000
9 > 9000
8 > 8000
ETC.



ZONES
0

SAVE
PRINT
GET
RETURN

EXTEND

CREATE

CLEAR & REDRAW
NORMAL SCALE
ENLARGE
SHRINK

OVERLAY WITH MAP 31
ZONESYMB 3 =ON DOTS
SSMODE =ON NUMBERS

FIND ZONE

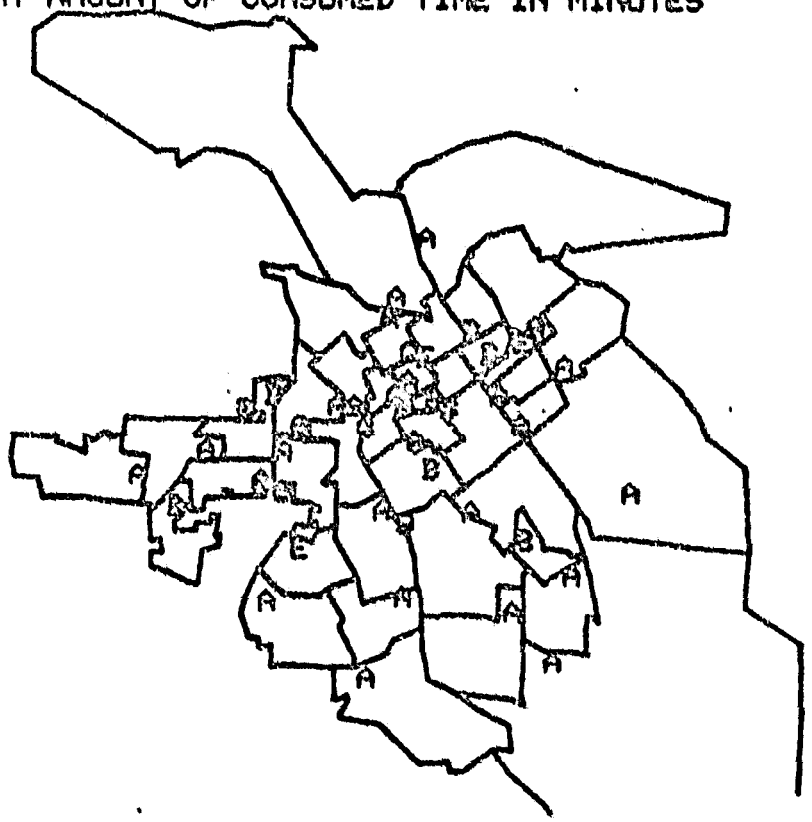
Exhibit 3

SAN JOSE P.D. CURRENT SUPERZONES BEAT STUDY
FINAL FINAL MAP 9-27-73 RMB 40 BEATS ***

SYMBOLS REPRESENT AMOUNT OF CONSUMED TIME IN MINUTES

A > 14000
B > 13000
C > 12000
D > 11000
E > 10000
F > 9000
G > 8000
ETC

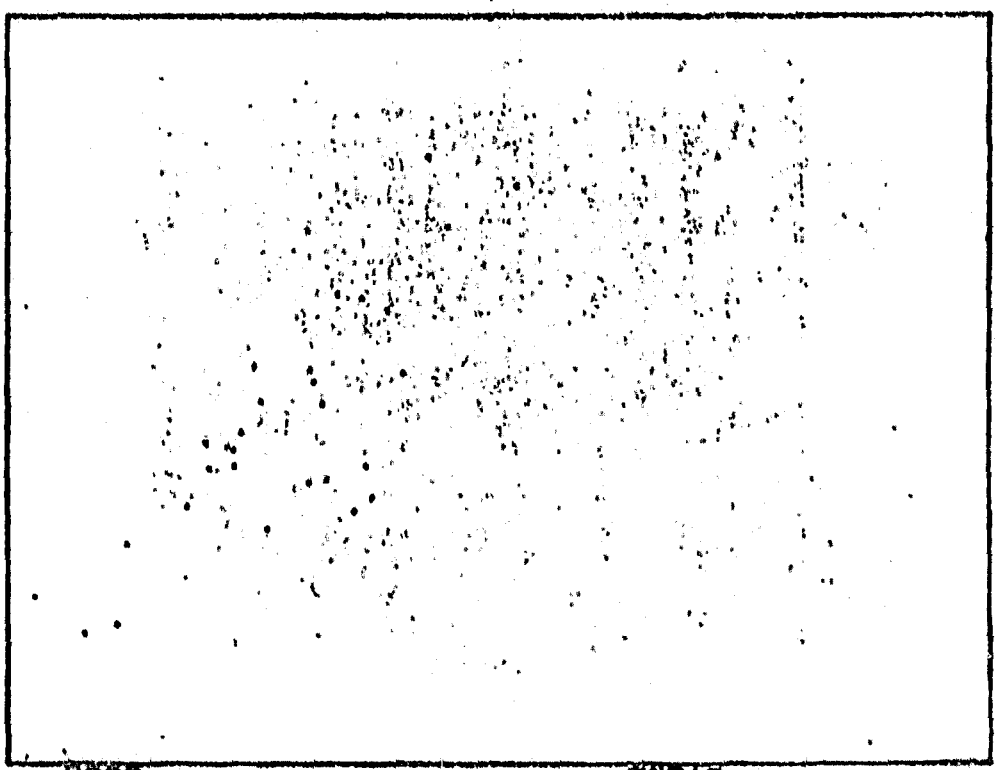
ZONES
0



SAVE EXTEND CLEAR & REDRAW FIND ZONE
POINT NORMAL SCALE OVERLAY WITH MAP 31
GET CREATE ENLARGE ZONESYMB 2 *ON DOTS
RETURN SHRINK SSMODE *ON NUMBERS

Exhibit 4

SAN JOSE POLICE DEPARTMENT BEAT STUDY
EACH DOT REPRESENTS THE VALUE OF TOTAL CONSUMED TIME IN MINUTES FOR A BEAT USING THE EXISTING BEAT STRUCTURE BEFORE THE STUDY.
THE X AXIS IS 1974 DATA AND THE Y AXIS IS 1972 DATA.



RG838

0

AUTOSCALE 3803. 63713.

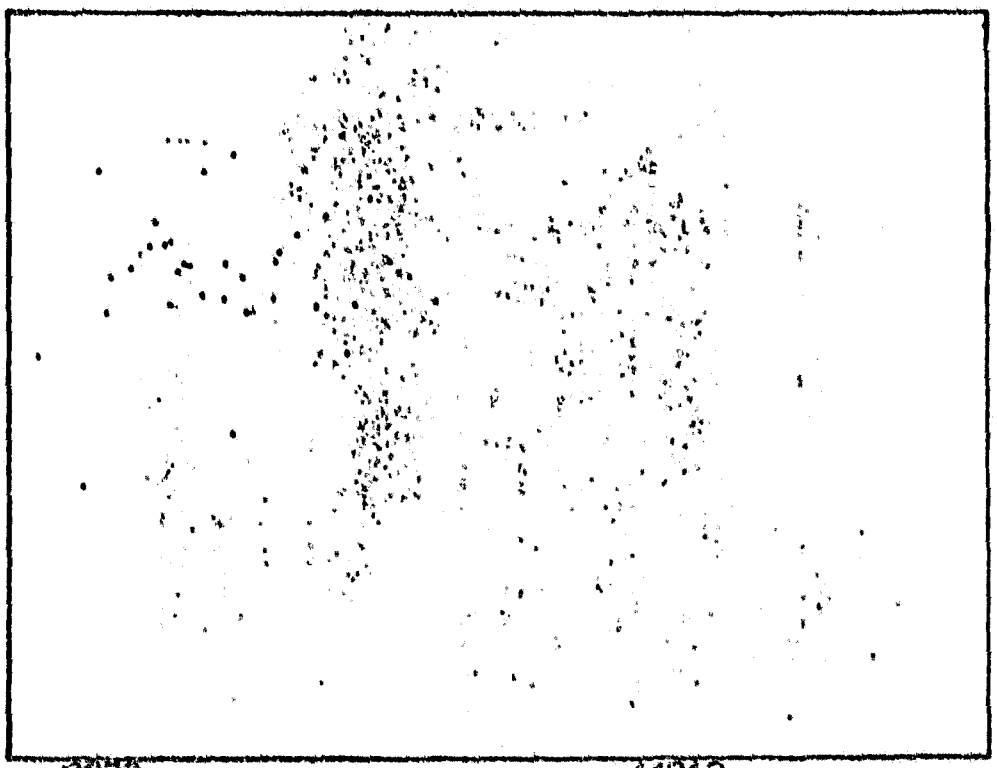
REDRAW

VARNAME	UNIT	USEMAP	ZONE	0
TOTCTIM	91	15		
TOTCTTM	61	15	ZONEGVMR	1

Exhibit 5

SAN JOSE POLICE DEPARTMENT BEAT STUDY
EACH DOT REPRESENTS THE VALUE OF TOTAL CONSUMED TIME IN MINUTES FOR A BEAT
THE X AXIS IS 1974 AND THE Y AXIS IS 1972.
(DATA SHOWS A MUCH MORE HOMOGENEOUS GROUPING THAN BEFORE STUDY).

16441.



0

6978. 44812.

AUTOSCALE
REDRAW
REGRESSION

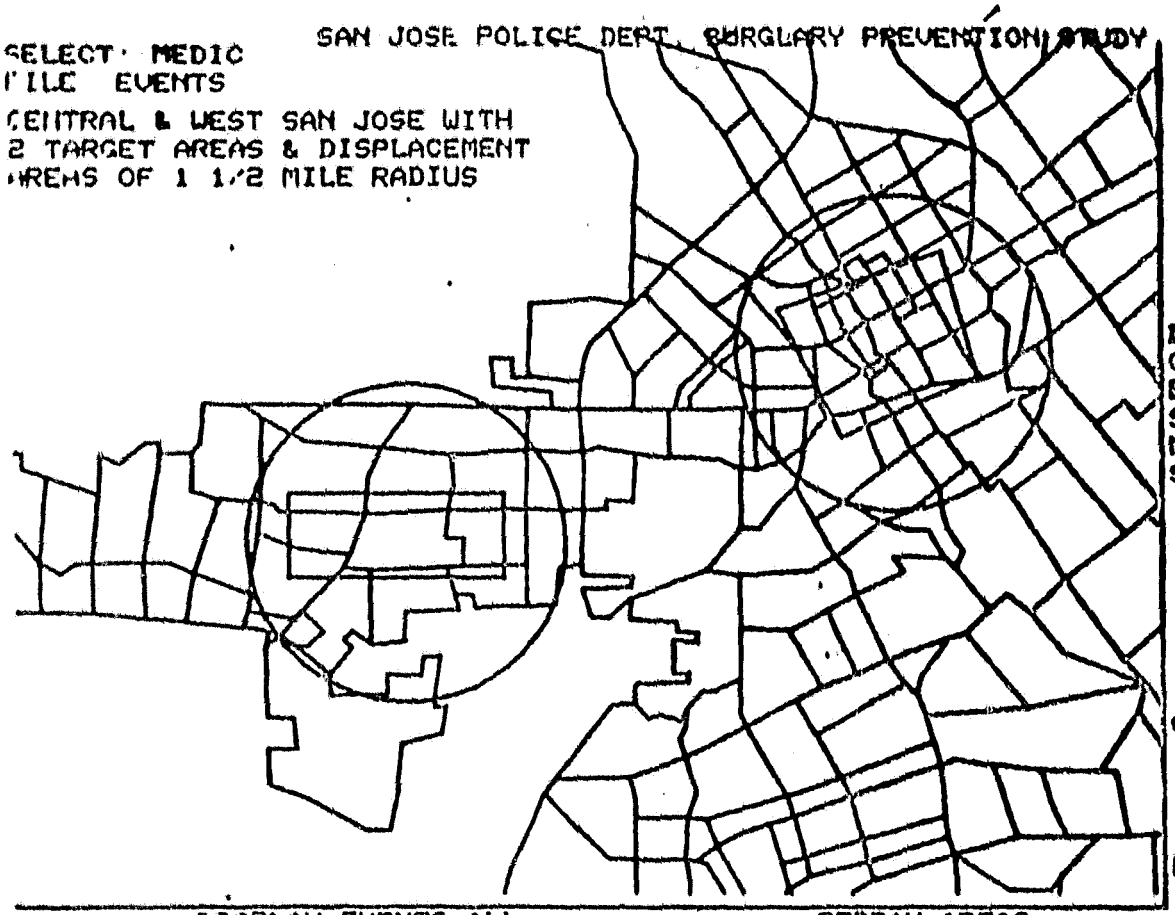
VARNAME	UNIT	USEMAP
TOTCTIM	91	31
TOTCTTM	61	31

