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Report on Feasibility of A Geographic Information System for The Central City Citizen Planning Committees

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REPORT ON THE FEASIBILITY
OF
A GEOGRAPHIC INFORMATION SYSTEM
FOR THE
CENTRAL CITY CITIZEN PLANNING COMMITTEES

A Report to Dean Smith, Director
Central City Planning Project

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INTRODUCTION

In September 1984 PSU was contracted to demonstrate the utility of an interactive graphic data base system. A project was done using LANDTRAK* to determine which records from the tax roll were inside the Central City Planning Area. This information provides a starting point for a parcel based information system for the Central City Planning Project. This report consists of a design for a geographic information system for the Central City Planning Area that may serve as a prototype for a broader geographic information system for the City.

Computer Services has been provided a data tape containing geo-coded parcel numbers, which will be useful in selecting the A&T information for the Office of Housing Policy's contract with the Central City Planning Staff. The LANDTRAK Software available through Portland State's Center for Urban Studies aided in producing that tape.

Records from the A&T tax roll within the quarter sections in and around the Central City Planning Area were obtained from Computer Services. In these 32 quarter sections there were 12,000 parcel records. By digitizing the boundaries of the Central City Planning Area, as well as the subareas within the Central City Plan, it was possible to select the 3,500 parcels that are within the Central City. The listing included the subarea, the census tract, block number and DIME record number associated with each parcel's tax account number. It is now possible to select the tax information from the current tax roll by matching the tax account number.

The process of creating the listing of parcel account numbers within the Central City Planning Area was accomplished by address matching. The 12,000 records from the A&T rolls were to sent to San Diego. It took approximately one and a half hours, to read the tape and run it through the three programs

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*Landtrak is a software system developed by Criterion Inc., of San Diego, California. PSU as access to the system for education and service applications.

necessary to "admatch" (match addresses to x and y coordinates and the census geography) the records. Ten thousand records were admatched. Two thousand records did not have addresses attached to the tax account numbers. These are on a file and have been listed with the legal description and will have to be matched manually. The ten thousand records were loaded into LANDTRAK in a "batch job" which took about four hours. (See Figure One) Once loaded, it took about five minutes to select the central city plan area, and ask for a list of the parcels in that area. (See Figure Two) The list included the census tract, block number, and DIME record number for each parcel. This file was copied to tape, and sent back to Computer Services. In less than a person-day's worth of time it was possible to select the records within the central city plan. The most time intensive part of the process was the first loading of the information. Once that was done, pulling information by geographic area is fast and can be done interactively. Nevertheless, the job took longer in elapsed time. If LANDTRAK were available on the City's computer system, it would have been far easier to do the job in-house rather than remotely.

A geo-based information system should be developed in-house. Much time was lost in the process of file transfers and in the inefficiency of using two systems, both of which have administrators with differing priorities as well as many users. The productivity of planning staff and citizen planning groups could be greatly enhanced by such a system. A geo-based system would help inventory and track downtown housing and for other areas that might be singled out for special attention currently or in the future. Urban Renewal Districts, Local Improvement Districts, and Housing and Community Development target areas, typically need a list of all the properties within these boundaries. These would be easy to produce. Staff could do the work interactively and not need to depend on Computer Services once the job becomes routine. Such lists used in combination with appropriate models, would aid in the study of current or future impacts of public investment, tax increment financing or special ordinances, with greater ease than is presently possible.

Interactive graphics seems to be a necessary ingredient to make address matching and other geo-based processing really usable to the Bureaus. A

system such as LANDTRAK and a user oriented systems analyst are needed to implement the technology.

Through this project, much insight has been gained into the problems of a city wide geo-based system. Portland's unique form of bureau structure presents many problems in developing a coordinated system, however many of the pieces of a geo-based system are in place. Computer Services, has considerable experience with the DIME file and geo-coding. With a small amount of coordinated effort the bureaus can utilize this experience and begin to "tie" individual data bases together into a city wide system, with the "whole" being greater than the sum of the parts. Nevertheless, the current issue is, how might the geo-coded data and the interactive graphic analysis system be of use to the Central City Plan Steering Committee, as well as other bureaus. And what are the costs and benefits?

