# INTERN EXPERIENCE AT

# THE CENTER FOR URBAN PROGRAMS

An Internship Report

by

Richard Ira Kerbel

Submitted to the College of Engineering of
Texas A&M University
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ABSTRACT

INTERN EXPERIENCE AT THE

CENTER FOR URBAN PROGRAMS (May 1979)

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This report discusses the author's internship at Texas A&M University Center for Urban Programs from May, 1978 through February, 1979. The objectives of the internship were to:

1. Increase the intern's technical competence in problems facing local governments;
2. Improve the administration of the Center for Urban Programs so that the Center can more effectively serve Texas local governments; and
3. Gain insight into the decision making process of local governments by active participation.

The intern's responsibilities included work on Center staff-directed research projects, Center-coordinated research projects, and Center administration. The intern's major project responsibilities included directing the Community Energy Conservation project of the Texas Energy Extension Service, developing a street maintenance priority ranking system for the City of Denton, serving as University Coordinator for the Garland Urban Observatory and devising a Budget Forecasting System for the Center. To accomplish the third objective, the author served on the College Station Parks and Recreation Board during the internship.

In evaluating the internship, the intern found that it fulfilled all

the objectives set forth by the intern, his internship supervisor, and his academic committee chairman. The intern increased his technical competence in solving problems facing local governments. He effectively handled administrative responsibilities at the Center and he participated in the decision making process of a local government. The intern also developed personal contacts with local, state, and federal government officials.

# ACKNOWLEDGEMENTS

The author thanks all the people who contributed to making the internship a meaningful experience and assisted in preparing this report. Particular recognition is made of the contributions of Donald L. Woods, Ph.D., P.E., Chairman of the author's academic committee and Don C. Moore, the internship supervisor. Dr. Donald L. Woods guided the author through his academic course work and directed the author through the procedures necessary to complete the Doctor of Engineering degree. Mr. Don C. Moore was moore than the intern's supervisor, but also his mentor and friend.

The support of the rest of the intern's academic committee, M.J. "Bob" Fox, Jr., Ph.D., P.E.; Gary Halter, Ph.D.; Professor M. Drahn Jones, P.E.; John V. Perry, Jr., Ph.D., P.E.; and Glenn R. Johnson, Ed.D., Graduate Council Representative, is also appreciated. Joseph W. Foster III, D.E., P.E., is thanked for substituting during the last month when Dr. Fox became ill.

No work experience can be called meaningful without the support of one's co-workers. The staff at the Center for Urban Programs, Stephen Biles, Dale Burton, Sandy Segal, Ellen White, Bill Fannin, Frank Crumb, Karen Taylor, Lynn Millegan, and Kay Sanders made the internship enjoyable as well as rewarding. Mrs. Segal deserves special mention for typing this report despite the author's handwriting.

The author also acknowledges the many faculty members and Texas city managers who worked on the many projects described.

The author also thanks his wife, Claudia, for her understanding, moral support, and assistance in completing this report.

Rich Kerbel

College Station, Texas
March, 1979

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# CHAPTER I

# INTRODUCTION

This is the final report of Richard Kerbel's intern experience at the Center for Urban Programs at Texas A&M University from May 29, 1978 through February 28, 1979. The purpose of the report according to the guidelines set forth by the College of Engineering "is to establish that the objectives of the internship have been met."[1] The objectives of an internship according to the same document are:

1. to enable the student to demonstrate his ability to apply his knowledge and technical training by making an identifiable contribution in an area of practical concern to the organization or industry in which the internship is served; and

2. to enable the student to function in a non-academic environment in a position where he will become aware of the organizational approach to problems in addition to traditional engineering design or analysis. These may include, but are not limited to problems of management, labor relations, public relations, environmental protection or economics. [2]

## Internship Goals

The intern's long range career goals were established while serving in the position of Assistant County Engineer for Boulder County, Colorado. During his tenure with Boulder County, he realized that public service on a local level was a satisfying job experience. The intern also perceived

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[1] Doctor of Engineering Internship Guidelines, Texas A&M University, September, 1976, p. 1.

[2] Ibid.

a need for improving his understanding of the relationship between engineering principles and the solution of management problems. Therefore the intern decided on a career path of working for local government in an engineering and management capacity eventually leading to a position of city manager in a medium size city.

The intern enrolled in the Doctor of Engineering program at Texas A&M University to augment both his technical and management skills. The Doctor of Engineering program's goal of producing practicing engineers in management positions is consistent with the intern's goal of becoming a city manager with an engineering background.

The internship required by the Doctor of Engineering program provided an opportunity for the intern to supplement his job experiences in Boulder with different local government activities. An internship at the Center for Urban Programs enabled the intern to be involved with many local government problems rather than be tied to one problem in one specific city.

## Internship Objectives

The intern, his internship supervisor and the chairman of his academic committee established that the objectives of the internship were to:

1. increase the intern's technical competence in problems facing local governments;
2. improve the administration of the Center for Urban Programs so that the Center can more effectively serve Texas local governments; and
3. gain insight into the decision making process of local

governments by active participation.

## Organization of Report

At the end of the first month of the internship, the intern submitted a detailed workplan for the internship. This workplan discussed the anticipated projects of the internship and the intern's responsibilities. At the end of the first month and each subsequent month, the intern submitted a monthly progress report that briefly outlined specific project accomplishments. This final report is not a compilation of the monthly reports. Instead, this report discusses in detail the intern's activities, evaluates their results, and assesses the internship according to the internship objectives.

The report is divided into three sections. The first consists of the first three chapters: an introduction, a description of the internship host organization, and an overview of the internship. The next five chapters describe and evaluate the major projects of the internship. Finally, the last two chapters evaluate the internship and summarize the report.

# CHAPTER II

## CENTER FOR URBAN PROGRAMS

In response to a request from Texas A&M University President, Jack K. Williams, Professor Richard E. Thomas proposed creating an Urban Problems Center within the Texas Engineering Experiment Station in 1971. As Dr. Thomas saw it, the Center's goal was "to bring the University's expertise ...to bear on urban problems."[3] The Texas A&M University Board of Regents accepted this proposal in 1972.

The Center for Urban Programs is part of the Texas Engineering Experiment Station (TEES). The University System Organization Chart (Figure 1), demonstrates how the Center relates to the rest of the University System. Since the Center is not part of an academic department, but is organized to foster research activities for faculty in academic departments, the Urban Programs Council was formed to advise the Center staff. The Council consists of representatives from colleges and academic departments whose faculty members have the ability to serve Texas local governments. The Council advises the Center on technical resources of the university and assists the Center in the management of its interdisciplinary work.

The Center consists of four full time professional staff members (Figure 2). Don C. Moore directs the Center's operations. He succeeded Dean Thomas in the fall of 1977. Mr. Moore previously was Assistant Director of the Texas Municipal League.

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[3] Memorandum from Richard E. Thomas to Dean Fred J. Benson, August 3, 1971.

Figure 1

University System Partial Organization Chart

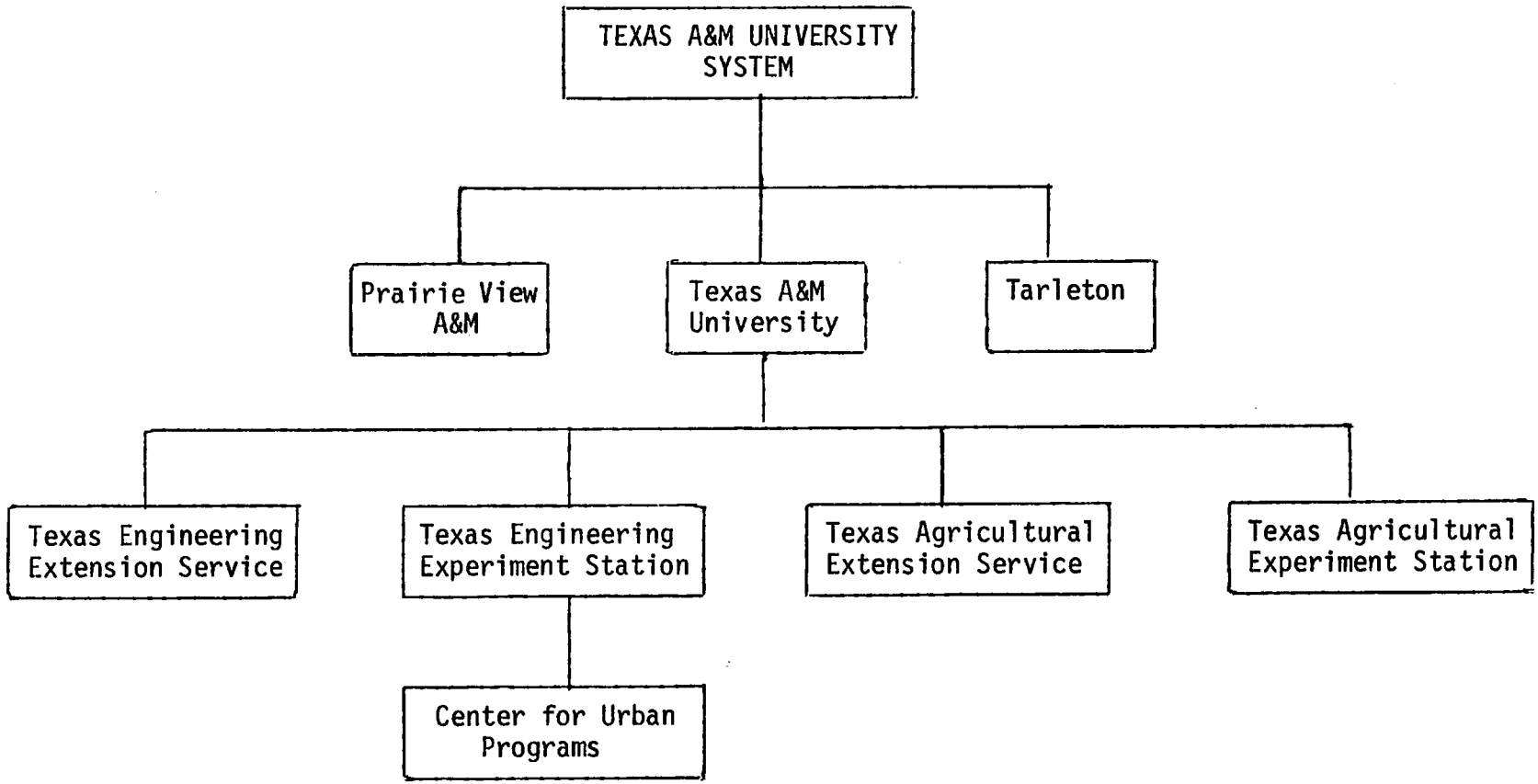
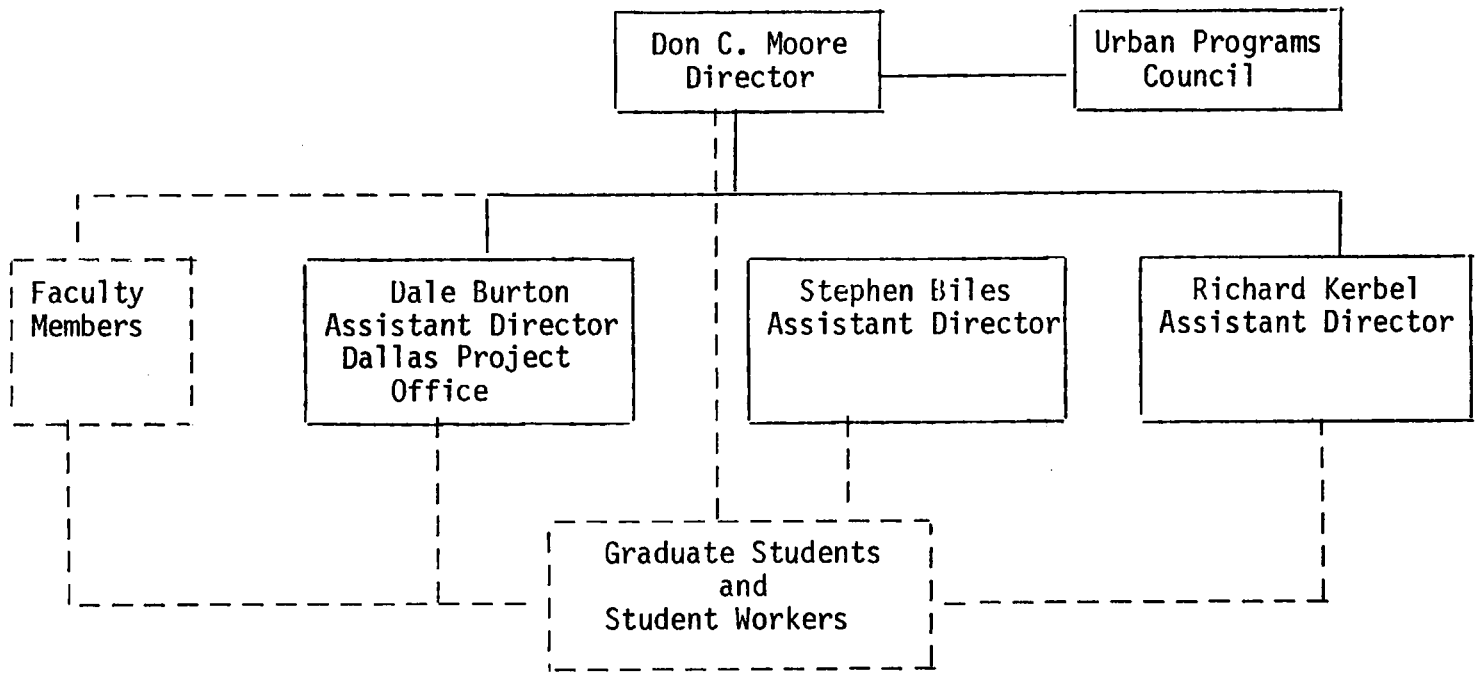