ZONE 0
ZONESYMB 1

SAN JOSE POLICE DEPT. BURGLARY PREVENTION STUDY

SELECT MEDIC
FILE EVENTS

CENTRAL & WEST SAN JOSE WITH
2 TARGET AREAS & DISPLACEMENT
AREAS OF 1 1/2 MILE RADIUS



DRAW MAP
CENTER
EXPAND
SHRINK
NORMAL
SCALE

GRID

ERASE

DISPLAY EVENTS: ALL
COUNT # IN AREAS
SUM _____ BY AREA

MARK
DELETE

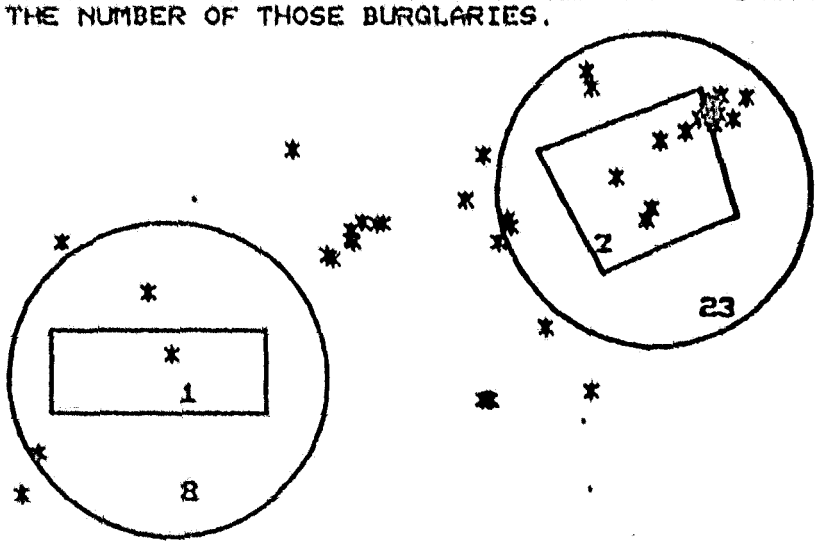
REDRAW AREAS
CREATE POLYGON
CREATE CIRCLE

RETURN

SAN JOSE POLICE DEPT BURGLARY PREVENTION STUDY

SELECT MEDIC
FILE EVENTS

CENTRAL & WEST SAN JOSE TARGET AREAS & DISPLACEMENT AREAS
DISPLAYING LOCATIONS OF 1973 BURGLARIES AT MEDICAL FACILITIES
AND COUNTING THE NUMBER OF THOSE BURGLARIES.



DRAW MAP
CENTER
EXPAND
SHRINK
NORMAL
SCALE

GRID

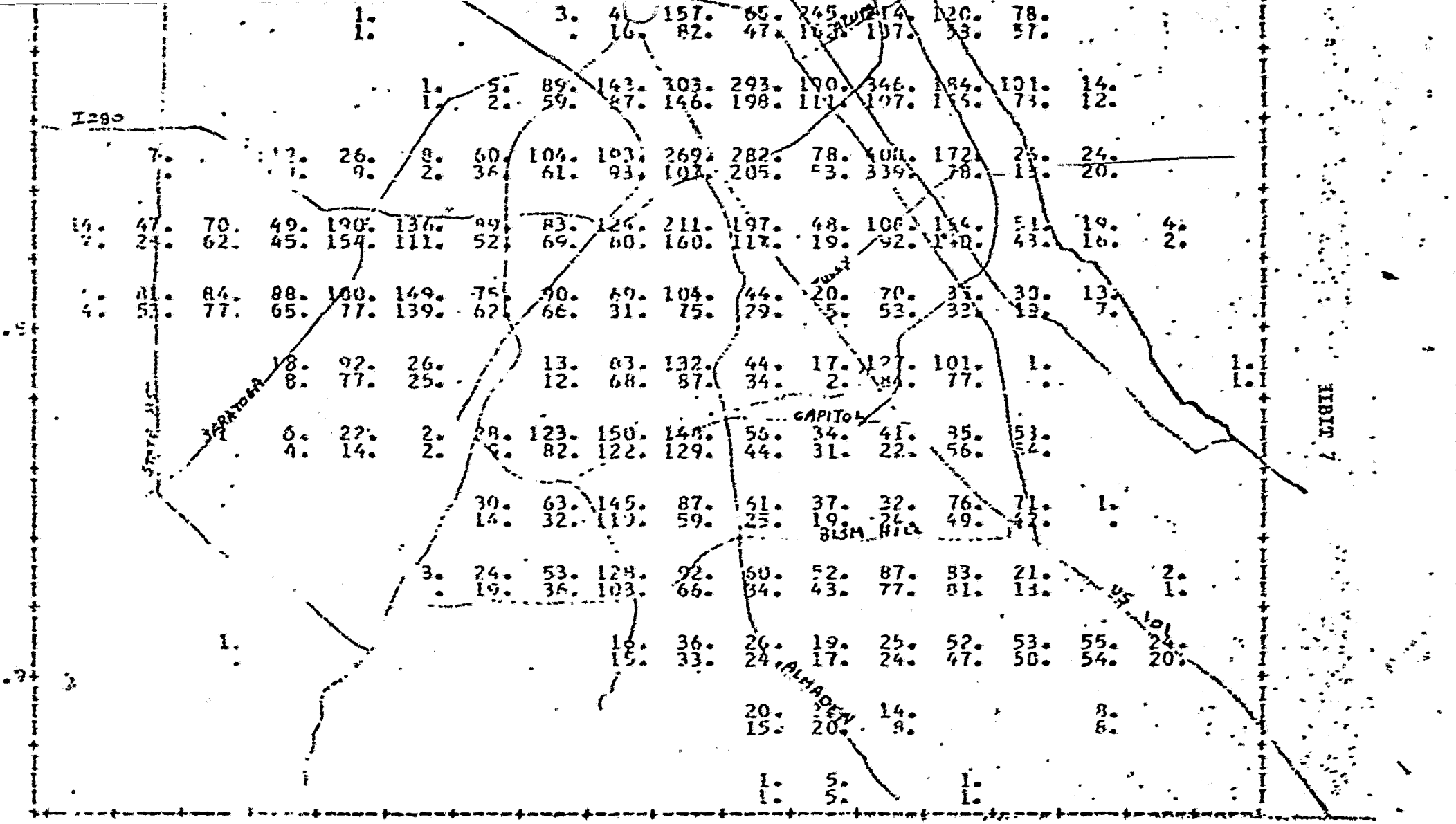
ERASE

DISPLAY EVENTS: ALL
COUNT # IN AREAS
SUM BY AREA

MARK ONE
DELETE

REDRAW AREAS
CREATE POLYGON
CREATE CIRCLE

RETURN



--- GRIDS --- (GRID) RELATED INFORMATION DISPLAY SYSTEM) --- GRIDS ---

TOTAL BURGLARIES & PRIVATE RESID. BURGS, SAN JOSE - 1973

SJPD BURGLARY PREVENTION GRANT STUDY
DATA SOURCE - 1973 C.A.P.E.R.
MAP PREPARED BY THE CENTER FOR URBAN ANALYSIS, SANTA CLARA COUNTY
DATE PREPARED: FEB. 21, 1975

FIGURES REPRESENT TOTAL CASES ON TOP LINE AND
CASES WITH PREMISE CODE OF 10,11,12,13,14 OR 15 ON BOTTOM LINE.

MAP SCALE IS 1 INCH = 2 MILES.
EACH GRID CELL IS 1 MILE SQUARE

FILE *NAME (CREATION DATE = 06/19/74)

* CROSSTABULATION OF *
CT - CENSUS TRACT BY CODE BUSINESS CATEGORY
* PAGE 1 OF 45

CT	COUNT / ROW PCT / COL PCT / TOT PCT	CODE 1.I BARB - BEAUTI.	2.I MEDICAL	3.I GAS STA.	4.I DEPART. STORE	5.I GROCERY STORE	6.I MANUFAC- TURING	7.I PERSONAL SERVICES	8.I RETAIL	9.I WARE - HOUSE	10.I LIQUOR STORE	ROW TOTAL
500100.		25	0	6	0	3	90	80	35	20	1	271
		9.2	0.0	2.2	0.0	1.1	33.2	29.5	12.9	7.4	0.4	2.2
		4.0	0.0	1.9	0.0	1.4	5.5	1.9	1.1	20.8	1.0	
		0.2	0.0	0.0	0.0	0.0	0.7	0.8	0.3	0.2	0.0	
500200.		14	12	6	1	5	28	316	24	8	1	438
		3.2	2.7	1.4	0.2	1.1	6.4	72.1	5.5	1.8	0.2	3.5
		2.2	1.4	1.9	1.5	2.3	1.7	7.4	0.8	8.3	1.0	
		0.1	0.1	0.0	0.0	0.0	0.2	2.5	0.2	0.1	0.0	
500300.		6	2	8	0	4	114	135	47	5	1	346
		1.7	0.6	2.3	0.0	1.2	32.9	39.0	13.6	1.4	0.3	2.8
		1.0	0.2	2.5	0.0	1.9	6.9	3.1	1.5	5.2	1.0	
		0.0	0.0	0.1	0.0	0.0	0.9	1.1	0.4	0.0	0.0	
500400.		6	14	0	0	3	9	113	14	3	0	171
		3.5	8.2	0.0	0.0	1.8	5.3	66.1	8.2	1.8	0.0	1.4
		1.0	1.7	0.0	0.0	1.4	0.5	2.6	0.4	3.1	0.0	
		0.0	0.1	0.0	0.0	0.0	0.1	0.9	0.1	0.0	0.0	
500500.		6	64	5	0	3	8	103	39	0	1	237
		2.5	27.0	2.1	0.0	1.3	3.4	43.5	16.5	0.0	0.4	1.9
		1.0	7.7	1.6	0.0	1.4	0.5	2.4	1.2	0.0	1.0	
		0.0	0.5	0.0	0.0	0.0	0.1	0.8	0.3	0.0	0.0	
500600.		15	18	5	0	0	18	163	37	1	0	268
		5.6	6.7	1.9	0.0	0.0	6.7	60.8	13.8	0.4	0.0	2.1
		2.4	2.2	1.6	0.0	0.0	1.1	3.8	1.2	1.0	0.0	
		0.1	0.1	0.0	0.0	0.0	0.1	1.3	0.3	0.0	0.0	
500700.		3	2	1	0	2	28	46	35	0	1	125
		2.4	1.6	0.8	0.0	1.6	22.4	36.8	28.0	0.0	0.8	1.0
		0.5	0.2	0.3	0.0	0.9	1.7	1.1	1.1	0.0	1.0	
		0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.3	0.0	0.0	
	COLUMN TOTAL	623	833	320	67	214	1650	4287	3150	96	102	12566
		5.0	6.6	2.5	0.5	1.7	13.1	34.1	25.1	0.8	0.8	100.0

(CONTINUED)