An Information System Approach

An information system is as complex as the decisionmaking system it supports. An information system like any other public program or facility needs to have a development plan. Such a plan must have long-range goals, short term objectives and appropriate evaluation procedures. A plan for an information system must serve and be supported by all involved. The support for an information system depends on results. It needs to be reliable and have a quick pay back period, in terms of production or time saved in day-to-day city business, such as data extraction for reports and studies. The City can no longer afford to collect data independently for each planning project, or program element. Data collection is an ongoing process.

Yet, a goal to acquire the "ultimate information machine" is not feasible, at least in one giant step. When thinking of computerized urban data, one often thinks of a muti-million dollar detailed mapping system taking years to implement, with a concomitant battle of who controls it and who maintains it. With these large costs the question becomes, which bureaus can afford it? The answer is those bureaus with large facility management responsibilities, and a constant need for detailed, large scale maps, such as Public Works, and the Water Bureau. Meanwhile, less costly systems are possible and useful,

particularly for the Planning Bureau, as well as other bureaus that must prepare reports about geographic areas, hold hearings or locate parcel information.

An Incremental Design

Another way is suggested to built an information system, incrementally, as each piece justifies itself. Such an approach requires a clear set of goals and objectives, cooperatively adopted, communication among participating bureaus, and staff to arrange tasks and coordinate activity. The staff role would be to design system elements to support current applications. The strategy would be to develop an interactive geo-based system, with rapid access to on-line information.

First, build from an area of strength, the city's experience with using data from the tax roll and the DIME file. Much city effort and time has been spent organizing records with DIME record numbers and identifiers. Augmentation with a LANDTRAK-type system would allow for interactive access to data, with simultaneous display of geographically collated information. The spatial accuracy of this type of system is suitable for most planning activities. It allows for the approximate location of parcels. It is not meant to produce maps accurate enough for engineering or detailed site planning, however.

More detailed mapping systems require a massive up-front loading of primary data and should be the responsibility of the bureaus having facility management tasks. Each would create it's own layer of data, e.g., water, transportation, sewers, for inclusion in an eventual multi-purpose cadastre system. Most bureaus would benefit from both types of systems. One should not preclude the other. The efforts should be coordinated, to make the "whole" effort more than the sum of separate data base efforts, in planning, buildings, business licenses, and the police information system, to name a few.

The rationale for an incremental strategy beginning with DIME file level of detail and accuracy is largely one of cost and time. The DIME based system framework exists, it can be extended to a parcel level using the ADMATCH program and using approximate parcel centroids for information at the parcel level. Such a system would cost about $100,000 to implement, and $40,000 per

year to maintain. This cost would include a system administrator to make it work. This system could be up and running within a one year time frame, because it requires little data input. There are many immediate applications to justify the system. The initial cost is minimal because a new computer is not needed immediately. The City's VAX is quite suitable, until such time as it becomes overloaded.

In the long run a more detailed and powerful mapping system will be needed, and steps to that end should begin. Yet all planning activities and information needs cannot wait for the ultimate system. Engineering/assessor map accuracy will require an improved system for geodetic control and base map coordination. This will be expensive. In addition, this detailed type of system includes the capture, storage, and processing of a much larger volume of data. Instead of 1 point per parcel there will be at least four or even more points per parcel, greatly increasing digitizing and data storage costs. Typically, this kind of system will cost a million dollars for hardware and software, and $200,000 per year for maintenance and manpower. A geographic information system with full mapping capability would take four to six years to implement. A dedicated computer would be needed up-front, and the system will not be ready to use for current projects.