Figure 2

Center for Urban Programs
Organization Chart




_____ solid lines indicate permanent positions

_ _ _ _ _ _ broken lines indicate temporary positions

When the Center began operation, to facilitate contacts with local governments in the Dallas/Fort Worth area, a Dallas Project Office was formed. Dale Burton, former city manager of White Settlement, directs the Dallas Office and coordinates the Center's Dallas area projects such as the Garland Urban Observatory. The other Assistant Directors, Stephen Biles and the author, assist the Director in the campus operations of the Center. Mr. Biles, prior to coming to the Center, held various positions with the City of Wichita Falls. Both Assistant Directors conduct research projects and provide support for faculty members working on Center projects.

At times, the Center augments its staff with faculty members on part-time appointments. These faculty members have both project-related and administrative duties. In the past, professors from Electrical Engineering, Marketing, Political Science, Civil Engineering, and Computer Science served as Assistant Directors. Currently, Dr. Joseph Foster of the Industrial Engineering Department is an Assistant Director. The Center staff also includes graduate students and student workers from various academic disciplines who share the Center's interest in problems facing local governments.

Projects undertaken by the Center fall into three broad groups:

- Problem solving - solving a unique problem of one local government or a group of local governments;
- Solution transfer - assisting a local government in adapting a problem solving technique developed for another local government; and
- Educational programs - distributing information pertinent to the needs of local government officials.

The Center has completed projects in all three categories; an example of a problem solving project is the Fleet Maintenance System designed for the City of Arlington. Funded partially by city funds and Public Technology Incorporated, the Industrial Engineering Department developed a system for recording and scheduling maintenance for city-owned vehicles. As an example of a solution transfer project, the Center assisted the City of Garland in using a computerized Police Officer Deployment System (PODS) originally developed for the City of Arlington. Center-sponsored educational programs included an Airport Manager's Short Course and Animal Control Officers Training Clinic.

If there is a standard way to describe the development of a typical Center project, it would start with a local government identifying a need. The Center staff then locates the appropriate faculty researcher or researchers to solve the problem. After a meeting with city officials, the researcher and Center staff member prepare a proposal outlining how the researcher would attack the problem. After the city approves the proposal, the Center staff serves as a liaison between the city officials and the researchers. The staff's role is to insure that the researcher is not only sensitive to the peculiarities of working with cities, but also delivers the project results and recommendations in a form understandable to local government officials. Finally, the Center staff maintains contact with the city officials to assist in implementation of the recommendations.

# CHAPTER III

# OVERVIEW OF INTERNSHIP

The responsibilities of the author as Assistant Director of the Center for Urban Programs included management and technical charge of research projects, coordination of faculty-directed research for local governments, and administrative duties relating to the operation of the Center. This chapter discusses all projects conducted in these areas during the internship and documents how the intern's salary was distributed.

## Center Staff-Directed Research

To accomplish the Center's objective of bringing the capabilities of the University to Texas cities, at times the Center staff directs research projects. These projects relate either to overall management or engineering assistance needs of local governments. During the internship the intern worked on projects in each of the categories as described below.

### Overall Assistance Needs

Texas Innovation Group. The Center serves as the secretariat for the Texas Innovation Group (TIG). The TIG is one of 13 regional networks funded by the National Science Foundation to encourage the transfer of science and technology to local governments. Currently 40 Texas local governments participate in TIG ranging in size from Littlefield to San Antonio. The TIG and the Center share the same director, Don C. Moore; the project manager is Dale Burton. The author works under their direction.

During the internship the TIG planning year ended and the first action year began. The intern's responsibilities included preparing budgets for the second and third action year proposals, meeting with representatives of the City of Houston to discuss possible inclusion of Houston in TIG, coordinating possible TIG-sponsored research projects and assisting in the general administration of TIG. An example of the intern's duties for this project occurred during a meeting of all Innovation Group managers. The National Science Foundation project managers discussed the possibility of a funds transfer from the Department of Energy (DOE) to the Innovation Groups to encourage local government energy conservation. Since the intern's experiences with the Texas Energy Extension Service (see Chapter IV) provided excellent experience in this area, he and the Director of the New England Innovation Group represented the Innovation Groups before DOE officials. Currently DOE officials are considering the transfer.

Urban Technology System. Another network funded by the National Science Foundation is Public Technology Incorporated's Urban Technology System. This project is funded on a national level to encourage the transfer of science and technology to cities with populations ranging from 50,000 to 250,000. Currently, 30 cities nationwide participate in the project. The Center is one of the five backup sites. The backup sites assist local technology agents in the 30 cities in identifying appropriate science and technology resources to solve the cities' needs. During a technology agent training session, the intern presented information on past Center research and possible future research areas. In subsequent weeks, the intern responded to several requests for information from the technology agents present at the training session.

Garland Urban Observatory. The Center's Garland Urban Observatory is one part of another national program of overall assistance to cities provided by universities. This project is discussed in detailed in Chapter VI.

## Management Assistance Needs

Coordinating Board projects. The Center received funding from the Texas Coordinating Board of Higher Education to develop two programs: Professional Development for City Managers' and Orientation Program for Boards and Commission Members. The City Manager program will develop a curriculum focusing on enhancing the capabilities of practicing city managers. The first step of the project was to determine which groups of city managers should be observed to assess the skills to be taught in the curriculum. These groups were determined by questionnaires sent to a random sample of the State's city managers. The intern assisted in the evaluation of the questionnaires and will be a member of the observation team. The Boards and Commission project will assist city staffs in training appointed and elected officials on their responsibilities and the operations of local government. The intern assisted in the development of the proposal for this project and will participate in the training program.

## Engineering Assistance Needs

During the past nine months, the intern participated in several Center-directed engineering projects. Chapters IV and V are devoted to two of these projects: (1) the Community Energy Conservation Project of the Texas Energy Extension Service; and (2) the Denton Street Inventory.

Regional Energy Profile. The intern directed the Center's engineering efforts for a Regional Energy Profile developed for the Alamo Area (San Antonio) Council of Governments in conjunction with Arthur Young and Company. This project determined the types of energy used in the San Antonio area and which segments of the economy use them. The intern developed descriptions of local government energy conservation opportunities for inclusion in the final report. During the project, the intern attended several advisory committee meetings and made presentations before the AACOG executive committee. The unique opportunity to work with a private consulting firm offered insight into their methods of operation.

Flood Resistant Construction Techniques Proposal. The intern proposed portions of three Center-directed engineering proposals that were not funded. The first, Flood Resistant Construction Techniques, answered a Request for Proposal (RFP) from the Federal Insurance Administration of the Department of Housing and Urban Development. This proposal included analyzing the design of structures that survived floods to determine their common construction techniques. The intern was to serve as co-principal investigator on this project with a professor of building construction. The ten member research team included representatives from five academic departments. Unfortunately, this proposal was not considered because of an error on the part of the messenger service.

Rural Community Energy Conservation Project. Prepared for the Texas Commission on the Humanities, this project proposed to give small communities the opportunity to receive assistance similar to what larger cities receive from the Community Energy Conservation project. The intern was to serve as the project director. However, the Center did not submit the proposal because the guidelines allowed only problem discussion not

problem solving in the project.

State Energy Conservation Plan Evaluation. This proposal was prepared jointly by the Center and Arthur Young and Company. The proposal preparation provided the intern with another opportunity to work with a private consulting firm. Although the project was awarded to another firm, the intern did learn that private consulting firms prepare proposals in a similar manner to the Center.

## Center-Coordinated Research

Each of the Center staff members' responsibilities include serving as a liaison between faculty researchers and city staff. As discussed in Chapter II, this is one of the Center's primary functions. Besides serving as University Coordinator for the Garland Urban Observatory described in Chapter IV, the intern coordinated four other Center research efforts.