Exhibit 8

FELONY CASES AS A % OF TOTAL CASES
COPANA DATA, FISCAL 1972-1973

PREPARED BY THE CENTER FOR URBAN ANALYSIS, SANTA CLARA COUNTY
DATE PREPARED: MAY 30, 1974

MAP SCALE: 1 INCH = 2 MILES

MINIMUM CELL VALUE(S) 0.0

MAXIMUM CELL VALUE(S) 0.331244E 00

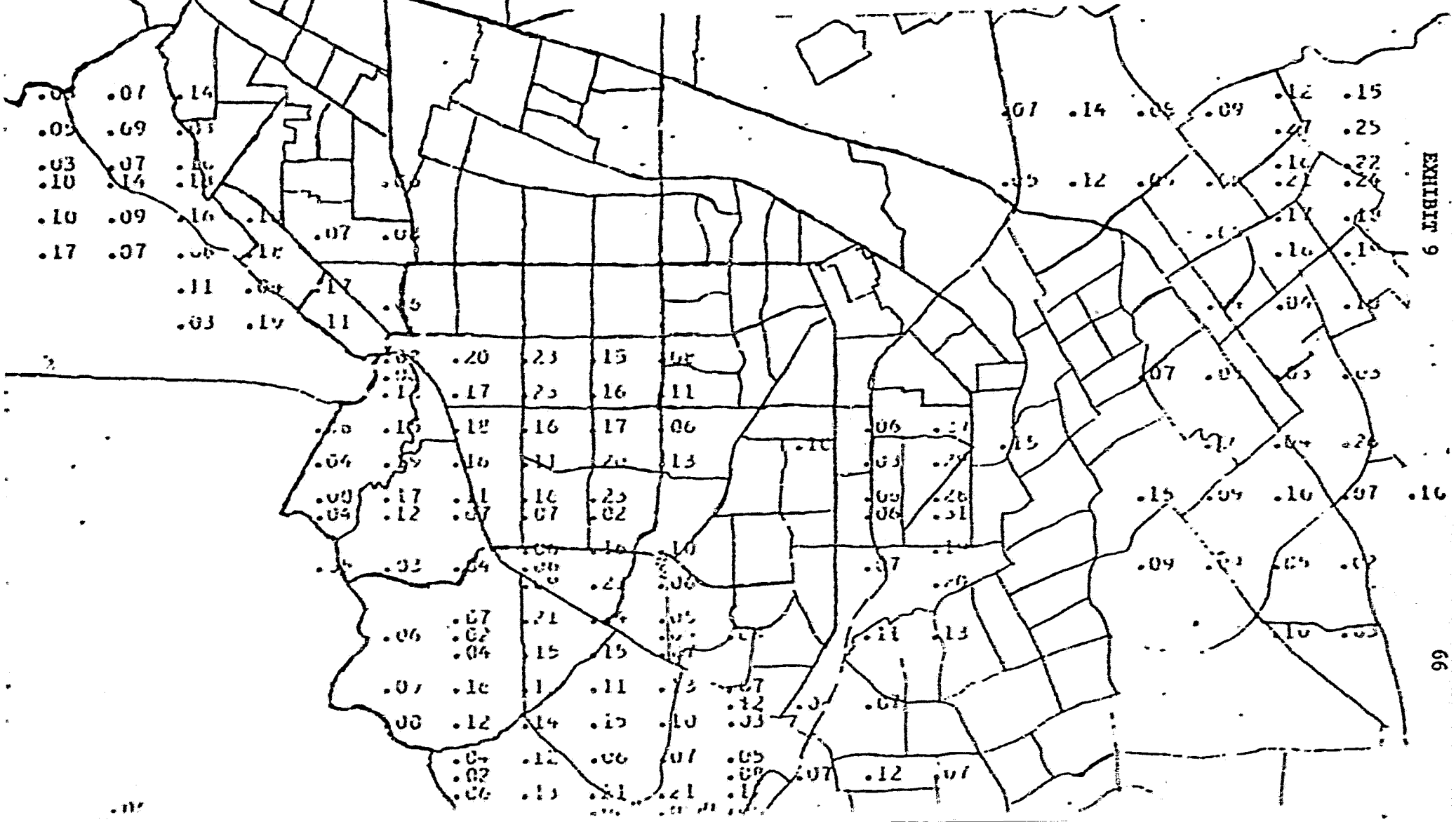
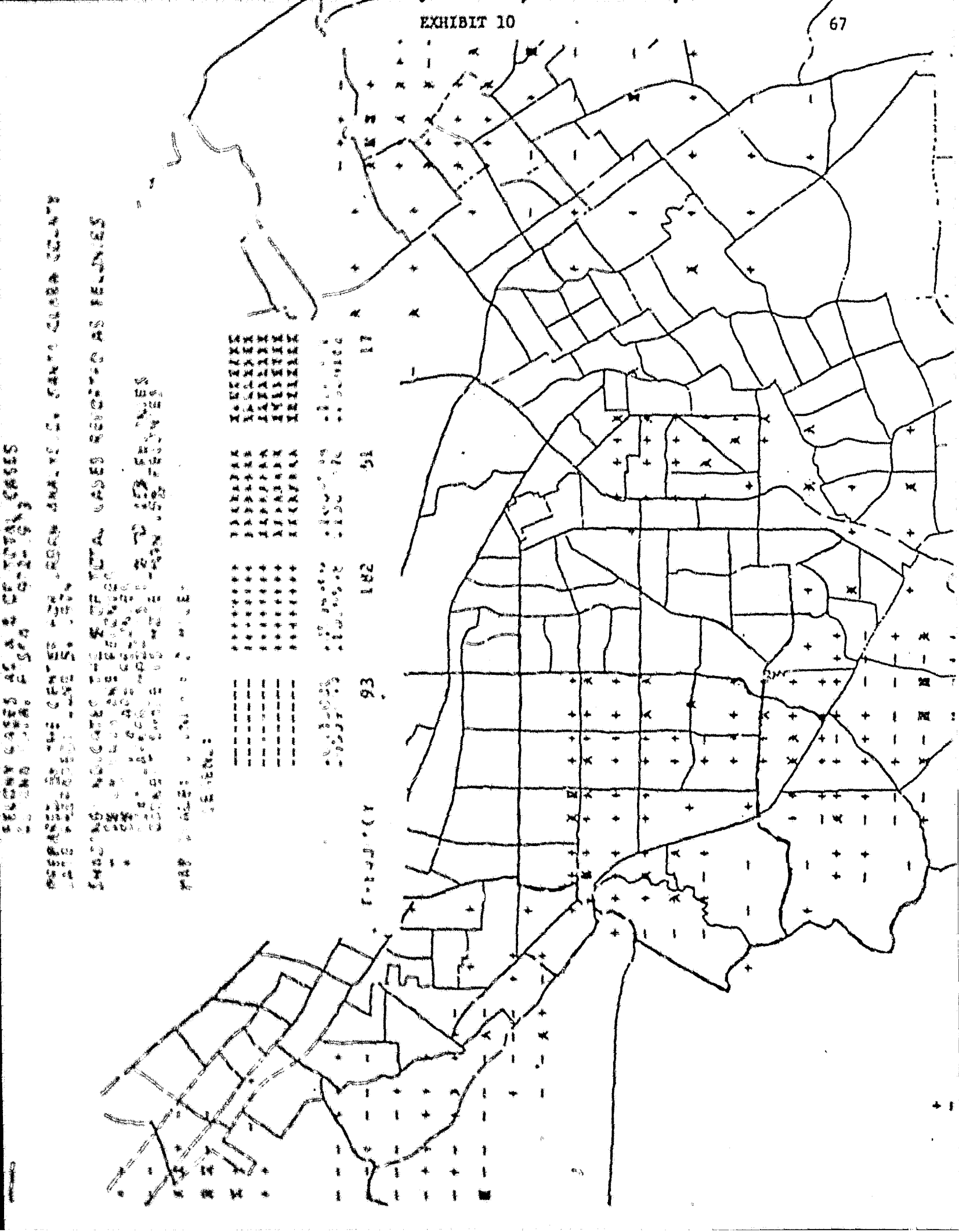


EXHIBIT 9



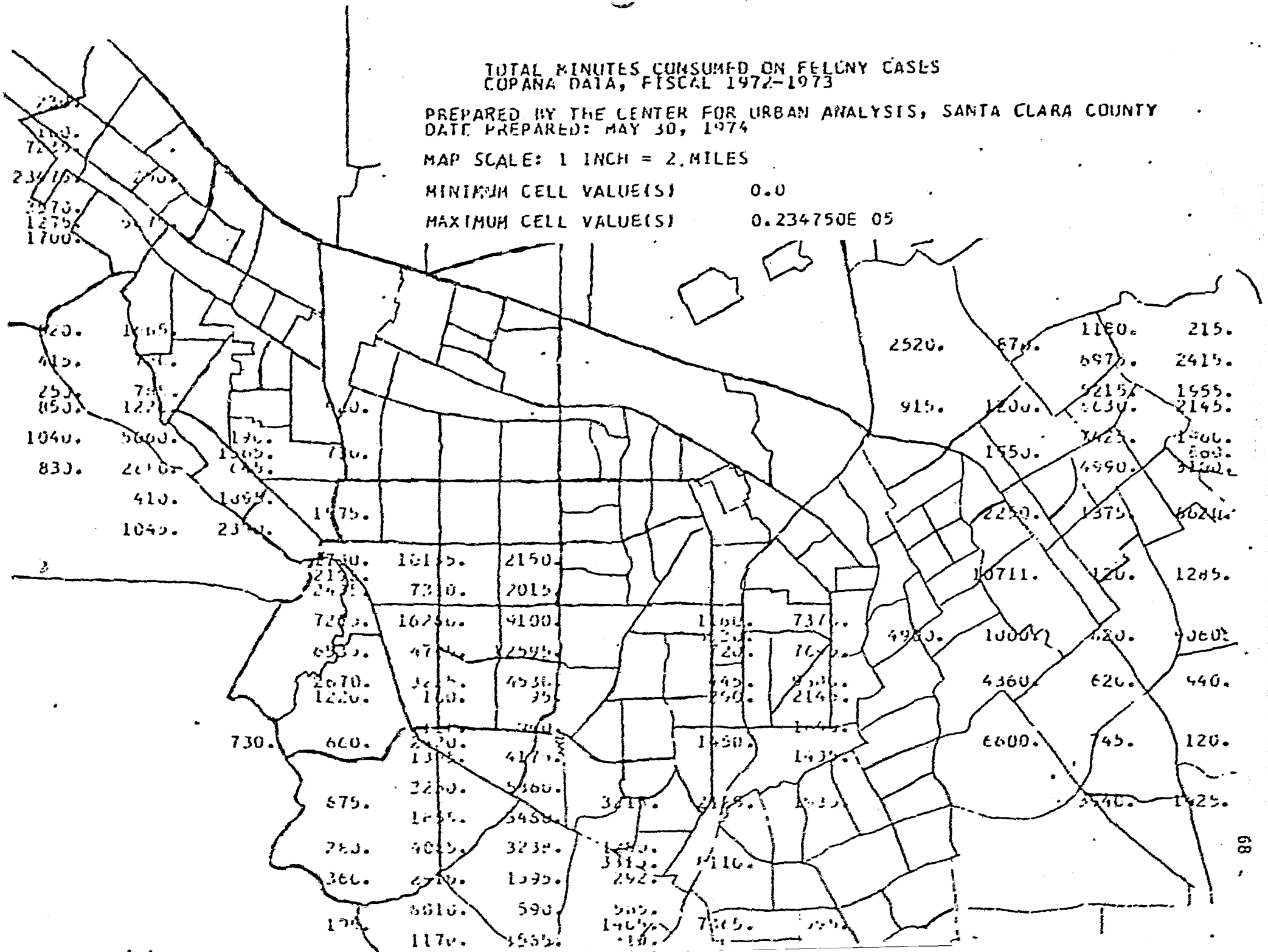
TOTAL MINUTES CONSUMED ON FELONY CASES
COPANA DATA, FISCAL 1972-1973

PREPARED BY THE CENTER FOR URBAN ANALYSIS, SANTA CLARA COUNTY
DATE PREPARED: MAY 30, 1974

MAP SCALE: 1 INCH = 2. MILES

MINIMUM CELL VALUE(S) 0.0

MAXIMUM CELL VALUE(S) 0.234750E 05



AND MEN MEC	# STREET NAME		CITY	CORRECTED ADDRESS, X Y
D20 015	WHITE FIR & RED FIR		CU	
D03 015	BURB & MCCLELLEN		CU	
D17 020	MCCLELLAN & STELLING R		CU	R: INCONSISTANT STREET TYPE
D06 015	MCCLELLAN & JOHN		CU	NON EXISTANT STREET TYPE
D07 015	MCCLELLAN & JOHN		CU	
D20 015	MCCLELLAN & JOHN		CU	
D19 020	BLUEHILLS DR & SR 85		SJ	SR 85: INCONSISTANT STREET NAME
D11 020	N/B SVALE & BOLLINGER		CU	N/B: DIRECTION OF TRAVEL - NOT AN ADDRESS
D19 015 001601	HWY 9		SJ	& : INCONSISTANT INTERSECTION DELIMITER
D19 015 001601	SARATOGA/SVLE RD	RD	SJ	/ : INCONSISTANT INTERSECTION DELIMITER
D01 005	85 AND SEA GULL		SA	85: INCONSISTANT STREET NAME
D01 045	85 AND SEA GULL		SA	
D09 020	SR 85 & BLAUER		SA	
D17 055 012946	ARROYO DE ARGUELLO		SA	
D20 060	SR#85 & COX AREA		SA	SR#85: INCONSISTANT STREET NAME
D09 015	SCULLY NR GOLETA		SA	AREA: NOT PRECISE ENOUGH
D22 040	SAR HI GYM		SA	INCONSISTANT PLACE NAMES
D23 010	OAK ST SCHL		SA	
D23 015	OAK ST SCHL		SA	
D18 165	HWY 85 & BIG BASIN		SA	
D14 010	HWY 280 NR SAR-SVALE		CU	NOT PRECISE ENOUGH

TYPE RIN NAME AND ALL — 02/10/75 PAGE 17

FILE TYICA (CREATION DATE = 02/10/75)

VARIABLE DAY OF WEEK

CODE

1. ********** (1873) 8.2 PCT
   MON

2. ********** (1562) 6.8 PCT
   TUE

3. ********** (1530) 6.5 PCT
   WED

4. ********** (2142) 9.4 PCT
   THUR

5. ********** (2526) 11.1 PCT
   FRI

6. ********** (2482) 10.9 PCT
   SAT

7. ********** (2046) 9.0 PCT
   SUN

0. ********** (8247) 36.2 PCT
(MISSING) UNKNOWN

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FREQUENCY

Exhibit 1

STATISTICS..