The State of Oregon and Multnomah County are engaged in a process of designing a cadastral layer (a parcel map) to serve as a base map for Multnomah County. Rather than duplicate this effort, the City should take advantage of the digital base map and create layers of data, that spatially register. Hence the City's own layers of data, i.e., sewers, water, buildings, will relate to each other and other agencies, i.e., gas, electric, assessors.

Applications

There is no doubt that geo-coded data is useful. Computer Services has recently used the DIME file to check utility payments and "found" several million dollar in fees owed to the city. However, what is needed is utility software to aid maintenance of the DIME file interactively and graphically and to relate records to polygons (areas, districts, zones) so that data can be selected by geograghic areas.

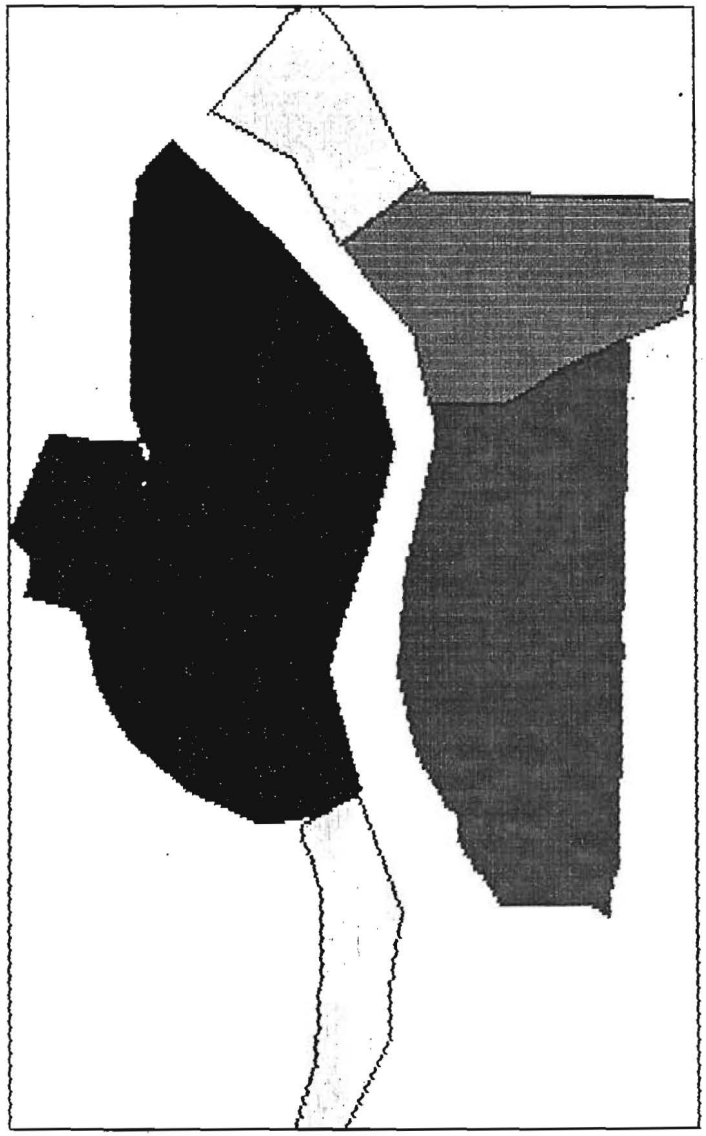
For the Central City Plan, such a geo-coded parcel based system will be able to calculate floor space by use by geographic area. This kind of information was used in the Seattle Central City Plan to determine where amenities were needed, and where FAR restriction could likely be traded for the development of those amenities. In Seattle each parcel was ranked according to its likelihood of development, a job which would have been easier according to the consultantwho developed the model, had the data been geo-coded. The experience of the Planning Bureau suggests that, at different times the Central City Steering Committee will want to find data by Neighborhoods, Comprehensive Plan Zones, Special Districts, Overlay Zones, or one of the myriad other zones in the City. Geo-coding will improve access to that kind of information whether it be for individual parcels, or aggregates by district.