### Bellaire Sewer System Analysis

Professor Harold Wolf of the Civil Engineering Department directed this project which analyzed the Bellaire Sewer System to determine if the City should begin replacing all their sewer lines. For this study, the intern prepared a history of the project, an evaluation of the project results, and recommendations as part of the final report submitted to the City staff. The City staff originally contacted the Center because its wastewater treatment plant had excessive flows after heavy rains. Bellaire city officials hoped the Center could save them the expense of systematically replacing most of their sewer lines. In order to determine whether the problem was inflow or infiltration, a testing procedure was developed to determine if the sewage during excessive flows was characteristic of ground water or surface runoff. The research design did not work because

the City's water supply comes from several wells which prevented development of consistent sewage characteristics. However the results from physical inspection of manholes and analysis of historical flows led the research team to conclude that the City should proceed with a sewer replacement program.

Texarkana Building Code Modification

The city officials of Texarkana, Texas approached the Center about a building code research project before the internship began. However, the project, the Texarkana Building Code Modification, was not initiated until July, 1978. The project is designed to propose modifications to the city building code to promote the rehabilitation of older structures. Principal Investigator for the project is Dr. Charles Hix of the Building Construction Department. The intern's role is liaison between the university research staff and city officials. Presently, the first draft of the final report is being prepared.

Sherman Police Study

Sherman city officials requested the Center provide assistance in instituting management by objectives in the City police department. The Center director requested the intern revise a proposal developed by Professor Louis W. Fry of the Management Department. The proposal was not delivered to the City because anticipated personnel changes in the police department did not occur.

McAllen Data Processing Study

Recently, the Center received a request for assistance in developing the City of McAllen's in-house electronic data processing. At present,

the City contracts with a private service bureau for computer services. Although the service is provided approximately at cost by a civic-minded individual, the City is interested in receiving more information and developing an interactive system for financial accounting. The intern, in conjunction with Dr. Bart Childs of the Computing Science Department, met with City staff and developed a rough draft proposal. The proposal is currently under consideration.

## Center Administration

As discussed in Chapter I, the second internship objective related to the intern's involvement in the Center's administration. From the beginning of the internship, the intern and the intern's supervisor agreed on administrative tasks that were the intern's responsibility. Although these tasks have little similarity to functions of local governments, the intern applied his problem solving ability to non-technical matters as will be necessary when managing local government. The intern's design of a Budget Forecasting System is discussed in Chapter VII. In that chapter a discussion of all the Center's budgets is presented.

### Budget Administration

Each month the intern distributes monthly payroll charges and other expenses as part of the Administration of the Center's Budgets. Each of the Center's projects has its own budget for salaries, fringe benefits, supplies, overhead, travel, and other expenses. Each expense the Center makes must be recorded in its proper category. The intern supervises the checking of accounting sheets from the Texas A&M Research Foundation and the Texas Engineering Experiment Station (TEES). When errors are discovered, the intern arranges for corrections to be made.

## Proposal Processing

When the internship began, the time between a city requesting assistance and a proposal being sent by the Research Foundation to the city was as long as four to six months. This delay was unacceptable. Therefore, the Center staff including the intern worked to improve proposal processing. The key to reducing the delays caused by administrative procedures was understanding the role and capabilities of the Research Foundation. All research not funded by state agencies must be processed by the Research Foundation. Originally, the Center relied on the Research Foundation for typing of final drafts and preparing the project budgets. However, by having the Center secretaries type the final draft, the Center eliminated the Research Foundation typing delay and the communication gap between a new typist and instructions from the proposal author.

Another improvement to proposal processing was the intern's developing proficiency in project budget preparation. This skill enabled the Center to give the potential sponsor an accurate estimate of the project's eventual cost and shortened the review period of the Research Foundation budget department. Since the budget is often complete before the final proposal, the Center found that submitting the budget early to the Research Foundation meant that it was ready when the final draft was submitted. Therefore, another delay was eliminated. Now the Center routinely processes a proposal through the Research Foundation in only three days. This does not mean that a city gets a proposal three days after it requests one, but it can reduce the time to as short as one month.

## Employee Supervision

The intern supervised the work of graduate research assistants and

undergraduate student workers on the Center staff. During the internship there were a maximum of four employees in these categories; currently, there is only one. At times, two of the employees were working on research projects directed by a faculty member outside the Center staff. In these cases, the intern maintained communication between the Center employees and the researcher to assure that the client city was receiving the product it expected. The intern also performed the normal duties of a supervisor including hiring and training new employees and delegating work assignments.

University Reporting Requirements

Responding to University reporting requirements is another of the intern's responsibilities. Routinely the University administration requests the Center to document past and predict future activities. The most significant of these reports is a program evaluation of the Center's activities required by the State Legislature. In January of 1978, the Center developed three performance measures to determine goal accomplishment and estimated the coming year's activities. The three performance measures are: (1) number of sponsored research programs; (2) number of cities served by research and transfer; and (3) number of identifiable problems attacked.

In August, 1978, the intern evaluated the 1977-1978 fiscal year actual performance compared to the January performance estimates and found that the Center had attained or exceeded the predicted performance level for each measure.

## Salary Distribution

Each month the intern's salary is distributed among various research projects according to the percentage of time spent on each project (Figure 3). A review of the Salary Distribution Chart shows that all the projects mentioned above did not have salary charged to them. Some of the projects mentioned included proposal development costs which must be absorbed by other projects. Meanwhile, others described individually were considered for funding purposes to be part of the Texas Innovation Group.

In addition, the cost of administrative tasks were distributed among the research projects and not charged to the Center's administration budget except in June. Therefore, the Salary Distribution Chart only approximates the intern's time commitments.

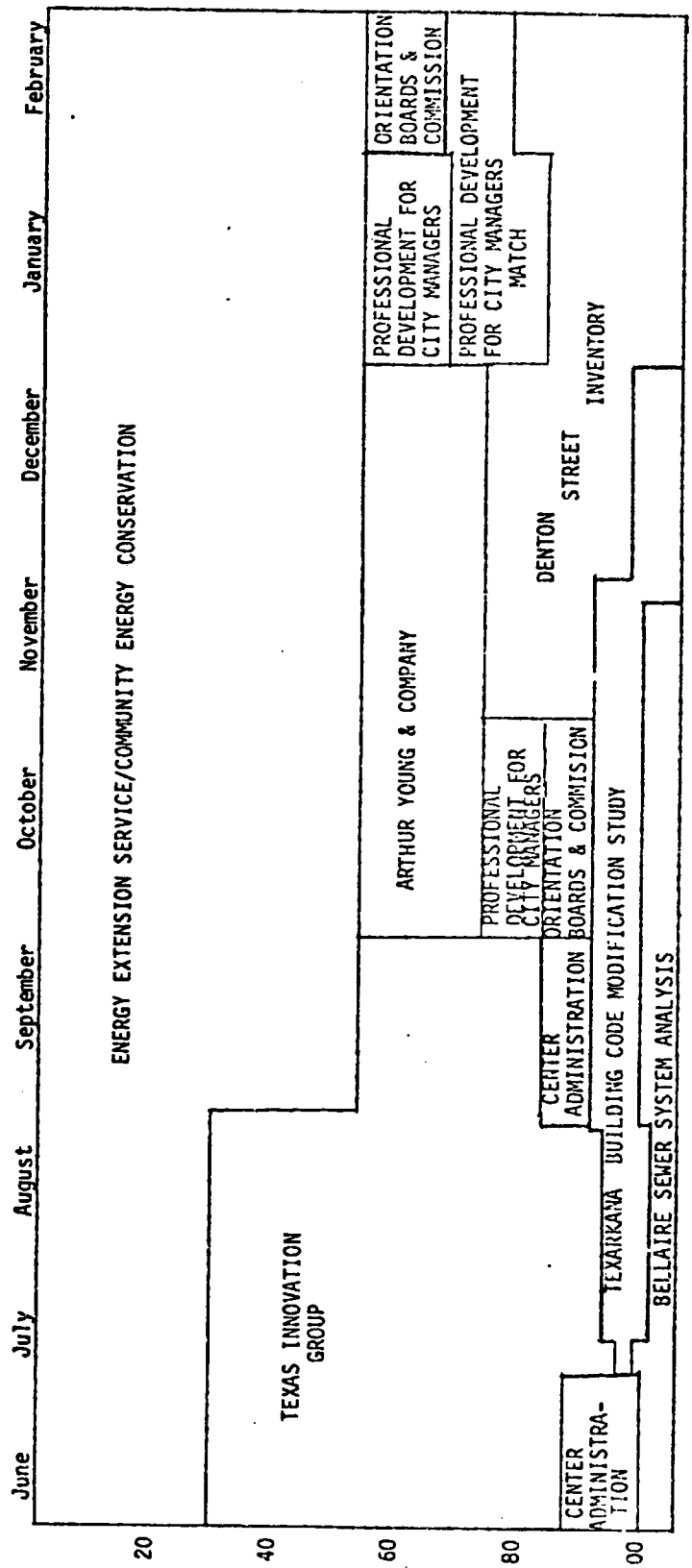
## Summary

This Chapter presents an overview of the intern's involvement in projects fulfilling Objectives 1 and 2 of the internship. The projects were categorized as Center Staff-Directed Research, Center-Coordinated Research, or Center Administration. Each project and the intern's responsibilities were described.

Chapters IV through VII discuss in greater detail four projects relating to these objectives. Chapter VIII reports on the project accomplishing Objective 3.

Figure 3

Salary Distribution Chart



# CHAPTER IV

# COMMUNITY ENERGY CONSERVATION PROJECT

Texas is one of ten states to receive grants from the Department of Energy (DOE) to establish Energy Extension Services (EES). The EES program was conceived by the Energy Research and Development Administration (ERDA). Between the submission of the proposal to ERDA and eventual funding by DOE, ERDA and the Federal Energy Administration (FEA) were merged to form DOE. The original grant awarded funds to operate the Texas EES for eighteen months from October, 1978 through March, 1979. Subsequently, DOE extended the grant for another six months through September, 1979. The Community Energy Conservation (CEC) project is funded by the Texas EES.

## Objective

The objective of the Texas EES is to "test the effectiveness of a variety of services to assist small energy users in achieving certain well-defined energy-saving objectives."[4] The CEC objective is to test the effectiveness of local government as a delivery mechanism for energy conservation information.

## Organization

Five area offices and eight special technical programs comprise the Texas EES. The area offices work directly with the citizens of their region. They are managed and staffed by universities (San Antonio,

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[4] Office of the Governor. The State of Texas Energy Extension Service Proposal (Austin, Texas: Office of the Governor) June 30, 1977, p. 2.

El Paso, Dallas/Fort Worth, Houston) or the Agricultural Extension Service (Lubbock). The technical programs are titled: Rural Poor; Financial Institutions; Hospitals; Home Building; Industry; Small Manufacturers; Heating, Ventilating, and Air Conditioning Engineers; and the CEC. Each of the technical programs is directed by researchers at Texas A&M University or Prairie View A&M University.