MEAN	4.203	STD ERROR	0.016	MEDIAN	4.394
MODE	5.000	STD DEV	1.949	VARIANCE	3.798
KURTOSIS	-1.143	SKEWNESS	-0.196	RANGE	6.000
MINIMUM	1.000	MAXIMUM	7.000		

VALID OBSERVATIONS - 14561
MISSING OBSERVATIONS - 8247

2	2.						
		2	RESPCN	2.42	0.20	0.12	0.0 100.00
		2	TOTAL	2.87	1.43	1.16	0.0 100.00
3	3.		84				
		84	RESPCN	4.07	0.05	0.06	0.0 100.00
		84	TOTAL	191.08	2.27	5.23	4.75 86.90
4	4.		45				
		45	RESPCN	2.93	0.07	0.21	0.0 100.00
		45	TOTAL	59.07	1.31	4.36	4.44 95.56
5	5.		159				

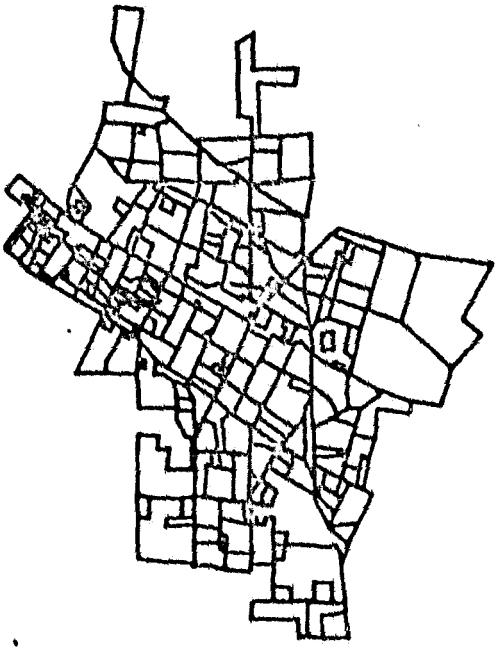
Exhibit 15

MT VIEW P D
CO BASIC ZONES

CURRENT SUPERZONES

CALLS FOR SERVICE STUDY

ZONES
0



CHOOSE . EXTEND
POINT
SET CREATE
CLEAR

CLEAR & REDRAW
NORMAL SCALE
ENLARGE
SHRINK

OVERLAY WITH MAP 1
ZONESYMB 1
SSMODE

FIND ZONE
DOTS
NUMBERS

Exhibit 16

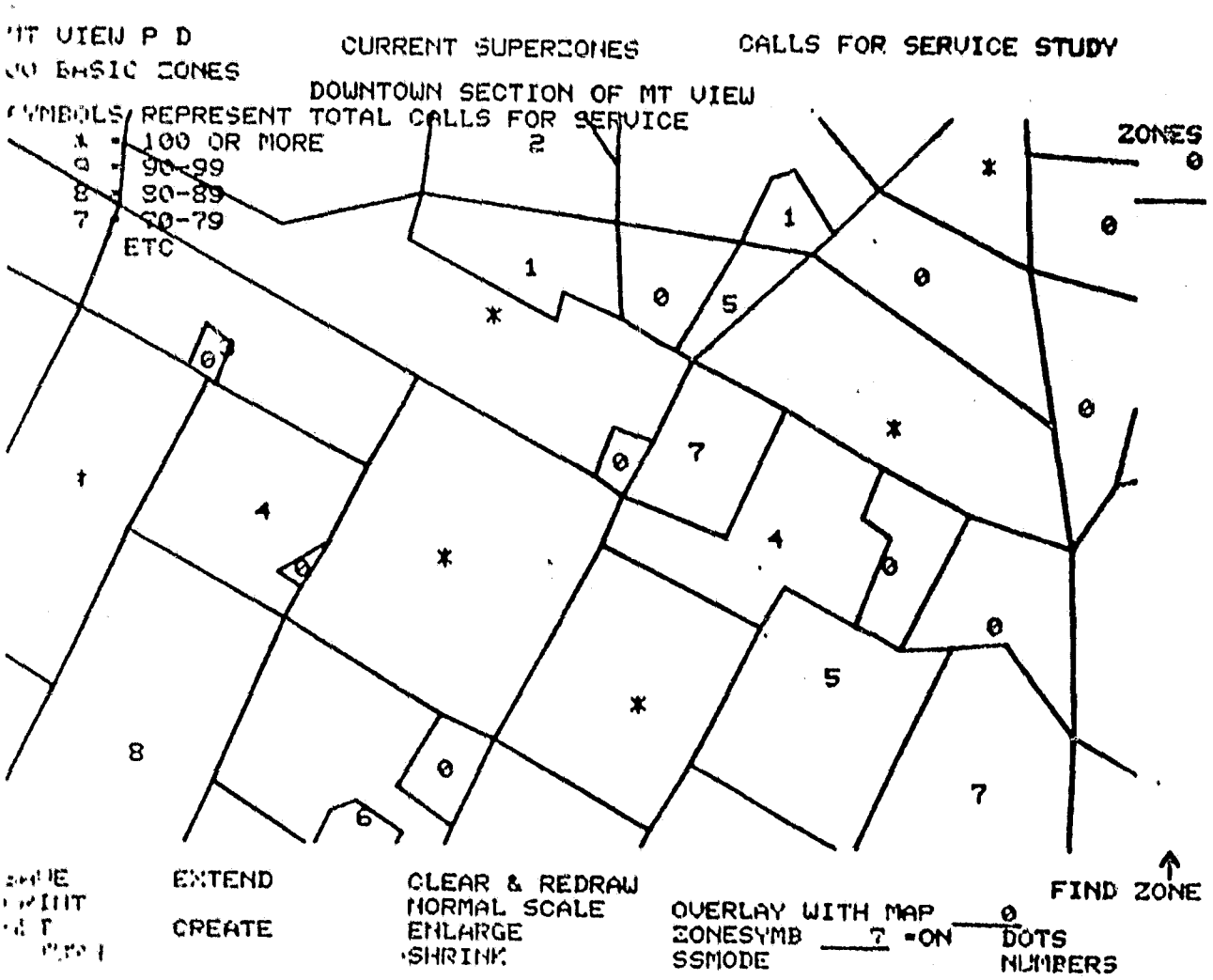
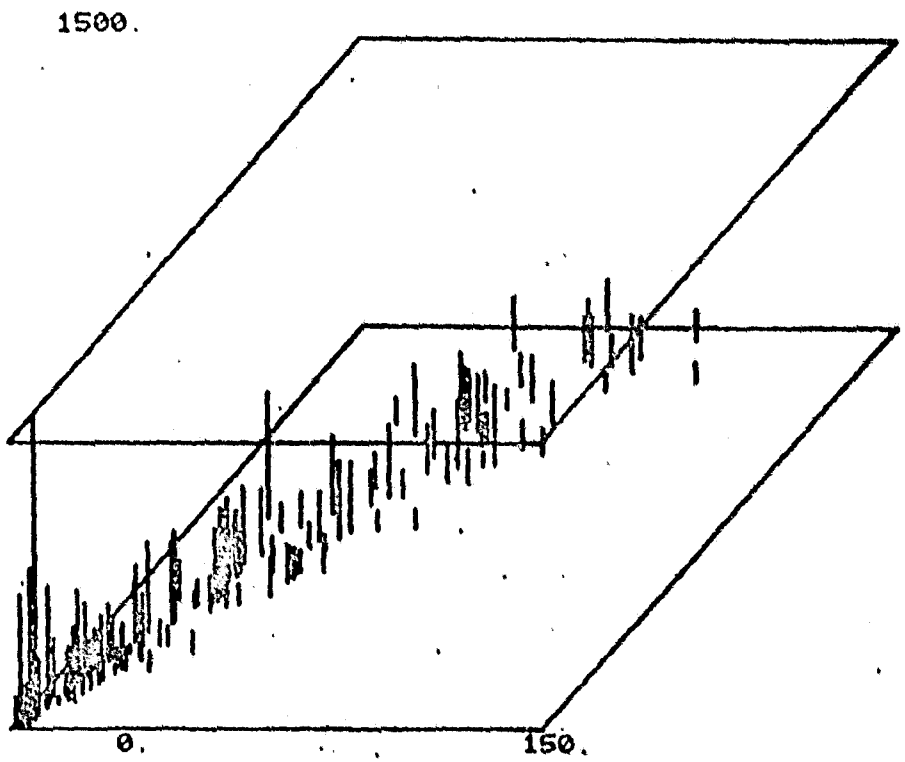

'IT VIEW P D
CURRENT SUPERZONES
CALLS FOR SERVICE STUDY
DOWNTOWN SECTION OF MT VIEW
ZONES
EXTEND
CREATE
CLEAR & REDRAW
NORMAL SCALE
ENLARGE
SHRINK
OVERLAY WITH MAP
ZONESYMB
ON
DOTS
NUMBERS
SSMODE
FIND ZONE

Exhibit 17

Mt View Police Department Calls for Service Study

Each stick represents the values for a "BBB" for Total Calls (on the x-axis), Total Consumed Time (on the y-axis) and Average Response Time (on the z-axis).



AUTOSCALE

REDRAW

RETURN

VARNAME	UNIT	USEMAP		
TOTAL	1	0	ZONE	0
TOTCTIME	1	0		
ARTTOTAL	1	0	ZONESYMB	1

EXHIBIT 18

Criminal Justice
Demonstration Project

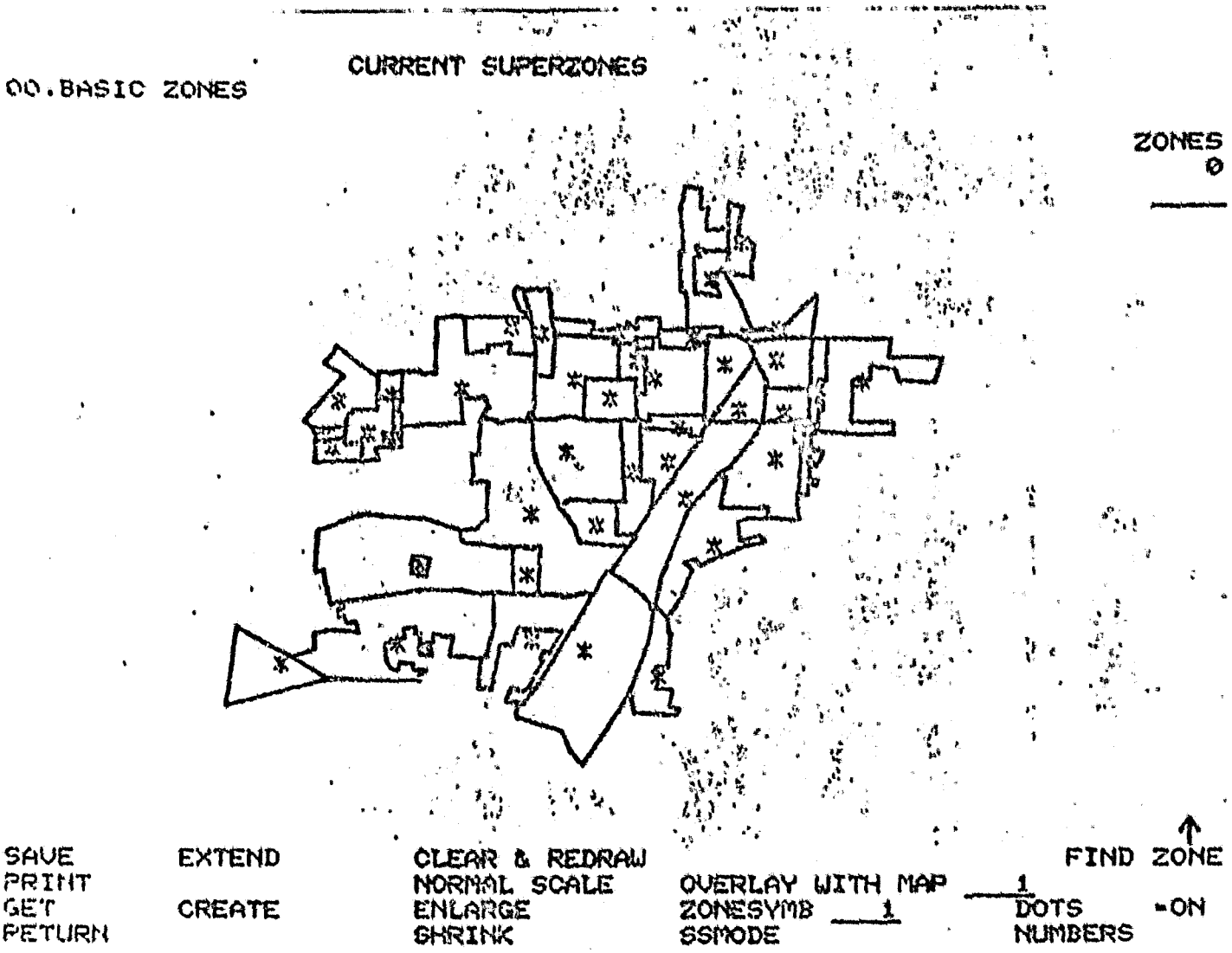
Campbell Police Department
March 5, 1975

Table of Contents of Reports

Exhibit 19

Campbell P.D. Calls-for-Service Study

Basic Zone Map of Campbell with * at the Centroid of Each Zone.