In Sum

The technology exists to improve the geo-processing of urban data. The kinds of systems that are available for analysis are affordable, and should be implemented. More detailed computer-aided mapping systems are expensive and difficult to justify for the Bureau of Planning, or indeed any one bureau. Through an interagency effort a highly versatile geographic information system is possible. Meanwhile, until and even after such a system is implemented, there will still be many applications that do not need highly accurate mapping, and for which less resolution, of both data and geography, and consequentially costs, will produce useful information and products.

Portland Central City
All Parcels 10,914
June 7th, 1985

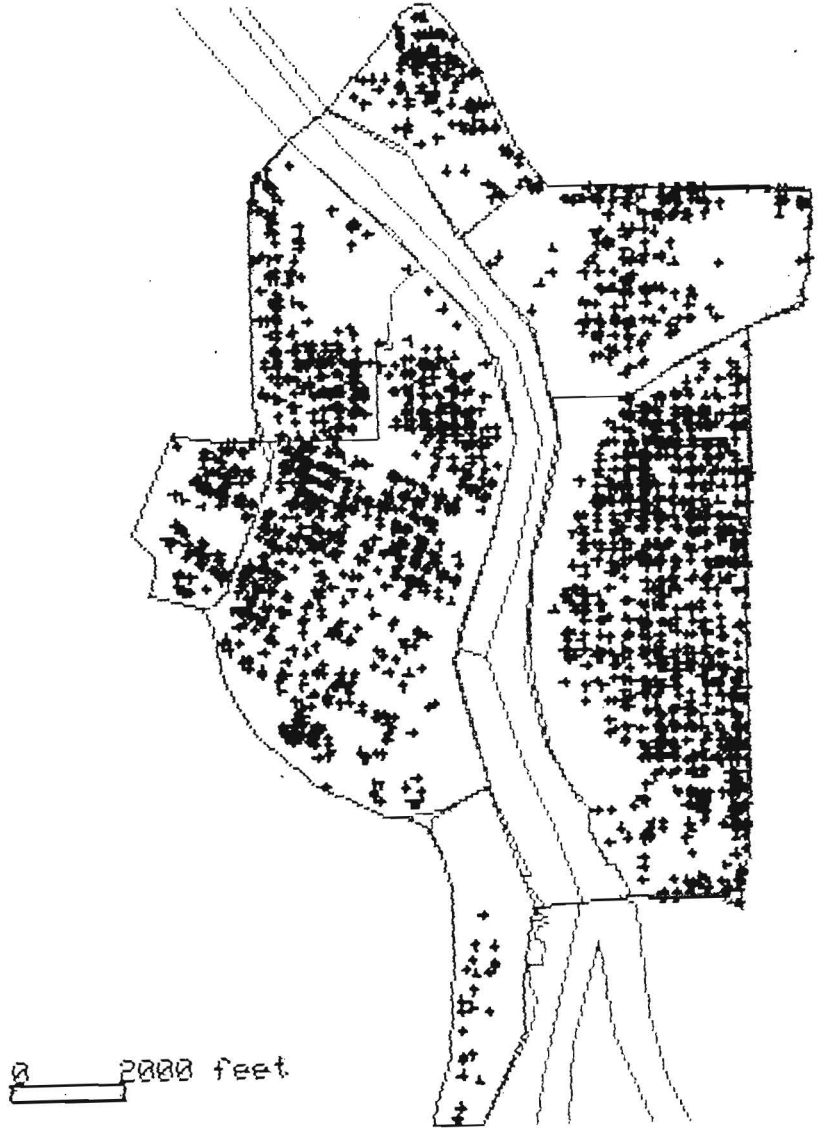
Figure 1



0.00 -	50.00
51.00 -	175.00
176.00 -	200.00
201.00 -	225.00
226.00 -	300.00
301.00 -	1200.00
1201.00 -	1600.00

Portland Central City
Subareas
June 7th, 1985

Figure 3



Portland Central City
Parcels In CCP 3,427
June 7th, 1985

Figure 2