Both the area and technical programs are coordinated by the Center for Mineral and Energy Resources (CEMR). Dr. Stephen Riter, Assistant Director of CEMR, directs the Texas EES. An organization chart (Figure 4) illustrates the relationship between the programs. The intern, as project director, is responsible for coordination with the EES central staff and providing direct assistance to the CEC cities.

## Methodology

The CEC methodology is based upon a marketing concept, the Consumer Adoption Cycle.[5] This concept theorizes that the majority of consumers follow the lead of "early adopters" in making their purchasing decisions. The Center proposed testing whether this concept applied to cities adopting programs. By developing complete CEC programs in six "early adopter" cities in the Dallas/Fort Worth area it was hoped that when other cities developed their own CEC programs they would base their programs on the "early adopter" cities.

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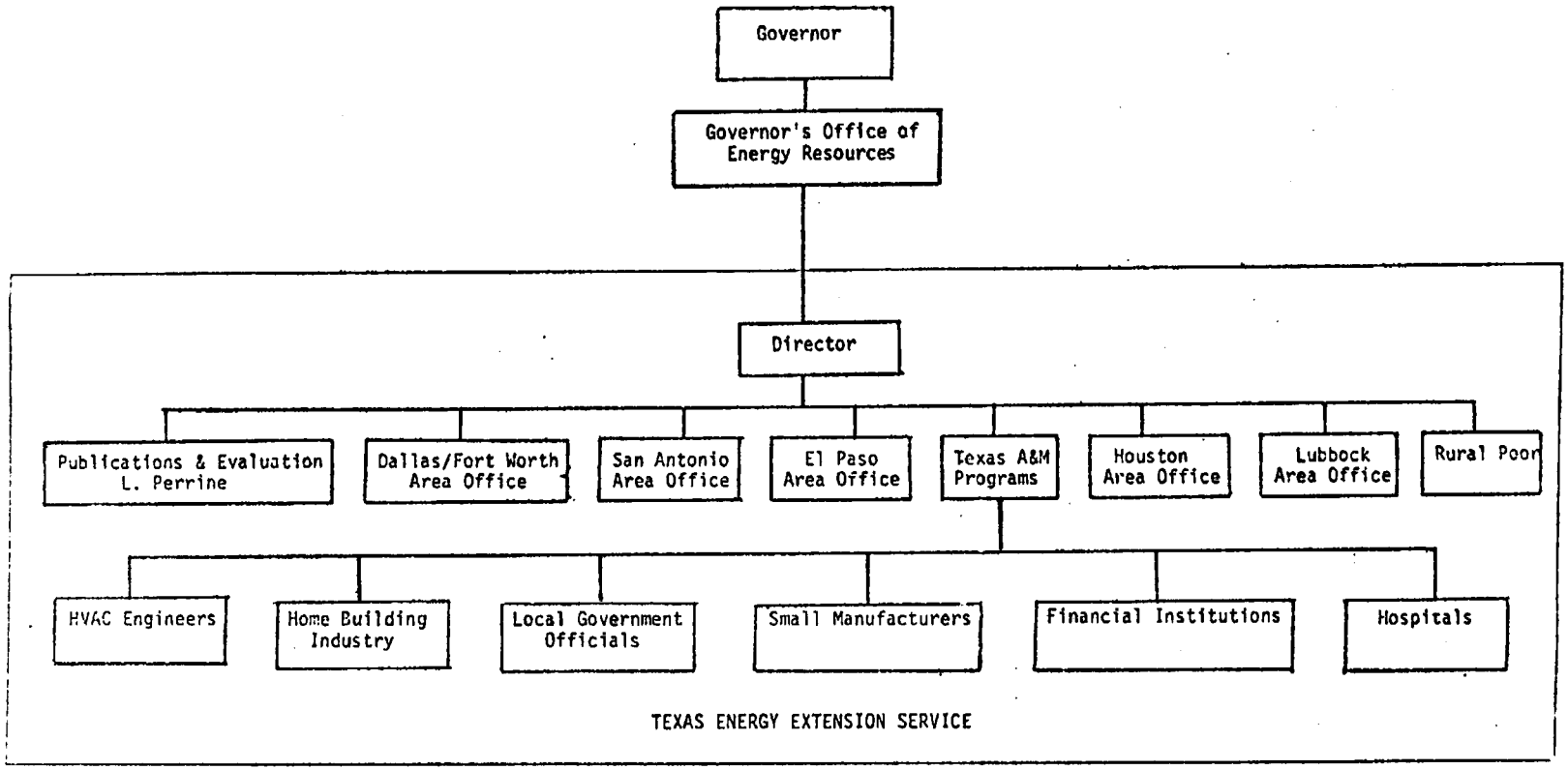
[5] Joe Kent Kirby. Consumer Behavior: Conceptual Foundations (New York: Dun-Donnelly Publishing Corporation) 1975, pp. 480-490.

Figure 4

Texas Energy Extension Service Organization[a]




[a] Office of the Governor. "The State of Texas Energy Extension Service Proposal." (Austin, Texas: Office of the Governor), June 30, 1977, p. 6.

## Tasks

The detailed workplan for the CEC developed by the intern sets forth administrative tasks, major tasks, and optional tasks. The latter two categories were first developed in a program outline sent to potential CEC cities. However, the detailed workplan broke the tasks into subtasks, assigned staff, and set completion deadlines. The tasks were:

### A. Administrative Tasks

Task 1: Update the Center for Urban Programs staff in the "state of the art" of the community energy conservation.

Task 2: Establish coordination links with other energy related government and private organizations.

Task 3: Develop program outline and enlist participating cities.

Task 4: Document the above stated efforts.

### B. Major Tasks

Task 1: Train city energy staff in "state of the art" energy conservation techniques.

Task 2: Assess status of existing energy conservation work in community.

Task 3: Assist city executives and staff in designing a community energy conservation program with a strong city government leadership element.

Task 4: Assist city executives and staff prepare a plan for communicating with citizens about energy conservation.

Task 5: Aid in assembling and preparing materials to be used in CEC information programs.

Task 6: Measure and document effectiveness of CEC demonstrations; this will include a measure of cost-effectiveness.

C. Optional Tasks

Task 1: Aid in evaluation of energy usage in city buildings and operations, and recommend remedial actions or priority areas for detailed cost-benefit analysis.

Task 2: Assist development of energy conservation presentations to civic clubs, neighborhood centers, schools, and other public forums.

Task 3: Develop practical seminars on energy conservation for special groups of energy consumers; i.e., builders, home repair and housing rehabilitation advisors, or owners of commercial buildings.

Task 4: Help design and conduct surveys of citizen opinion and behavior regarding conservation.

Task 5: Provide assistance establishing an "energy conservation action committee" made up of citizens, business leaders and city officials for the purpose of adding to the leadership dimension.

Task 6: Help design and implement special energy conservation awareness activities to call attention to the program.

The Center's activities under the Administrative Tasks and the first two Major Tasks can be combined into: updating the Center's staff community energy conservation expertise, recruiting cities to participate in the program and training the staffs of the participating cities. The Center is currently providing assistance to the CEC cities in implementing Major Tasks three through six and all the Optional Tasks.

## Updating Center Staff Expertise

For the Center to update its expertise in community energy conservation, the intern researched publications, consulted city staffs across the nation and attended short courses and seminars. Based on this research, the intern divided city energy conservation activities into five categories.

1. In-house - This category focuses on the development of programs such as city building audits and energy contingency plans with the objective of reducing city government energy consumption.
2. Individual Assistance - Emphasis is placed on establishing a city staff responsible for providing individual citizens with information on how to conserve energy in their homes and businesses. This is accomplished by energy audits, analysis of infrared - thermographs and similar programs.
3. Citizen Awareness - This category stresses the systemized disbursement of energy conservation information to the general public using mass media and individualized programs.
4. Transportation - This component seeks increased energy efficiency in the transportation system by recommending vanpool/carpool services, synchronizing traffic lights, and similar programs.
5. Codes - The adoption of building codes and development practices are designed to decrease energy consumption in new construction and in rehabilitation of older neighborhoods.

The chart on the following page (Figure 5) lists some of the programs that can be included in each category. While no city can expect to implement each program listed, the chart serves as a shopping list for the city

Figure 5

Community Energy Conservation Activities

| IN-HOUSE | LOCAL GOVERNMENT ACTIONS | CITIZEN AWARENESS | INDIVIDUAL ASSISTANCE | TRANSPORTATION |
|---|---|---|---|---|
| Contingency Plan | Energy Efficient Building Codes | Utility Bill Stuffers | Consumer Hotline | Ramp Metering |
| City Building | Energy Element in Comprehensive Planning | Public Service Anouncements | Weatherization Project | Staggered Work Hours |
| Reduced Police Patrolling | Tax Incentives | Energy Fairs | Savings and Loan Program | Mass Transit |
| Modified Purchasing Procedures | Community Energy Profile | Energy Libraries | Commercial Building Audit | Vanpool/Carpool |
| Energy Budget | Zoning, Subdivision Regulations or Deed Restrictions | Workshops | Home Energy Audits | Traffic Light Synchronization |
| Street Lighting | Sign Lighting Ordinance | Test Homes | Aerial Thermography or Infrared Flyover | |
| | Required Conservation Plan | Youth Programs | | |

staff in developing their own city energy conservation program. Cities may also choose to implement programs not listed to meet a particular need.

## Recruit Cities

In recruiting the "early adopter" cities, the staff did not want to create interest in the program but instead looked for cities already considering energy conservation programs. A notice of Innovative Energy Conservation Grants offered by the Governor's Office of Energy Resources was mailed by the Center to cities in the Texas Innovation Group. The city managers of interested cities were mailed a CEC program outline and asked to get a commitment of the elected officials of their city. The selected cities were Denton, Garland, Grand Prairie, Texarkana, and Waco.

For the CEC project to be successful other Texas cities must adopt the programs of the selected cities. Cities more readily adopt programs if they follow the example of cities of similar population. The population range of the CEC cities reflects the majority of Texas cities.

## Train City Staff

After recruiting the cities and before training the city staffs, CEC staff conducted interviews with top city officials in each of the cities to assess the status of their cities' energy conservation efforts and determine their expectations for the project. These structured interviews were tape recorded and compiled to prepare a status report on all the cities' efforts. The conclusions of this report stated that the original workplan will be modified to:

- account for the high degree of technical competence of the city staff in one of the home energy audit techniques (i.e., infrared

aerial photographs, infrared scans, walk through audits);

- emphasize the establishment of city goals and plans for energy conservation; and
- assist cities coordinating the various government and non-government energy conservation efforts.

In response to the conclusions of this report, the CEC staff developed a one day Community Energy Conservation Workshop for the CEC cities' energy coordinators. The workshop agenda (Figure 6) was designed to address both managerial and technical aspects of community energy conservation planning.