GILROY P.D. C-F-S ANALYSIS

EVENTS (LESS 900 CALLS) BY DAY

EXHIBIT 5

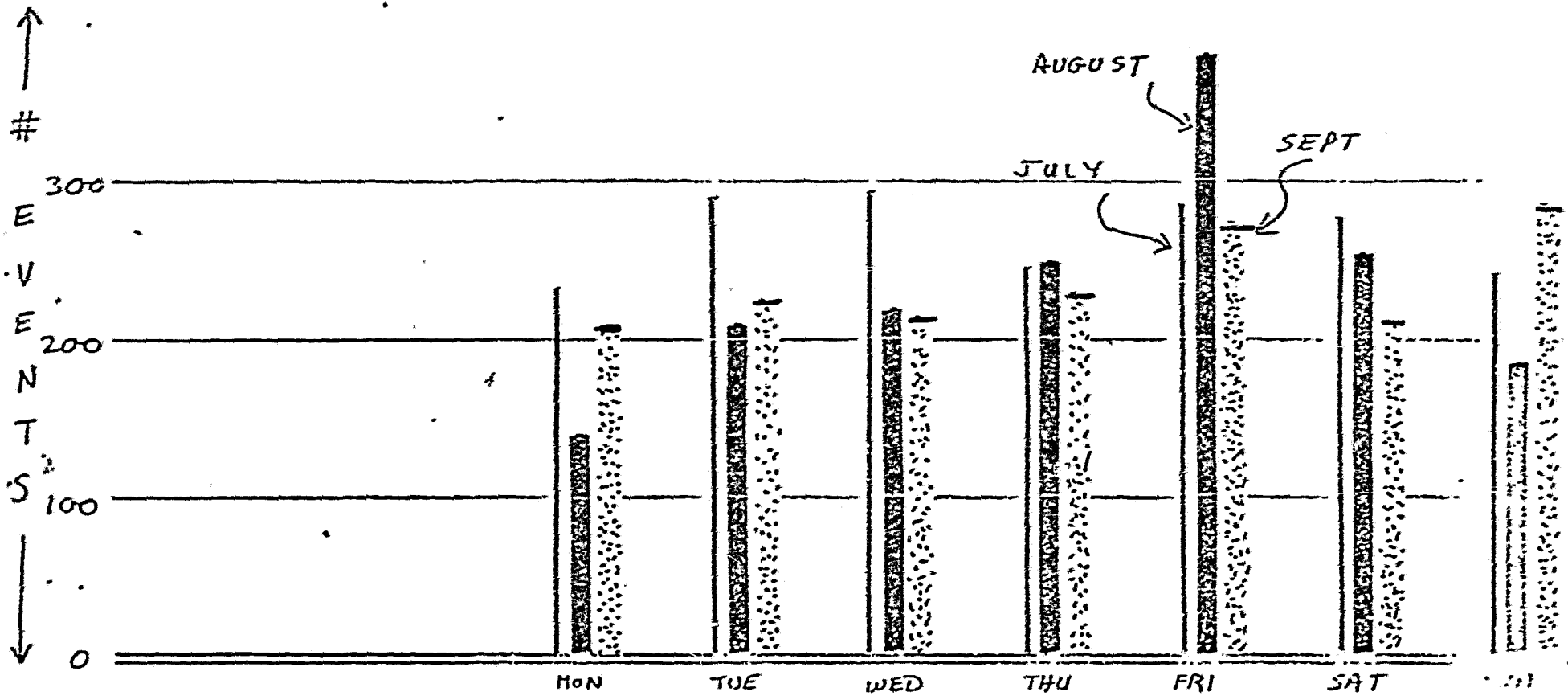
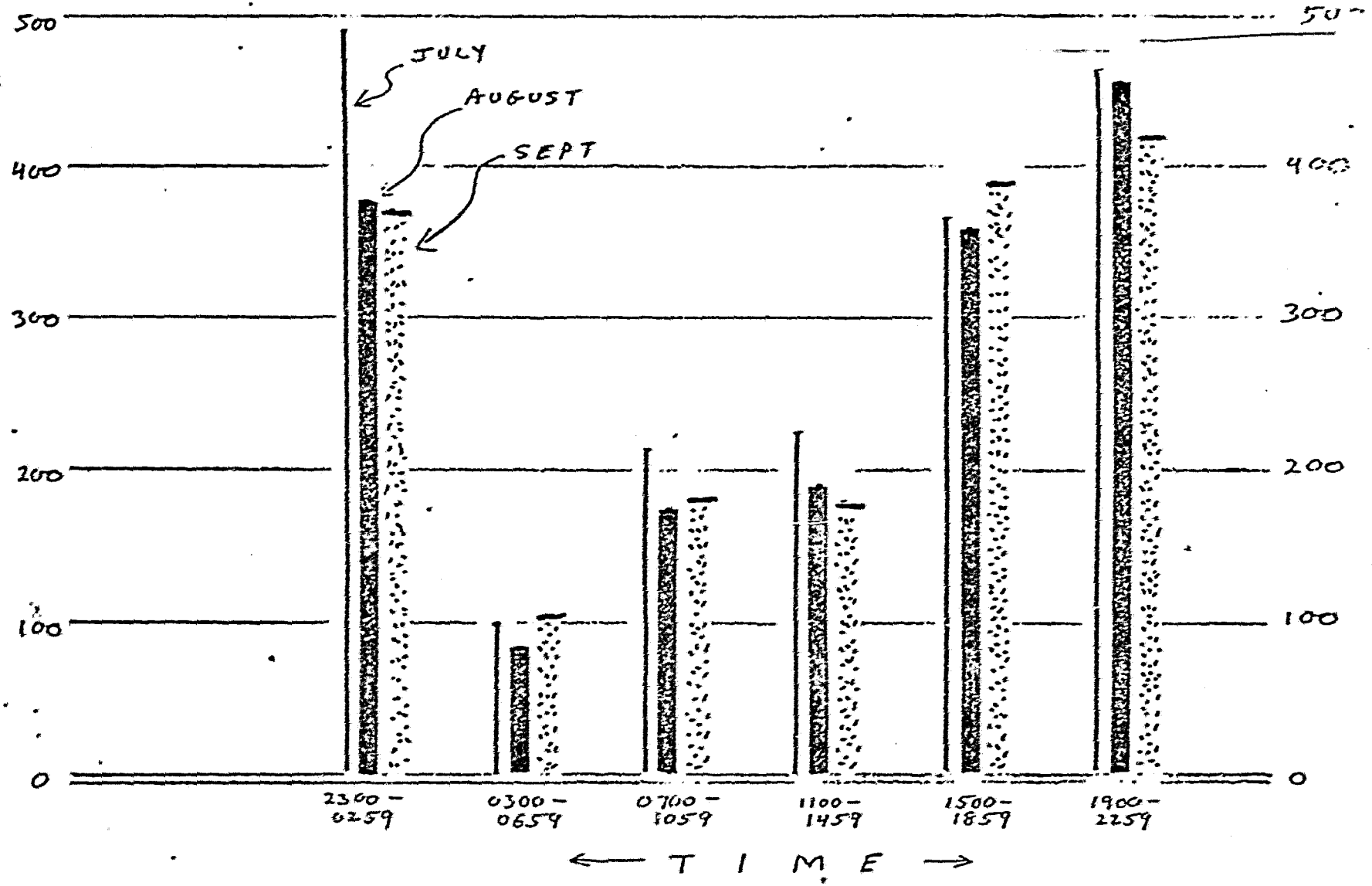


EXHIBIT 20

SOURCE: GILROY P.D. DISPATCH RECORDS JULY - SEPT 1974

PREPARED BY: CENTER FOR URBAN ANALYSIS
DEC 5, 1974
S.M.D.

EVENTS (LESS 900 CODES) BY HOUR



SOURCE: GILROY P.D. DISPATCH RECORDS JULY - SEPT 1974

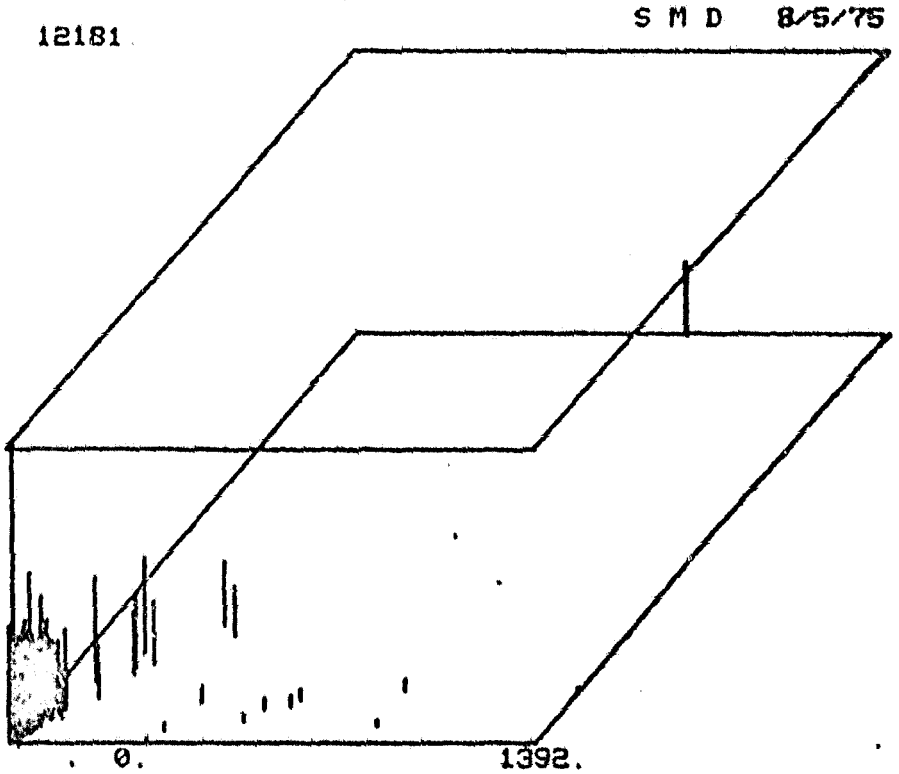
PREPARED BY: CENTER FOR URBAN ANALYSIS
DEC 5, 1974
S.M.D.

EXHIBIT 21

EXHIBIT 22

GILROY POLICE DEPARTMENT CALLS FOR SERVICE
EACH STICK REPRESENTS THE VALUES FOR A ZONE THE X AXIS IS TOTAL CALLS.
THE Y AXIS IS TOTAL CONSUMED TIME IN MINUTES AND THE Z AXIS IS AVERAGE
CONSUMED TIME IN MINUTES DURING THE PERIOD JULY - SEPT 1974

S M D 8/5/75



AUTOSCALE

REDRAW

RETURN

VARNAME	UNIT	USEMAP		
TOTAL	1	0	ZONE	0
TOTCTIME	1	0		
TEMP	1	0	ZONESYMB	1

EXHIBIT 23

CURRENT SUPERZONES

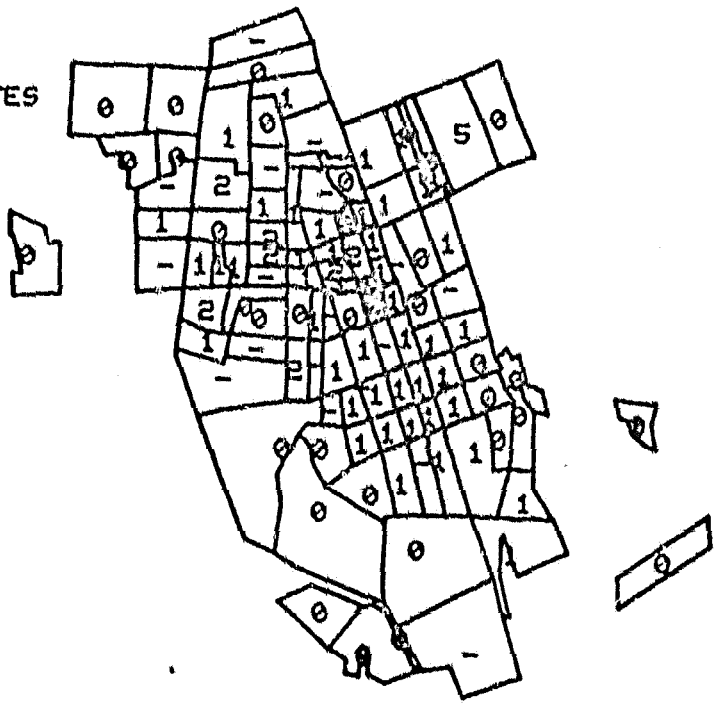
30 BASIC ZONES

SYMBOLS REPRESENT VALUES FOR AVERAGE CONSUMED TIME FOR EACH ZONE.

5 = 50 OR MORE
4 = 40-49
3 = 30-39
2 = 20-29
1 = 10-19
- = 5-9
0 = 0-4 MINUTES

S M D
8/5/75

ZONES
0



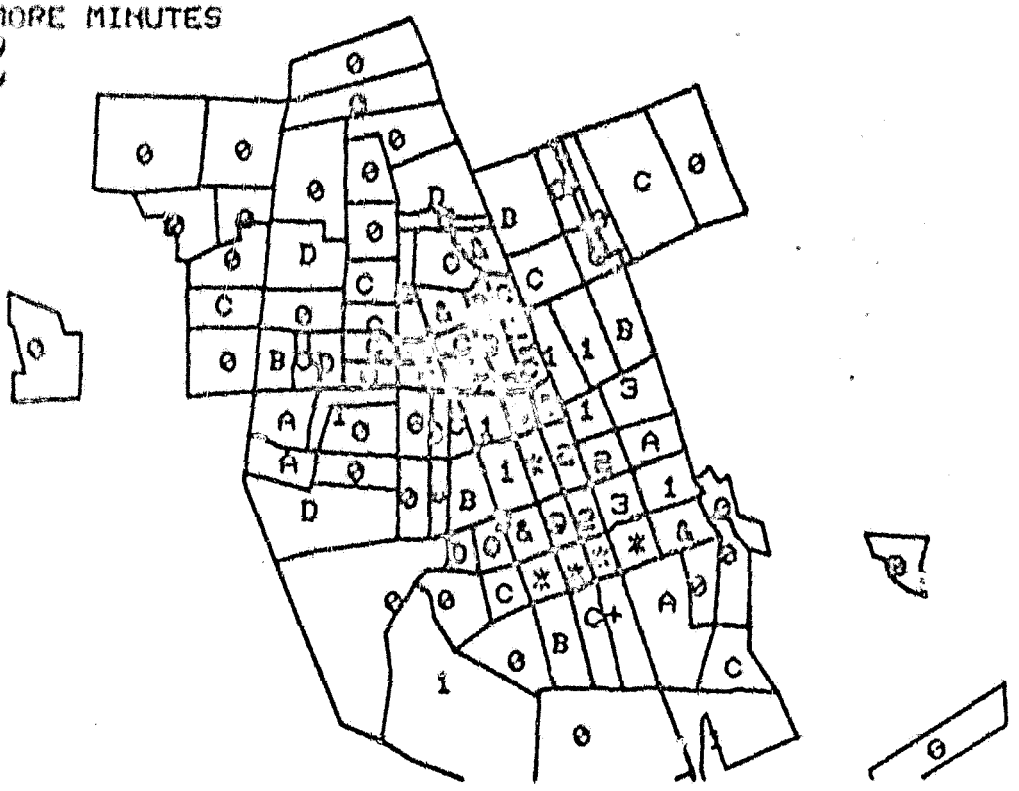
SHOE EXTEND CLEAR & REDRAW FIND ZONE
PRINT NORMAL SCALE OVERLAY WITH MAP 1
GET CREATE ENLARGE ZONESYMB 2 ON DOTS
DELETE SHRINK SSMODE NUMBERS

EXHIBIT 24

GILROY P D CURRENT SUPERZONES CFS STUDY
ON [illegible] ZONES

[illegible] ZONE MAP OF GILROY WITH SYMBOLS REPRESENTING TOTAL CONSUMED TIME IN EACH ZONE
* = 5000 OR MORE MINUTES
[illegible] 2999
1 = [illegible] 1999
[illegible] 1499
[illegible] 1249
[illegible] 999
[illegible] 749
[illegible] 499
[illegible] 249
[illegible] 99
[illegible] 49

ZONES
0

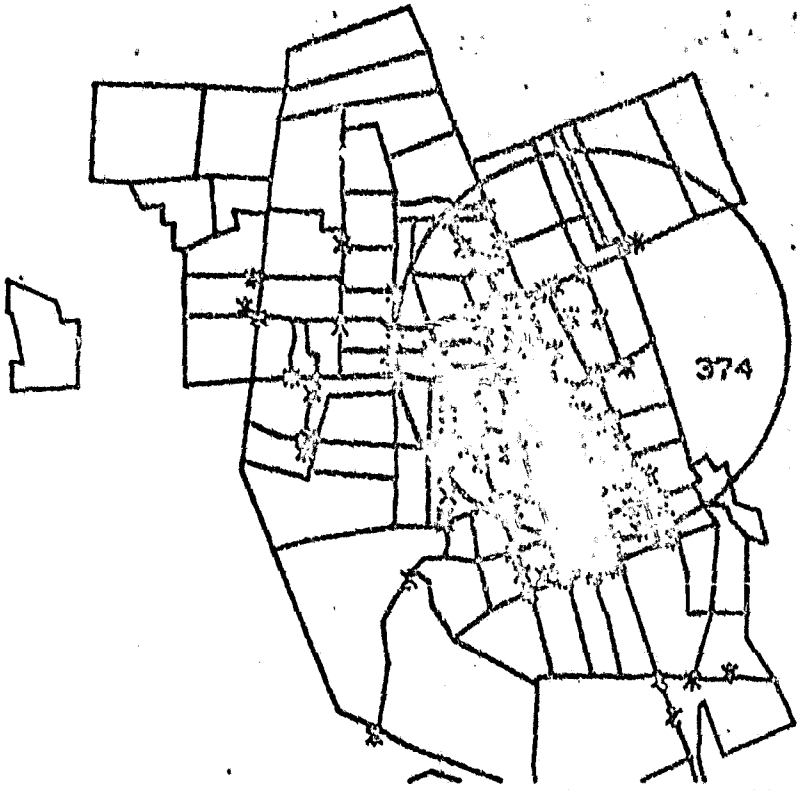


[illegible] EXTEND CLEAR & REDRAW FIND ZONE
[illegible] NORMAL SCALE OVERLAY WITH MAP 1
[illegible] CREATE [illegible]LARGE ZONESYMB 1 -ON DOTS
[illegible] [illegible]SMOOTH NUMBERS

EXHIBIT 25

SELECT CODE636
FILE EVENTS

GILROY POLICE DEPARTMENT CFS STUDY
BASIC ZONE MAP OF GILROY WITH * WHERE-EVER AN EVENT WITH ACTIVITY CODE = 636 OCCURRED AND COUNTING THE NUMBER OF THOSE EVENTS WITHIN A 1 MILE RADIUS CIRCLE.

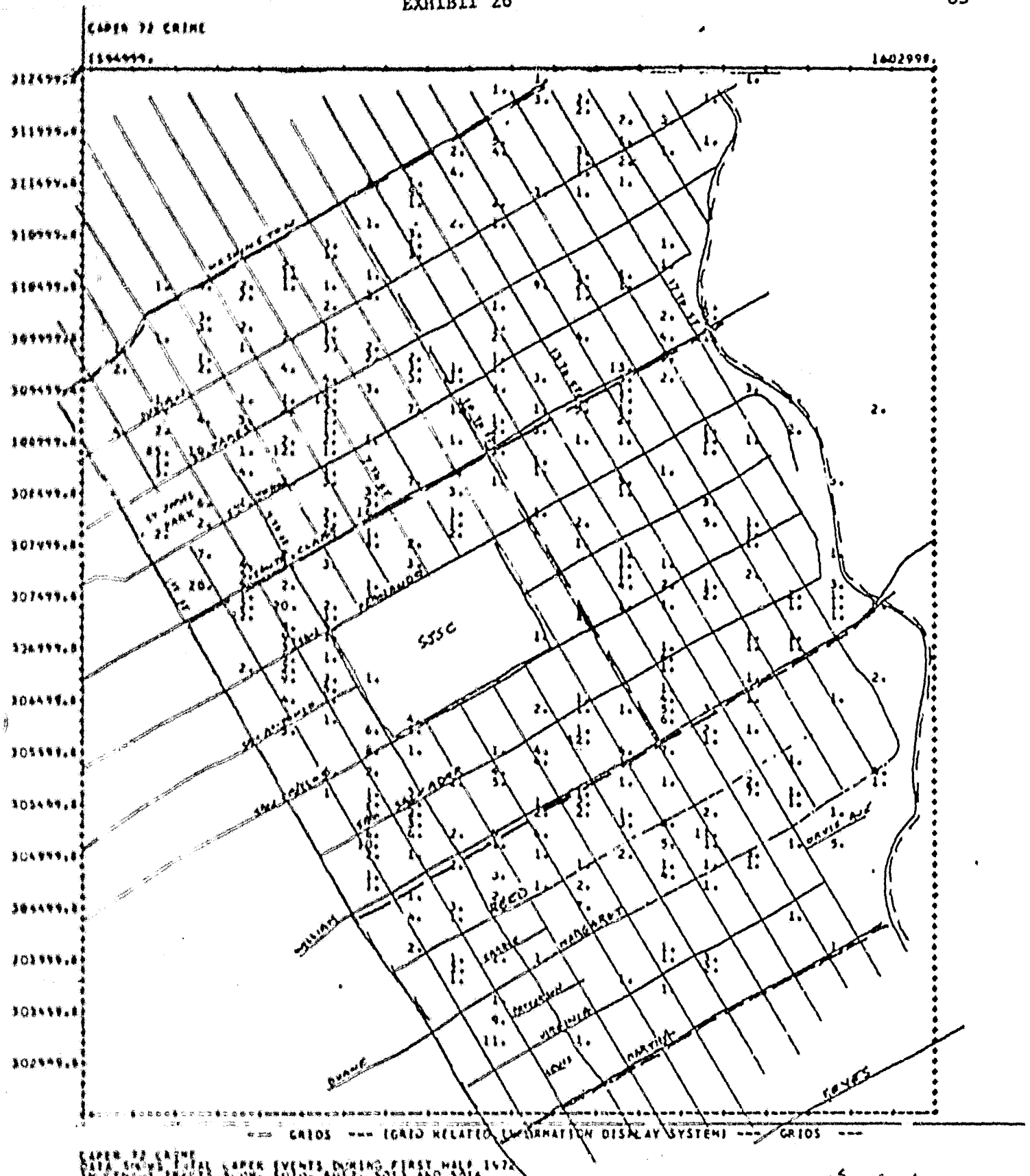


DRAW MAP
CENTER
EXPAND
SHRINK
NORMAL
SCALE

GRID

ERASE

DISPLAY EVENTS ALL
COUNT * IN AREAS
RETURN SUM BY AREA
MARK
DELETE
REDRAW AREAS
CREATE POLYGON
CREATE CIRCLE
END OF FILE



CAPER 72 CRIME
DATA SHOWN: TOTAL CAPER EVENTS DURING FIRST HALF 1972
IN CENSUS TRACTS 5009, 5010, 5012, 5013 AND 5016
LOOK AT CAPER 72

PREPARED BY THE CENTER FOR URBAN ANALYSIS, COUNTY OF SANTA CLARA
DATE PREPARED: APRIL 6, 1974

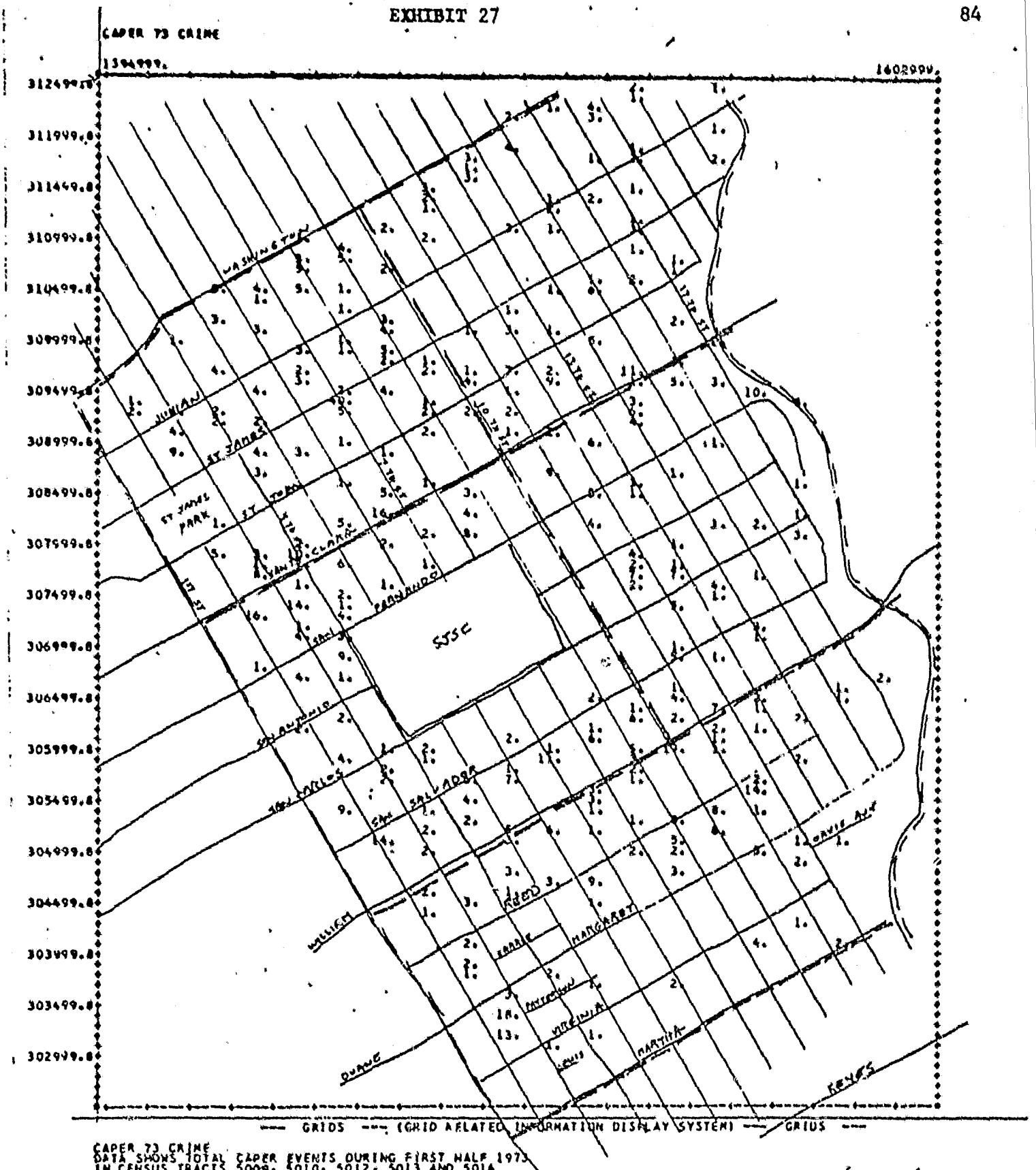
MAP SCALE = 1 INCH EQUALS 400 FEET

MINIMUM CELL VALUE(S): 0.1000000 01

MAXIMUM CELL VALUE(S): 0.8500000 02

CENSUS TRACTS

5010	5012
5009	5013
5016	



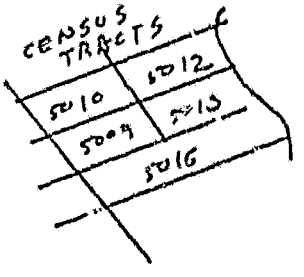
CAPER 73 CRIME
DATA SHOWS TOTAL CAPER EVENTS DURING FIRST HALF 1973
IN CENSUS TRACTS 5009, 5010, 5012, 5013 AND 5016