The Role of Cities in Energy Conservation

The first presentation dealt not only with an ideal city program but also the relationship of the Texas EES programs to the State Energy Conservation Plan (SECP) and the then proposed National Energy Act. The SECP is a program currently funded by DOE but conceived by the portion of DOE that used to be FEA. The goal of the program is to reduce energy conservation by 5% by 1980. All 50 states received grants to develop and implement SECP's.

The Governor's Office of Energy Resources (GOER) is reponsible for implementing the Texas SECP. One of the eleven program areas in the plan is local government. As part of the program, the GOER grants cities money for innovative energy conservation programs. Another program area of the SECP is thermal and lighting standards. Under this program, local governments received grants to adopt energy efficient building codes. As part of the then proposed State Energy Management Planning Act, the EES and SECP were to be combined. However, the actual form of this

Figure 6

Workshop Agenda

DESIGNING A COMMUNITY ENERGY CONSERVATION PLAN
August 17, 1978
Room 101 Texas A&M at Dallas

| | |
|---|---|
| 9:00 a.m. | INTRODUCTION<br>"The Role of Cities in Energy Conservation"<br>Rich Kerbel<br>Project Director<br>Community Energy Conservation Program<br>Texas Energy Extension Service |
| 10:15 a.m. | BREAK |
| 10:30 a.m. | "Building Support for Your Community Conservation Plan"<br>Don C. Moore<br>Director<br>Center for Urban Programs |
| 12:00 Noon | LUNCH |
| 1:15 p.m. | "Energy Conservation Techniques Roundtable"<br>Walt Patterson, Moderator<br>Dallas/Ft. Worth Area Office<br>Texas Energy Extension Service |
| 2:30 p.m. | BREAK |
| 2:45 p.m. | "Energy Conservation Information Distribution"<br>Charlene Clark<br>Energy Information Specialist<br>Texas Energy Extension Service |
| 3:45 p.m. | "What's Next in the Community Energy Conservation Project?"<br>Rich Kerbel |

combination was not clear.

The National Energy Act (NEA) is composed of five bills concerning natural gas pricing, utility rate reform, energy taxes, coal conversion and energy conservation. The areas of the Act that relate to natural gas pricing, energy taxes and energy conversion are to be controlled and implemented by the federal government. However, the energy conservation and utility rate reform aspects of the Act call for certain implementation activities at the State and local government level.

The section relating to natural gas conservation allows for gradual removal of price controls by the year 1985 when natural gas will be priced at its market value. However, it is unlikely that the energy bill will affect the local price of natural gas or electricity; Texans are already paying at or near the future market rate.

The tax portions of the NEA, beginning in 1980, steadily increases the tax on "gas guzzlers" to encourage purchase of fuel-efficient vehicles. This section also gives tax credits to individuals and businesses that either install energy conservation measures, such as insulation, or convert to renewable energy sources, such as solar or wind.

The NEA requires power plants and major raw-energy consuming industrial facilities built after 1977 to use coal or alternative sources and to consider new rate structures which could encourage energy conservation. The conservation section of the Act makes funds available for local governments to conduct energy audits of public buildings.

Building Support for Your Community Conservation Plan

The second presentation trained the energy coordinators how to perform a staff role in local government. Persons without departmental

responsibility who offer suggestions on how to improve a department often find their suggestions not accepted. The presentation discussed different methods to circumvent this resistance.

Energy Conservation Techniques Roundtable

The first afternoon session related to the specifics of community energy conservation. The "Roundtable" featured presentations from City of Garland officials on how they use infrared aerial thermography and the problems they encountered implementing an energy efficient building code.

Energy Conservation Information Distribution

The final presentation introduced the energy coordinators to the capabilities of the Texas EES central office. Information was distributed on films, pamphlets, and other mass media materials available to the cities.

An evaluation found the the participants felt the workshop had been helpful in the development of their cities' energy conservation program. However, future assistance efforts would have to meet individual city needs. Therefore, the rest of the CEC program is designed to provide continuing assistance to the cities' staff.

## Provide Continuing Assistance

The first continuing assistance effort provided individual assistance to each of the cities in developing their own community energy conservation plan. As a result of these efforts:

> Waco is developing an agenda for an environmental commission to lead the city energy conservation

> program. The program will be initiated by developing a community energy profile showing where energy is used within the community.
>
> Denton is restructuring its conservation program, beginning with moving program coordination from the utility department to the city manager's office. The move should enable the city energy coordinator to work with all of the city's energy concerns.
>
> Grand Prairie is considering using its nationally recognized code enforcement program for the rehabilitation of existing buildings. The program will also include provisions for the increasing traffic efficiency of major streets.
>
> Texarkana is expanding the existing residential audit program to include comprehensive energy planning for the future. City goals for the year 2000 will include an energy segment.
>
> Garland is completing the development of a community energy profile, which will serve as a baseline for future activities, such as the infrared-thermography program. A citizens committee is directing the program. [6]

The CEC also sponsored a life-cycle cost-benefit analysis seminar for city purchasing agents. This seminar explained how to figure the payback period for implementing energy conserving changes and how to explain to elected officials that a higher initial cost but more efficient piece of equipment may be cheaper in the long run than a lower initial cost and less efficient one.

The intern also assisted the CEC cities in preparing grants for the second round of Innovation Energy Conservation Grants from the GOER. Both Garland and Texarkana received new grants while Denton and Waco obtained extensions on their first year grants.

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[6] Rich Kerbel. "Energy Conservation Programs." Texas Energy and Mineral Resources Volume 5 Number 3, College Station, Texas: Center for Energy and Mineral Resources at Texas A&M University, February, 1979, p. 1.

Recently, the intern attended a meeting of representatives of all the EES states serving local governments. He is currently transferring information received at the program to the CEC cities through office visits, correspondence, and telephone calls.

## Project Evaluation

The success of any project promoting energy conservation is dependent on numerous outside factors. The current situation in Iran and the rise of energy prices increases the general public's concern about energy consumption. In the long run, the true judge of the effectiveness of the CEC depends on how firmly the energy conservation program is entrenched in the city organization.

At the beginning of the CEC project, only one of the CEC cities had a program with components in each of the five ideal local government program areas. Now, two more of the CEC cities have complete programs. The other two cities' energy conservation programs are expanding but do not include activities in all five areas. Even though local governments are under extreme pressure to reduce expenditures, all five of the CEC cities have either enhanced or maintained their energy conservation programs.

## Evaluation of Intern's Role

The intern's experiences with the CEC allowed him to develop expertise in an area where he previously had none. As energy becomes more costly, most local governments will develop some community energy conservation program. The intern will be well-equipped to manage these programs in a local government where he is employed.

This program also enhanced the intern's ability to work with state and federal government officials. Because of the similarity in goals between EES and SECP, the intern maintained constant communication with the GOER. The contacts developed here will be invaluable in the future for securing grants for future Center or local government effort. The meetings in Washington, D. C. with DOE officials allowed the intern to be introduced to the grantsmanship on a federal level.

# CHAPTER V

# DENTON STREET INVENTORY[7]

As part of the Texas Innovation Group, Denton city officials participated in a city assistance needs analysis in the summer of 1977. This needs analysis confirmed the city staff's perception that improvement of the city street system was a high priority. In the spring of 1978, the city staff met with representatives of the Center for Urban Programs to define a program for a ranking of the street repair needs. The Center staff designed a research project to meet this need. A contract between the City and the Center to perform the project was signed in the fall of 1978. The objectives of this study were to:

- develop a system for priority ranking of the maintenance needs of the city streets;
- perform the ranking on 40 representative miles of city streets; and
- train the city staff on how to conduct the inventory.

## Tasks

The research proposal submitted to the City in September, 1978 outlined the following eight tasks for successful completion of the project.

Task 1: Literature Search

Task 2: Assemble Street Design Information from City Records

Task 3: Design Inventory Procedure and Select Streets for Inventory

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[7] This chapter is adapted from the final project report currently in draft form.

Task 4: Pre-Test Inventory Procedures with a Site Visit

Task 5: Review Results of Preliminary Inventory and Adjust Inventory

Task 6: Conduct Inventory of Major Thoroughfares

Task 7: Analysis of the Data and Report to the City on Results of Inventory

Task 8: Train City Staff in the Use of the Inventory

## Project Organization

The intern served as principal investigator for the Denton project. He supervised the work of a graduate research assistant who conducted the literature search. Both the assistant and the intern conducted the inventory. The main city contact for the intern was the City Engineer, however, initial negotiation was with the Assistant City Manager and the City Manager. Professor M. D. Jones of the Civil Engineering Department provided assistance throughout the project on problems with city street maintenance.

## Methodology

Denton presently determines maintenance needs through an informal system. Either street condition complaints are logged and answered in chronological order or street supervisors driving the streets develop maintenance priority lists. However, these informal procedures lack an objective method for determining the maintenance needs of the streets relative to each other.

Since street conditions constantly change due to weather conditions, a system requiring expensive time-consuming tests is not acceptable. By

the time all the streets are completed, the first streets inventoried may be in a markedly different condition. Therefore, the Center designed an inventory form which is completed quickly and easily, yet thorough enough to give a relative ranking among the streets inventoried.

## Street Inventory Forms

The research team consisting of the intern and the graduate research assistant, investigated several methods of conducting the inventory. They sought an inventory that surveys only surface conditions since analysis of street surface conditions also gives an estimate of street base conditions. The researchers found several Texas cities maintain a physical street inventory, but these inventories only describe the surface conditions in terms of riding quality. These inventory procedures do not offer a method for establishing a maintenance priority from the street surface condition. The Roadway Maintenance Evaluation User's Manual,[8] developed by the Texas Transportation Institute for the Texas Highway Department, proposes such a system. The manual describes a procedure for inventorying State-maintained roads which are more rural than city streets. For use in Denton, the researchers adapted the procedure for city streets. The inventory consists of three forms.

### Form A

Form A (Figure 7) includes data on location and functional adequacy. The location of the street is defined by the street name and the names

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[8] J. A. Epps; A. H. Meyer; I.E. Larrimore, Jr. and H. L. Jones. Roadway Maintenance Evaluation User's Manual. (College Station, Texas: Texas Transportation Institute), September, 1974.

Figure 7

STREET INVENTORY DATA FORM A:

LOCATION

Street Name:_____

From:_____

To:_____

Section #:_____

Length of Section:_____

FUNCTIONAL ADEQUACY

Roadway Width..... _____

Number of Lanes..... _____

Median Width..... _____

Parking on Street.....Yes_____ No_____

Sidewalks.....Yes_____ No_____

Location .....Back of Curb___Detached___

24 Hour Traffic Volumes (ADT)..... _____

Drainage: Storm Sewer..... _____

Unpaved Side Ditch..... _____

Curb & Gutter..... _____

V Gutter..... _____

Paved Side Ditch..... _____

Comments:

Total Distress Points_____
(From second page)

of intersecting streets which form the boundaries for the particular street segment being inventoried. Each section eventually is assigned a section number to help keep the inventory forms in order without consulting a map. Section length indicates the mileage of roadway inventoried.