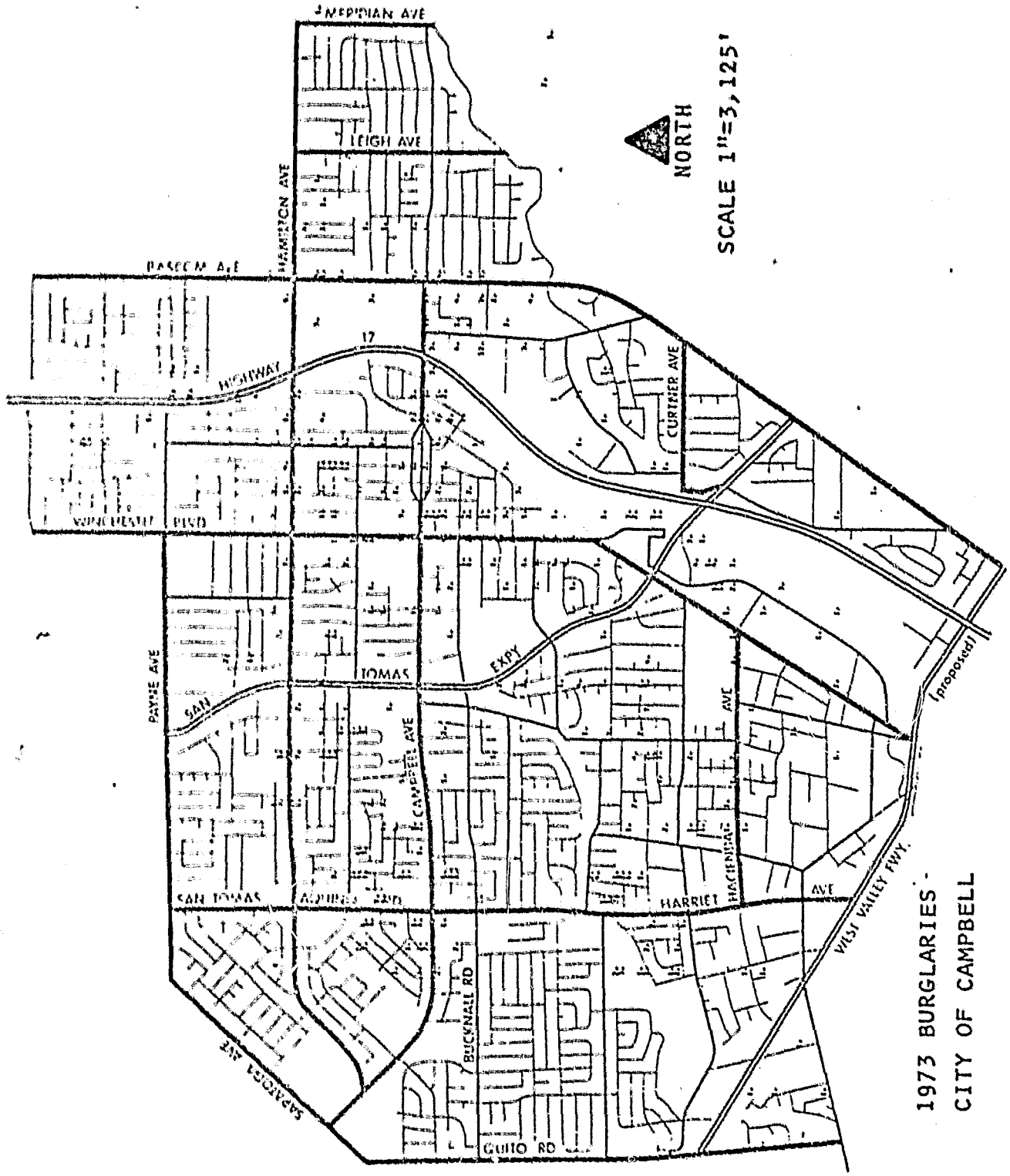
PREPARED BY THE CENTER FOR URBAN ANALYSIS, COUNTY OF SANTA CLARA
DATE PREPARED: APRIL 8, 1974

MAP SCALE - 1 INCH EQUALS 800 FEET

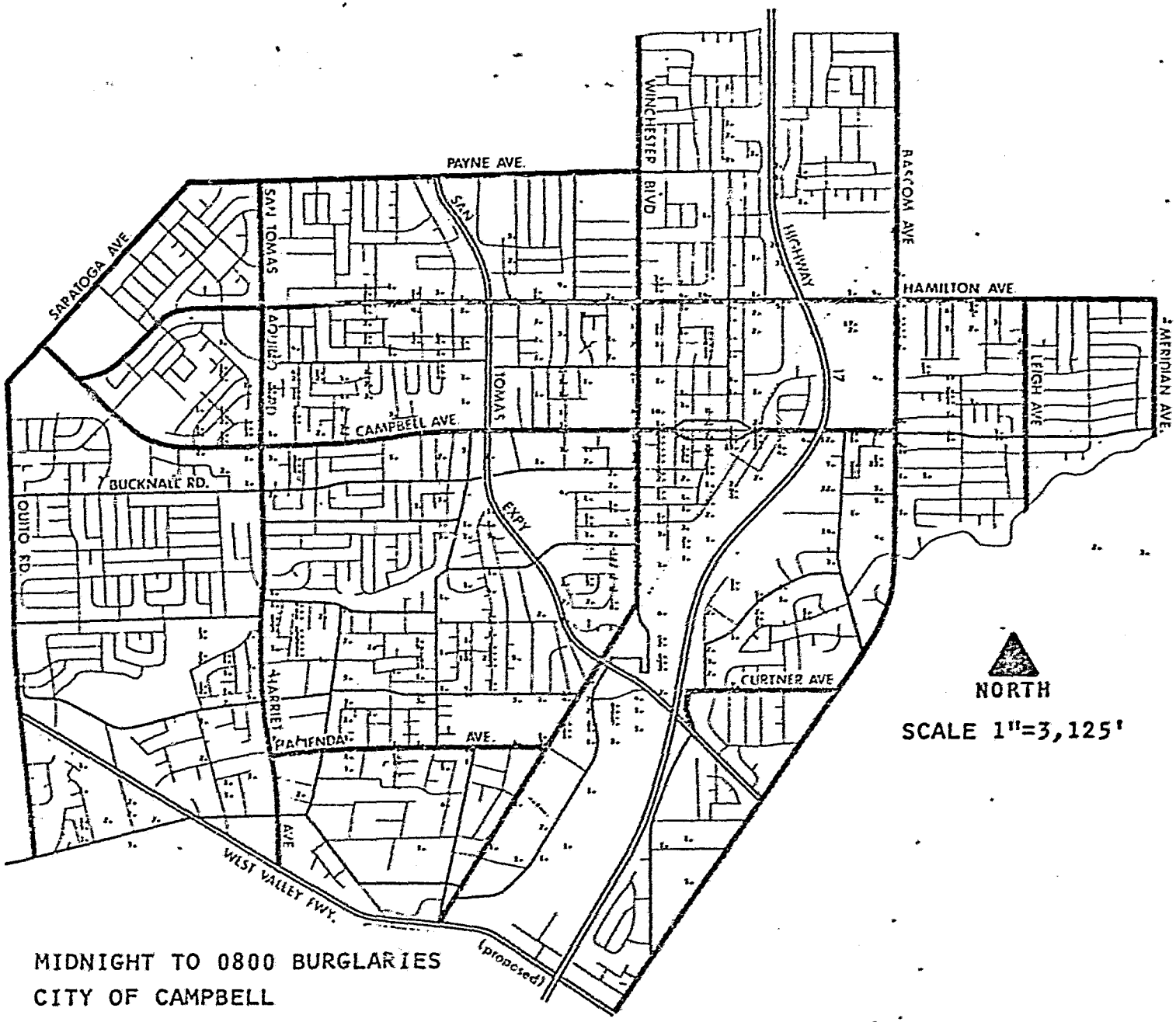
MINIMUM CELL VALUE(S) 0.1000000 01

MAXIMUM CELL VALUE(S) 0.4000000 02





1973 BURGLARIES -
CITY OF CAMPBELL



MIDNIGHT TO 0800 BURGLARIES
CITY OF CAMPBELL

EXHIBIT 29

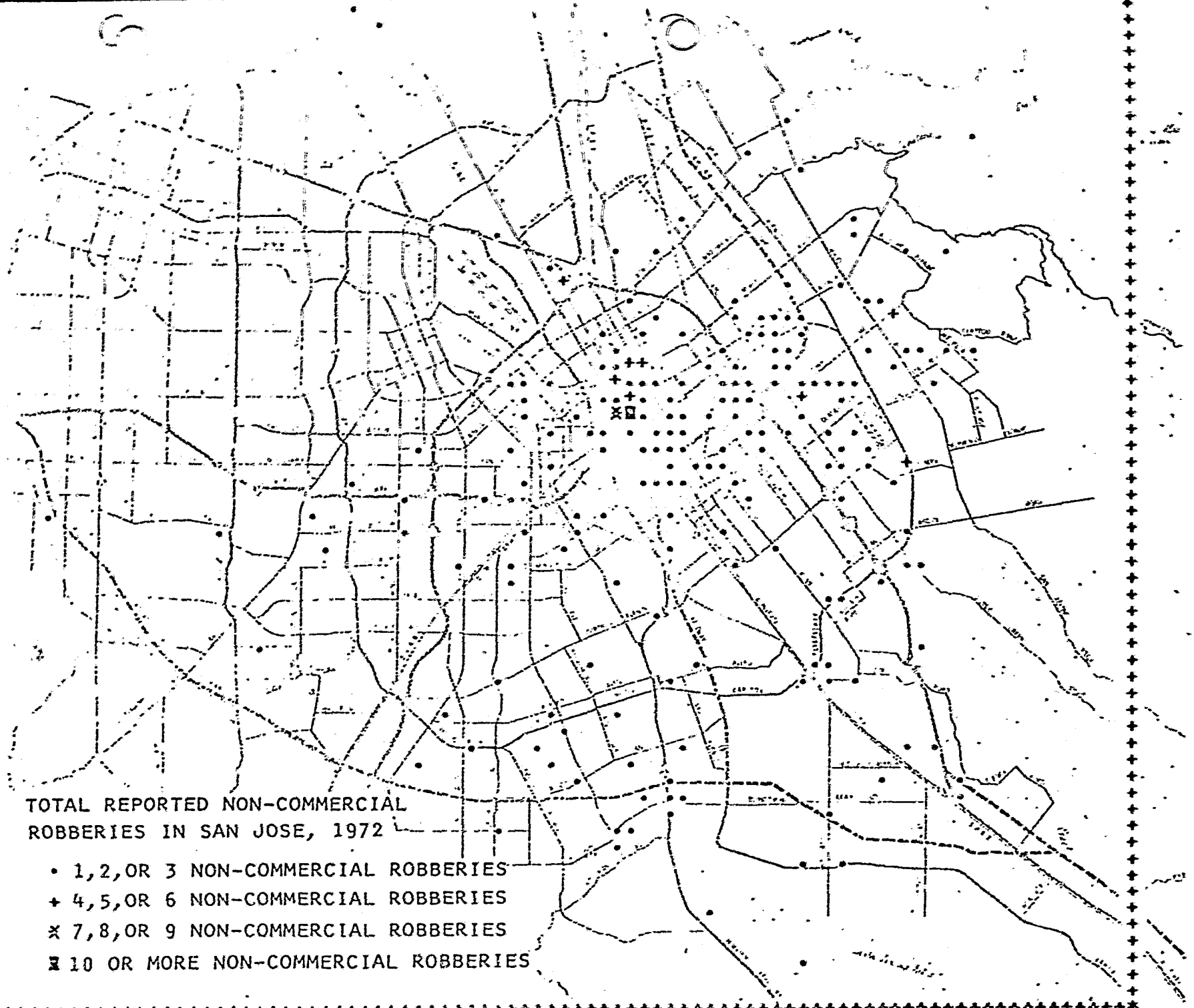

TOTAL REPORTED NON-COMMERCIAL
ROBBERIES IN SAN JOSE, 1972
• 1,2,OR 3 NON-COMMERCIAL ROBBERIES
+ 4,5,OR 6 NON-COMMERCIAL ROBBERIES
✕ 7,8,OR 9 NON-COMMERCIAL ROBBERIES
⧗ 10 OR MORE NON-COMMERCIAL ROBBERIES

EXHIBIT 30

REFERENCES

Bibliography of IBM Papers on Interactive Graphics

1. Mantey, P. E., Carlson, E. D.; "Integrated Data Bases for Municipal Decision-Making"; AFIPS Conference Proceeding volume 44, AFIPS Press, Montvale, N. J. 07645

2. P. E. Mantey, J. L. Bennett, E. D. Carlson "Information for Problem-Solving: The Development of An Interactive Geographic Information System," IEEE Int. Conf. on Communications, Volume II. Seattle, Washington, June, 1973

3. E. J. Cristiani, R. J. Evey, R. E. Goldman, P. E. Mantey, "An Interactive System for Aiding Evaluation of Local Government Polices", IEEE Transactions on Systems, Man and Cybernetics, Volume SMC-3, No. 2, March, 1973

4. E. D. Carlson, J. L. Bennett, G. M. Giddings, P. E. Mantey, "The Design and Evaluation of an Interactive Geo-Data Analysis and Display System", Proceedings of the IFIP Congress 74, International Federation for Information Processing, Stockholm, August, 1974. North Holland Publishing Company, Amsterdam, 1974

5. E. D. Carlson and J. A. Sutton, "A Case Study of Non-Programmer Interactive Problem-Solving", IBM Research Report RJ1382, IBM Research Laboratory, San Jose, CA, April, 1974

6. G. M. Giddings and E. D. Carlson, "An Interactive System for Creating, Editing and Displaying a Geographic Base File," IBM Research Report RJ1288, IBM Research Laboratory, San Jose, CA, 1973

7. B. F. Grace, "A Case Study of Man/Computer Problem-Solving: Observations on Interactive Formation of School Attendance Boundaries", IBM Research Report RJ1483, IBM Research Division, San Jose, CA, February, 1975

8. E. D. Carlson, B. F. Grace, J. A. Sutton, "Observations on End User Requirements for Interactive Problem-Solving Systems", to appear in MANAGEMENT DATAMATICS

   (IBM confidential at this time)

9. D.M. Wytock, B. F. Grace, "Computer Assistance for Planning School Attendance Boundaries", paper prepared for presentation at 1975 URISA Conference

Budget Category	D-3238		A1899-2		
	Grant Funds	Match Funds	Grant Funds	State Match	Local Match
Personal Services	110,097.	25,079.	36,262.	3,611.	-0-
Travel	1,197.	-0-	788.	-0-	-0-
Consulting Services	32,678.	10,000.	1,500.	-0-	-0-
Operating Expenses	16,908.	22,040.	26,450.	-0-	3,611.
Equipment	-0-	2,412.	-0-	-0-	-0-
TOTALS	160,880.	59,531.	65,000.	3,611.	3,611.

Appendix F = Cost Information

APPENDIX F: COSTS

Countywide CAPER Geocoding

Geocoding the Countywide CAPER data currently requires several passes thru the computer. However, the various phases can be processed as one job and the Center's costs to process 30,000 data records can be estimated as follows:

Set up Costs (2 hours x $25.00)	$ 50.00
Machine Costs*	$ 75.00
Total/Record	$ 0.004
Total	$125.00

Based on the Center's current matching experience of 62%, the cost per geocoded record is now $0.007. Upon implementation of the D.I.M.E. file as our primary geographic base file this cost should be reduced by 10-15% as the number of matches increase. However, at the same time, the ability to match intersection data will result in an increased cost. We estimate the additional run necessary to match intersection data will cost about the same as the non-intersection job and will result in a match rate of 90 - 95% of the intersection records. Therefore, upon implementation of the D.I.M.E. and D.I.M.E. Intersection files, the costs to process 30,000 records and successfully geocode 90% of them will be:

Set up Costs (4 hours x $25.00)	$100.00
Machine Costs*	$150.00
Total/Record	$ 0.008
Total/Geocoded Record	$ 0.010
Total	$250.00

*Machine Costs are those costs billed to the Center by GSA-Data Processing Center. A detail breakdown by item is available upon request.

Dec. 18, 1974

APPENDIX F: COSTS

Countywide CAPER GRIDS Maps

Producing a set of GRIDS maps requires three separate steps after all geocoding is completed. The first step is to convert the agency code to a numeric value and is required by the GRIDS program regardless of the number or types of maps requested. Based on previous experience, the costs for this operation, for a batch of 30,000 records are:

Set up cost (1 hour x $25.00)	$25.00
Machine Cost*	$13.53
Total/Record	$ 0.00128
Total	$38.53

The costs associated with the production of the maps, step 2, vary depending on the number and types of maps requested. If the requested maps differ from previously created maps only in the source data used, the following costs for a run of 16 maps displaying 30,000 records can be anticipated:

Set up cost (2 Hours x $25.00)	$ 50.00
Machine Cost*	$ 95.28
Total/Map	$ 9.08
Total	$145.28

If the requested maps differ from previously created maps in any way other than using different data, the set up costs will increase depending on the complexity of the change. However, a reasonable cost for designing, developing and implementing a totally new map should not exceed $25.00.

The third step in the process is the final printing and assembly of the maps produced in step 2. Again, based on past experience, the following costs for a run of 16 maps can be anticipated:

Set up cost (1.5 hour x $7.00)**	$ 10.50
Machine Cost*	$ 23.11
Assembly cost (9 Min/Map x 16 Maps x $15.00)	$ 36.00
Paper Cost (6 Pages/Map x $0.055/Page x 16 Maps)	$ 5.33
Total/Map	$ 4.68
Total	$ 74.94

Summary (assuming 16 previously set up maps displaying 30,000 records):

Set up Cost	$ 85.50
Machine Cost*	$131.92
Assembly Cost	$ 36.00
Paper Cost	$ 5.33
Total/Map	$ 16.17
Total	$258.75

**Data Processing Center's Data Control Clerk

*Machine Costs are those costs billed to the Center by GSA-Data Processing Center. A detail breakdown by item is available upon request.

APPENDIX F: Staffing: Center for Urban Analysis

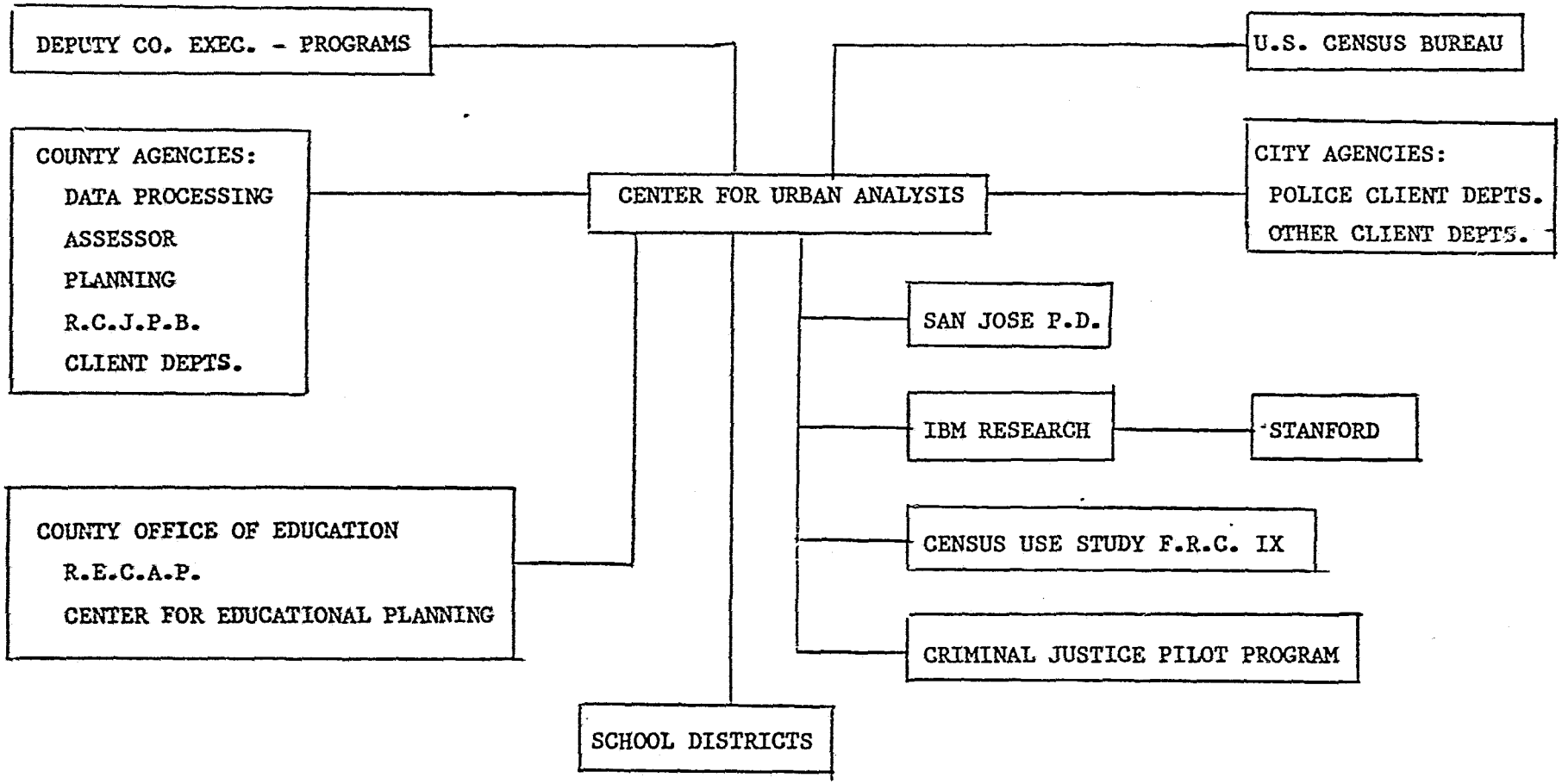
F. M. Lockfeld	Project Director	May 1973 - current
R. W. Renshaw	Assistant Project Director	(acting: May 1973 - Oct. 1974) Oct. 1974 - Current
D. M. Wytock	Operations Research Analyst	Oct. 1973 - current
S. M. Dunn	Operations Research Analyst	Oct. 1973 - current
W. Hanks	Operations Research Analyst I (Admin. Analyst I/Planner I	Oct. 1974 - current Oct. 1973 - Oct. 1974
C. Hunt	Geographic Base File Specialist (Supervising Clerk position)	July 1973 - current
G. Olivas	Technical Aide (Account Clerk position)	July 1973 - current
L. Gama	Technical Aide (Account Clerk position)	Feb. 1974 - current
K. Mueller-Simmons	Technical Aide (Account Clerk position)	Oct. 1974 - current

Former Staff:

R. Clark	Abstract Clerk	July 1973 - Jan. 1974
L. Quintel	Int. Typist Clerk	July 1973 - Jan. 1974
C. Chew	Account Clerk (extra help)	Feb. 1974 - Oct. 1974
J. Harwell	Int. Typist Clerk (extra help)	Oct. 1973 - Jan. 1974
B. Johnson	Int. Typist Clerk	Jan. 1974 - Oct. 1974
J. Millar	Int. Typist Clerk (extra help)	Mar. 1974 - Sept. 1974
C. Barahona	Int. Typist Clerk	Feb. 1974 - Apr. 1974

CENTER FOR URBAN ANALYSIS

STRUCTURE & RELATIONSHIPS



APPENDIX F

PROPERTY DISPOSITION RECOMMENDATION

1. There is a continuing requirement for all of the property obtained during the grant period for on going use within the original purpose of the LEAA grant.

2. The property is needed by the Center for Urban Analysis to continue to service user agencies with the capabilities exhibited in the demonstration projects. The utilized property will support criminal justice agencies as well as other governmental agency clients of the Center. The funding support of the Center are user chargers, plus federal grants for specialized portions of work. The agency that will have actual physical possession of the property is the County of Santa Clara, Office of the County Executive. Current projects involving criminal justice agencies include the San Jose Police Department, Computer Assisted Public Safety System (for police and fire, initially San Jose, subsequently to other jurisdictions), work with the Gilroy Police Department, and Countywide CAPER.

M. Lockfeld — July 1975

F. M. Lockfeld, Project Director (date)