The functional adequacy information recorded on Form A consists of the roadway width, as measured from back to back of curb, number of lanes and median width. The roadway and median width should not be measured, but approximated using the Denton typical street cross sections found in the Denton Comprehensive Plan[9] or the inspector's knowledge of typical street sections. Whether parking is permitted on the streets or sidewalks is also recorded. Finally, when available the twenty-four hour average annual daily traffic volume (ADT) and the method of storm water drainage is also indicated.

Form A provides the evaluator ready access to the information needed for setting priorities if the maintenance ranking shows streets in approximately the same condition. The form is not meant to substitute for accurate physical street inventory.

Forms B and C

The use of Form B or C depends on whether the street being inventoried is flexible or rigid pavement. Both forms record the surface condition of the streets and the history of the street's construction and maintenance. Also indicated on the forms is a ranking of one through four for the overall riding quality of the street. The ranking is defined as follows:

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[9] Denton Community Development Department. Denton: A Twenty Year Comprehensive Plan 1974-1994. (Denton, Texas: City of Denton), 1974.

1 - No problems in driving the speed limit.

2 - Some roughness and bumpy ride when driving the speed limit.

3 - Difficult to handle the car when driving the speed limit. In some situations forced to drive slower than speed limit.

4 - Impossible to drive the speed limit.

The ranking of the different types of surface conditions or distress includes three categories relative to the severity of distress and three relating to the extent. The categories of severity, slight, moderate, and severe, while given the same titles, are defined differently for each types of distress. However, the extent rankings all refer to the percent of street area over which the distress occurs; they are defined:

1-15% - Distress occurs only in a small section of the street.

16-30% - Distress occurs in more than just isolated sections but not continually.

30% - Distress occurs continually.

The percentage figures are used only as a guide not as an exact measure. If a one mile section of street has two one-tenth mile sections with alligator cracking, then the 16-30% column should be checked. The inspectors cannot maintain a reasonable speed in surveying and still keep detailed records of lengths of sections with a particular distress. Therefore, the definitions above should be used as guidelines.

The definitions for the eight types of distress identified on the flexible pavement form, Form B (Figure 8), are listed below:

Rutting

Slight - A shallow but obvious depression in the pavement parallel to the side of the street where the wheels of a car normally travel.

Figure 8

STREET INVENTORY DATA FORM B:

FLEXIBLE PAVEMENTS

STRUCTURAL ADEQUACY

Date of Construction..... _____

Date of Last Major Maintenance..... _____

a) Surface Overlay..... _____

b) Seal Coat..... _____

c) Crack & Joint Maintenance... _____

Riding Quality: ___1; ___2; ___3; ___4

| Type of Distress | | Percent of Area 1-15% | 16-30% | 30% |
|---|---|---|---|---|
| Rutting (grooving, channeling) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Raveling (surface disintegration) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Flushing (bleeding) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Corrugations (wash board) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Alligator Cracking (map or chicken wire cracking) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Longitudinal Cracking | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Transverse Cracking | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Cracks | Sealed | | | |
| | Partially Sealed | | | |
| | Not Sealed | | | |
| Patching (repairs) | Good | | | |
| | Fair | | | |
| | Poor | | | |

Total Points _____

Moderate - A similar depression approximately one half inch to one inch deep but not deep enough to prevent easy steering of the car.

Severe - A depression deep enough to prevent easy steering of the car.

Raveling

Slight - Some breaking up of the street surface with obvious loose pieces of fine aggregate.

Moderate - Breaking up of the street surface with some loose pieces of large aggregate.

Severe - A rough surface with numerous loose pieces of large aggregate.

Flushing

Slight - Portions of the pavement surface where the aggregate has begun to be obscured by excess asphalt.

Moderate - Portions of the pavement surface where the aggregate is obscured by excess asphalt.

Severe - Total obscuring of the aggregate by excess asphalt.

Corrugations

Slight - Ripples in the pavement perpendicular to the direction of traffic obvious to the eye but not big enough to create a bumpy ride.

Moderate - The same ripples big enough to create a bumpy ride but not big enough to cause a driver to reduce speed.

Severe - The same ripples significant enough to cause a driver to reduce his speed.

Alligator Cracking

Slight - Pavement cracks just barely visible which form a pattern similar to an alligator's skin.

Moderate - Similar cracks greater than one quarter inch wide in parts but not big enough to cause a complete separation between sides of the cracks.

Severe - Similar cracks big enough to have complete separation between both sides of the cracks.

Transverse Cracking

Slight - Cracks perpendicular to the direction of traffic that have just begun to form.

Moderate - Beginning separation between the sides of a crack perpendicular to the direction of travel but not wide enough to allow for bond to be broken.

Severe - Cracks perpendicular to the direction of travel wide enough to break the bond between both sides.

Longitudinal Cracking

Slight - Visible cracks parallel to the direction of travel but no apparent separation between sides.

Moderate - Beginning separation between the sides of a crack parallel to the direction of travel but not wide enough to allow for bond to be broken.

Severe - Cracks parallel to the direction of travel wide enough to break the bond between both sides.

Cracks

In this section the inspector indicates whether maintenance crews

sealed, partially sealed, or did not seal the cracks noted above.

Patching

Good - A patch level with the rest of the street and showing no signs of deterioration.

Fair - A patch beginning to deteriorate but still able to be driven smoothly at a reasonable speed.

Poor - A patch with obvious deterioration or an unpatched pothole.

The definitions for the six types of distress for the rigid pavements form, Form C (Figure 9), are as follows:

Surface Deterioration

Slight - Visible indications of some surface deterioration.

Moderate - Deterioration significant enough to expose some large aggregate.

Severe - Most of the large aggregate exposed.

Spalling

Slight - Visible indication of flaking occurring at corners or joints.

Moderate - Flaking to the extent that pieces of concrete are missing from the surface at joints or corners.

Severe - Flaking enough to affect riding quality at joints.

Longitudinal Cracking

Slight - Visible cracks parallel to the direction of travel but no apparent separation between sides.

Moderate - Beginning separation between the sides of a crack parallel to the direction of travel but not so wide

Figure 9

STREET INVENTORY DATA FORM C:

RIGID PAVEMENTS

STRUCTURAL ADEQUACY

Date of Construction

Date of Last Major Improvement of Reconstruction:

a) Crack and Joint Maintenance . . . . . .

b) Surface Overlay . . . . . .

Riding Quality: ___1; ___2; ___3; ___4

| Type of Distress | Extent | Percent of Area 1-15% | 16-30% | 30% |
|---|---|---|---|---|
| Surface Deterioration (scaling, raveling, pop-out) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Spalling (corner breaks) | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Longitudinal Cracking | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Transverse Cracking Joint Spacing ≥ 20' ___ <20' ___ | Slight | | | |
| | Moderate | | | |
| | Severe | | | |
| Patching (repairs) | Good | | | |
| | Fair | | | |
| | Poor | | | |
| Joints | Sealed | | | |
| | Partially sealed | | | |
| | Not sealed | | | |

Total Points ____

as to allow the bond to be broken.

Severe - Cracks parallel to the direction of travel wide enough to break the bond between both sides.

Transverse Cracking

The severity of the damage done by transverse cracks depends on the joint spacing. Therefore, the form provides for recording whether the spacing is greater or less than 20 feet.

Slight - Visible cracks perpendicular to the direction of travel but no apparent separation between sides.

Moderate - Beginning separation between the sides of a crack perpendicular to the direction of travel but not wide enough to allow for bond to be broken.

Severe - Cracks perpendicular to the direction of travel wide enough to break the bond between both sides.

Patching

Good - A patch level with the rest of the street and showing no signs of deterioration.

Fair - A patch beginning to deteriorate but still able to drive smoothly at a reasonable speed.

Poor - A patch with obvious deterioration or an unpatched pothole.

Joints

Whether the joints are partially sealed, sealed, or unsealed is recorded on the form.

## Selecting an Evaluation Team

The purpose of the inventory is to determine a relative ranking of

the streets. Therefore, the two person inspector/evaluator team must rank the streets consistently. The driver of the inventory vehicle is primarily responsible for observing street conditions and calling the conditions out to the recorder. The driver must keep the speed of the inventory slow enough (ten miles per hour or less) to allow the recorder to observe the street conditions and record the data. An ideal team consists of persons familiar with street design procedures and maintenance methods. The team should first inspect streets inventoried previously to allow them to refine their procedure on how to record the data. Also, they can use the previous inventory to determine how their rankings compare to previous rankings. The inventory vehicle needs flashing lights for safety. It should have good visibility from both the driver and passenger seat.

## Selecting the Streets

In selecting the streets, give priority to those streets for which the city needs to determine maintenance priorities, for example, those that are most likely to need repair. However, a representative sample of the rest of the city streets including one or two arterials, collectors, and local access streets in both good and bad condition should be included.

## Determining the Section

After selecting the street to be inventoried, the evaluation team determines the roadway section boundary based upon the following criteria:

- Limits of past or present construction projects;
- Limits of seal or overlay projects;
- Changes in roadway geometrics
  a) from two-lanes to four-lanes or visa versa -

b) from four-lane divided to form one lane undivided or visa versa -

c) from urban to rural area -

d) from roadway with curb and gutter section to roadway without curb and gutter or visa versa; and

- Significant changes in visual appearance of the pavement or traffic characteristics.

## Evaluating the Results

After completing the inventory, the evaluation team ranks the streets by determining the distress points for each street. Distress points are determined using the keys for Forms B and C (Figure 11 and Figure 12). Points are assigned for each box checked during the inventory, added and recorded on each form. On Form B, the evaluator must remember to assign the proper points for longitudinal and transverse cracking depending on whether the cracks are sealed, partially sealed, or not sealed. For Form C, the points for transverse cracking vary depending on the joint spacing. However, points do not differ whether the cracks are sealed or not because once the bond is broken in rigid pavement, sealing the crack will not reestablish the bond.

When all the inventoried streets are ranked, the results are tabulated as shown below:

Figure 10

Summary Sheet

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume (ADT) | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | From | To | | | | | | | |
| | | | | | | | | | |

Figure 11

Key To

STREET INVENTORY DATA FORM B:

FLEXIBLE PAVEMENTS -

STRUCTURAL ADEQUACY

Date of Construction..... _____

Date of Last Major Maintenance..... _____

a) Surface Overlay..... _____

b) Seal Coat..... _____

c) Crack & Joint Maintenance... _____

Riding Quality: ___1; ___2; ___3; ___4

| Type of Distress | | Percent of Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1-15% | | | 16-30% | | | 30% | | |
| Rutting (grooving, channeling) | Slight | 0 | | | 2 | | | 5 | | |
| | Moderate | 5 | | | 7 | | | 10 | | |
| | Severe | 10 | | | 12 | | | 15 | | |
| Raveling (surface disintegration) | Slight | 5 | | | 8 | | | 10 | | |
| | Moderate | 10 | | | 12 | | | 15 | | |
| | Severe | 15 | | | 18 | | | 20 | | |
| Flushing (bleeding) | Slight | 5 | | | 8 | | | 10 | | |
| | Moderate | 10 | | | 12 | | | 15 | | |
| | Severe | 15 | | | 18 | | | 20 | | |
| Corrugations (wash board) | Slight | 5 | | | 8 | | | 10 | | |
| | Moderate | 10 | | | 12 | | | 15 | | |
| | Severe | 15 | | | 18 | | | 20 | | |
| Alligator Cracking (map or chicken wire cracking) | Slight | 5 | | | 10 | | | 15 | | |
| | Moderate | 10 | | | 15 | | | 20 | | |
| | Severe | 15 | | | 20 | | | 25 | | |
| Longitudinal Cracking | Slight | 2 | 5 | 8 | 3 | 7 | 12 | 5 | 10 | 15 |
| | Moderate | 5 | 8 | 10 | 7 | 12 | 15 | 10 | 15 | 20 |
| | Severe | 8 | 10 | 15 | 12 | 15 | 20 | 15 | 20 | 25 |
| Transverse Cracking | Slight | 2 | 5 | 8 | 3 | 7 | 10 | 3 | 7 | 12 |
| | Moderate | 5 | 8 | 10 | 7 | 10 | 15 | 7 | 12 | 15 |
| | Severe | 8 | 10 | 15 | 10 | 15 | 20 | 12 | 15 | 20 |
| Cracks | Sealed | S | PS | NS | S | PS | NS | S | PS | NS |
| | Partially Sealed | | | | | | | | | |
| | Not Sealed | | | | | | | | | |
| Patching (repairs) | Good | 0 | | | 2 | | | 5 | | |
| | Fair | 5 | | | 7 | | | 10 | | |
| | Poor | 7 | | | 15 | | | 20 | | |

Figure 12

Key To

STREET INVENTORY DATA FORM C:

RIGID PAVEMENTS

STRUCTURAL ADEQUACY

Date of Construction

Date of Last Major Improvement of Reconstruction:

a) Crack and Joint Maintenance . . . . . _____

b) Surface Overlay . . . . . _____

Riding Quality: ___1; ___2; ___3; ___4

| Type of Distress | Extent | Percent of Area | | |
|---|---|---|---|---|
| | | 1-15% | 16-30% | 30% |
| Surface Deterioration (scaling, raveling, pop-out) | Slight | 5 | 10 | 20 |
| | Moderate | 10 | 20 | 30 |
| | Severe | 20 | 40 | 60 |
| Spalling (corner breaks) | Slight | 5 | 10 | 15 |
| | Moderate | 10 | 15 | 20 |
| | Severe | 20 | 40 | 60 |
| Longitudinal Cracking | Slight | 5 | 10 | 15 |
| | Moderate | 10 | 15 | 20 |
| | Severe | 15 | 20 | 25 |
| Transverse Cracking Joint Spacing <20' ___ >20' ___ | Slight | 5/0 | 10/5 | 20/10 |
| | Moderate | 10/5 | 20/10 | 30/20 |
| | Severe | 15/10 | 30/15 | 40/30 |
| Patching (repairs) | Good | 0 | 2 | 5 |
| | Fair | 5 | 7 | 10 |
| | Poor | 7 | 15 | 20 |
| Joints (Information) | Sealed | | | |
| | Partially sealed | | | |
| | Not sealed | | | |

The table lists the streets in descending order with those streets having the highest number of distress points first and the lowest number last. The streets are divided into three categories: streets that need no maintenance at this time, streets that if maintained their useful life will be extended, and streets that are deteriorated to the point that complete reconstruction is needed.

Using a hypothetical flexible pavement street, the researchers determined that the division between the first and second categories is 10 distress points and between the second and third categories is 50 points. The city staff may determine new dividing points after they conduct the inventory for several years and determine how to adjust the numbers. Because of the lack of Rigid Pavement streets, the researchers did not establish similar categories for this type of pavement.

After dividing the streets into categories, priority for either reconstruction or maintenance is given to the high point over low point streets, arterials over collectors and subdivision streets, older over newer streets, and busier streets over less busy streets. By using the structural description on Form A and current costs, the City staff can develop cost estimates to determine how many streets can be improved in one year. City staff engineers or a consulting engineer should prepare the design for street improvement projects in the third or major reconstruction category.

## Results

Of the streets inventoried, the researchers found 2.2 miles of Flexible Pavement Streets needing no immediate maintenance, 25.4 miles needing maintenance, and 9.4 miles needing reconstruction. The 1.9 miles

of rigid pavement streets inventoried needed no maintenance. The Denton Street Inventory Summary Sheets are in Appendix A.

## Recommendations

The researchers recommended the following courses of action to the City of Denton:

### Conduct the Inventory Yearly

The street conditions constantly change. The results from the inventory conducted during December, 1978 and January, 1979 were accurate then but the following year when the city decides maintenance priorities a new inventory could result in different priorities. If the City conducts yearly inventories comparing the results from one year to the next, the results will yield a rate of deterioration. This deterioration rate is another factor to consider when assigning priorities.

### Establish A Complete Physical Street Inventory

While conducting the inventory for this project, the researchers found incomplete and inaccessible city street records. The city can not easily retrieve from their records, street or right-of-way widths, street sign locations, and other information needed for street project design. The City should adopt a physical inventory procedures and consider computerizing the information. All street maintenance and construction operations must be recorded in this system or the inventory will be hopelessly out of date in a short time.

### Establish Yearly Budgets for Street Maintenance and Reconstruction According to the Inventory Results

Unless the City takes action in repairing the streets, an annual

inventory will serve no purpose but recording the decline of street conditions. If the city budgets street maintenance and reconstruction funds similar to the Capital Improvement Budget, eventually, properly planned street maintenance can reduce the number of streets requiring reconstruction.

Develop Comparative Street Inventory Data With Other Texas Cities

The Texas Innovation Group, a consortium of Texas cities, will conduct an inventory similar to Denton's in several Texas cities. By comparing the condition of a city's streets with its maintenance budget, a performance measure will be developed. Comparing a city's performance measure to that of other Texas cities can assist city officials in determining whether they are making cost-effective expenditures.

## Project Evaluation

The City received a tool for comparing the maintenance needs of different streets. The city staff indicates they will conduct the similar inventories in the future to assign maintenance priorities.

Until the City inventories more rigid pavement streets, it cannot make objective maintenance decisions due to lack of comparative data.

An indication that the project fulfills a need are requests for similar studies from other cities. Since the Center announced the availability of the street inventory study, city officials of the Texas Innovation Group decided to sponsor training sessions for member cities on conducting street inventories.

## Evaluation of Intern's Role

The Denton Street Inventory Project and the Community Energy Conservation Project were two major projects where the intern had technical and managerial charge. In contrast to the Energy project, which was part of a larger program, this project was the sole responsibility of the intern.

Many engineering courses emphasize scientific decision making but in practice local governments have difficulty in applying these techniques. Political pressures interact with facts if information can not be quantified. For this project, the intern developed an objective decision making tool to substitute for less scientific decisions. In the future, the intern plans to implement the street inventory procedure in cities where he is employed.

# CHAPTER VI

# GARLAND URBAN OBSERVATORY

As discussed in Chapter III, the intern served as a liaison between faculty researchers and city officials. For the Garland Urban Observatory the Center staff directs the efforts of university researchers studying city policy issues. The intern performed this function in conjunction with the Observatory Director.

## Objectives

The original proposal to establish the Garland Urban Observatory stated that the Observatory exists to:

1) provide an effective means to test the urban extension concept;
2) provide information, concepts, programs and techniques which may be applicable in other cities both in the Dallas area and statewide through relationships already established and others yet to be developed; and
3) enable the identification of extension problems and techniques involved when a city and university (particularly if some distance apart) work together.[10]

## History

In 1968, the Department of Housing and Urban Development (HUD) funded ten cities across the country to develop urban observatories. HUD concluded that the initial experiment needed further testing in cities smaller than the original ten. The City of Garland was one of the ten

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[10] The City of Garland and Texas A&M University. "Consideration as a possible participant in the Department of Housing and Urban Development Urban Observatory Program," (Garland, Texas: City of Garland), September, 1974, p. 4.

small city observatories. The Garland Urban Observatory is unique among the observatories because of the 180 mile separation between the university and the city.

Garland chose the Center as its university partner in the Observatory because of an established working relationship. Both the city manager and assistant city manager served on Center advisory committees and were familiar with the goals and products of the Center.

HUD funded the Observatory for three years. Each funding year the federal funds decreased and the city's funds increased. This funding arrangement was designed to encourage continuation of the Observatory after the third year when federal funding ceased.

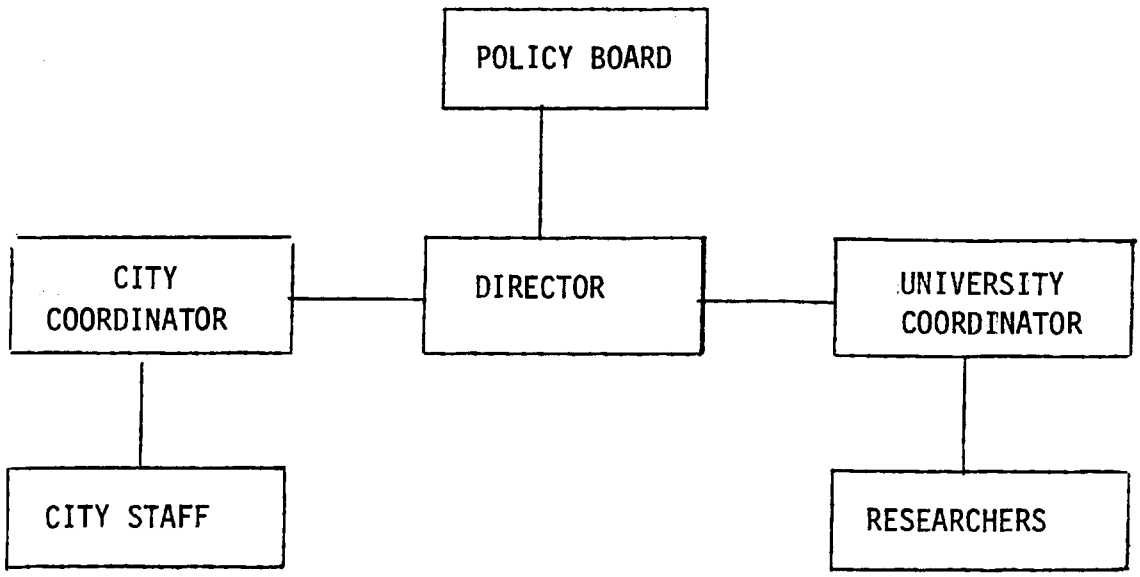
## Organization

The Observatory Policy Board, composed of four city representatives and three university representatives, functions as a review agency for all proposed work and sets the final research agenda. The Board also reviews all final reports, before submission to the city council. During the project, the city representatives on the Board usually included two elected officials, the mayor and a city councilmember, and two city staff members, the city manager and one other. The university representatives on the Policy Board are the Interim Dean of Engineering and the Deans of the College of Liberal Arts and the College of Architecture and Environmental Design.

The Director of the Observatory reports directly to the Policy Board (Figure 13). He is an Assistant Director of the Center for Urban Programs stationed in the Dallas area and manages all Observatory work. He is responsible for maintaining linkages with city officials, city staff

Figure 13

Garland Urban Observatory
Organization Chart



and citizen representatives. The Director performs four functions: 1) advising city officials on implementation of research results; 2) developing individual research projects with the University Coordinator; 3) arranging faculty visits to the city; and 4) assisting city staff in collecting data.

The City Coordinator is appointed by the City Manager. Throughout the project, although individuals changed, the City Coordinator held a high ranking staff position in the city organization. The role of the City Coordinator is to receive all city research requests and forward these requests to the Observatory Director. After a research proposal is developed, the City Coordinator reviews the proposal with the requesting city official. When the Policy Board funds a project, the City Coordinator assists the Director in communicating the City's needs to the researchers.

The University Coordinator manages all university research projects. Historically, the position of the University Coordinator was assigned to an Assistant Director of the Center. The intern, currently serving as University Coordinator, is responsible for proposal preparation and processing, liaison with university members of the Policy Board, identification of appropriate faculty researchers, project administration, and budgetary control.

## Research Projects

For each of the three federally-funded years, the Observatory workplan consisted of five research projects and an evaluation project.

For the first year of all-city funding, the Garland city staff requested the five projects listed below:

- A Profile Study of Library Users
- Officer Intelligence System
- Tree Policy for Undeveloped Land
- Comprehensive Communication Study (Radios)
- Energy Conservation Plan

However, before final selection of researchers and development of the project proposals, the first three studies were eliminated due to budgetary constraints. The Policy Board reviewed and approved proposals for the latter two projects on May 31, 1978. In addition, another item, the Continuing Education and Technology Identification Project, was requested by the city manager and included in the workplan. This project funded one week visits by faculty members to identify areas for the city to consider improving operations.

After the Policy Board approved the workplan, the intern as University Coordinator and the Observatory Director, prepared the final proposal. The proposal identified the University Coordinator and Observatory Director as principal investigators to designate management responsibility for the research projects.

Communication System Evaluation

The university researchers on the Communications System Evaluation Project were Professors Willis and Beasley of the Electrical Engineering Department. For funding purposes, the project was divided into two parts.

Phase One objectives were:

- to describe the present system
- to determine present city communication needs
- to propose short term suggestions for improvement

The Objectives of Phase Two were:

- to evaluate the long term city communication needs
- to develop a long term plan for the communications.[11]

The researchers completed both phases of the project. The Phase One report identified three problems with the City's communication system: 1) traffic on three city radio channels exceeding capacity; 2) inadequate City phone system during peak loads; and 3) a lack of coordination in City communication systems planning.

The Phase Two final report recommended the City:

1) Add new duplex UHF frequency to city government radio
   a) move electric departments to the new frequency
   b) move other city departments (approximately 40 mobile units) from KAZ 415 to KUL 749
2) Begin initial and refresher training programs for all persons who use radios.
3) Procure and install digital radio identification/ status reporting system in Sanitation Department vehicles. Estimated cost $7,000.
4) Limit number of pagers each department can have.
5) Add an additional UHF Duplex Channel in 1988.
6) Install an automatic telephone computer controlled exchange.
7) Institute a department alert scheme for major emergency or disasters.
8) Create a Director of City Communication Services headed by a part-time administrator.
9) Establish a contract for all maintenance necessary for designed City communication system
   a) hire one full-time radio repair technician
   b) institute a 5 percent spare capability for all mobile radios
10) Make individuals accountable for equipment damage due to negligence.
11) Develop an emergency communication dispatch center and install stand-by power at C.E. Newman transmitter site.[12]

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[11] Center for Urban Programs. Garland Urban Observatory. (College Station, Texas: Texas A&M Research Foundation), June 14, 1978, pp. 9-10.

[12] Giles W. Willis, Jr. and William L. Beasley. Rough Draft of the Final Report on the City of Garland Communication System. (College Station, Texas: Center for Urban Programs), February, 1979, unnumbered.

## Evaluation of Energy Use Patterns

Professor Richard G. Moore of the Environmental Design Department served as university researcher on the Evaluation of Energy Use Patterns Project. The objective of the study was to identify the energy users in Garland, what types of energy they used, and the impact of declining fuel supplies on the city. Although project funding is completed, the final report is still in rough draft form. The research findings show that Garland's critical energy consumption areas are electrical generation and transportation.

## Current Status

The Observatory's fourth year will also be its last. The closing of the Observatory operations is the conclusion of several organizational changes within the City and not indicative of project accomplishments. Both the City Manager and Assistant City Manager, who were instrumental in starting the Observatory, left the City's employ during the last federally funded year. The Assistant City Manager left on his own volition to become city manager in another Texas city. However, the city council terminated the employment of the City Manager.

The terminating of a city manager while not typical is not an unusual way for a manager to leave a city. Frequently, this termination is not due to a manager's incompetence, but to a conflict between a newly-elected city council and the policy of a former council which the manager is implementing. This was the case in Garland.

The new City Manager's idea of coordination with the university was for individual city departments to use their departmental funds to support research. This policy is contrary to the "Urban Observatory"

concept of reserving a portion of the City's general funds exclusively for university research. He hired a new employee as part of the City staff to perform in-house research on productivity improvement.

## Research Projects Evaluation

Despite the closing of the Observatory, the fourth year research projects will provide needed information. The Communication Study, although not in final form, is already influencing City policy. The City consulted with the researchers before purchasing radios to insure that they were consistent with the report's final recommendations.

The Energy Use Study has not been as successful as the Communications Study. The researcher misinterpreted the City's needs and the concept of applied research. His initial drafts of the final report attempt to explain a theoretical model of how cities are influenced by limited fossil fuel supplies. The researcher did not comprehend that Garland wanted specific information which should be understood easily by non-scientist, non-engineer, non-architect, city councilmen. Due to five revisions of the report translating scientific language into layman's terms, the delivery of the final report to the City is already delayed four months. Currently, the Center staff, in conjunction with the researcher, is preparing a final draft of the report.

The City staff, though frustrated by the delay, understands that the problem is project specific and not indicative of the Center's or Texas A&M's ability. The intern received assurances from the City that the project will not adversely affect the Center's credibility or limit future work with the City of Garland.

## Evaluation of the Intern's Role

The problems of the Energy Use Study tested the intern's ability to manage a research project. Throughout the project, he interpreted city needs for the researcher. The intern thought he adequately explained the city's needs but each draft of the report only indicated slightly increased awareness by the researcher. To determine the cause of the problem, the intern evaluated his own performance with his supervisor and co-workers. The group's consensus was that the intern had sufficiently performed the role of University Coordinator.

# CHAPTER VII

# BUDGET FORECASTING SYSTEM

Each year the Center is appropriated only enough funds to cover a portion of its total operating costs. Research funds secured from federal, state and local governments cover the rest of the costs. In effect, the Center starts each year with a budget deficit. The purpose of the Budget Forecasting System is to help the Center Director estimate whether or not the Center has secured enough research to cover the costs of operation.

## Objective

The objective of this project was to develop a managerial accounting system documenting all the Center's costs, commitments and secured research funds. The budget forecasting system translates the myriad of forms the Center receives to a concise statement of the Center's financial status.

## Tasks

The intern developed the following tasks to complete the project to:

- to understand University accounting systems that affect the Center;
- to develop accurate Center expenditure records; and
- to estimate future expenditures and commitments.

As with most administrative functions, accounting is a dynamic process. Everyday the Center's financial situation changes and the appropriate changes must be recorded. To describe the Budget Forecasting System developed by the intern, this chapter is organized according to the tasks listed above.

## University Accounting Systems

### Texas Engineering Experiment Station

The Texas Engineering Experiment Station (TEES) is responsible for administering three funding sources: the Center's state-allocated dollars, interagency contracts between the Center and another state agency, and matching funds when appropriate. The Center's state dollars are a portion of TEES' state-allocated dollars determined by the TEES administration. For the current fiscal year (September, 1978 - August, 1979) the Center's state dollar allocation is $50,000. For the previous fiscal year, the Center's appropriation was $70,000.

### Texas A&M Research Foundation

The Texas A&M Research Foundation is a non-profit corporation directed by the Texas A&M University Board of Regents. The Foundation exists to encourage funded research at Texas A&M. The Foundation processes all Center research funds except those from state government agencies. Center staff salary and fringe benefits charged to a Research Foundation project are first charged to TEES which then bills the Research Foundation. All other expenditures are charged directly to the Research Foundation.

### Texas Engineering Extension Service

The Texas Engineering Extension Service (TEEX) controls some Center research projects funded by state government agencies. For these projects, all charges are made directly to TEEX.

The Organizational Control of Center Research Projects chart

(Figure 14) documents the organizational responsibility for each project.

Monthly Accounting Reports

Each month the Center receives reports which detail expenditures, encumbrances, allocations, and balances of the following categories for each project: Salaries, Wages, Fringe Benefits, Supplies, Travel, Data Processing, Other Operating Expenditures, and Overhead.

The Business Office of Engineering Services (BOES) prepares monthly accounting sheets for both TEES and TEEX. The Center receives these sheets the first week of each month reflecting the previous month's expenditures except for overhead. Overhead is not recorded until charged by the University Fiscal Office several months after the salaries and wages are paid. Overhead is not charged at all for salaries and wages paid by State dollar projects. The TEES sheets also identify charges for salaries and wages on Research Foundation projects.

The Center receives the Research Foundation monthly accounting sheets during the first two weeks of the month. These sheets account for the previous month's charges except for salaries, wages, fringe benefits, and overhead which are delayed one month.

Center Annual Budget Estimates

Each year the Center staff prepares a budget estimating total expenditures for the coming fiscal year. The TEES sheets list this budget as Unallocated Research Dollars. When the Center secures new research funds, the amounts are subtracted from the Unallocated Research Dollars. The past two years, the Center anticipated spending approximately $160,000 which was consistent with the Center's expenditures of $160,775.65 in

Figure 14

Organizational Control of Center Research Projects
(September, 1977 - March, 1979)

| Texas Engineering Experiment Station | Research Foundation | Texas Engineering Extension Service |
|---|---|---|
| El Paso Assembly | Garland Urban Observatory | Animal Control Officers' Training Clinic |
| El Paso Travel | Marshall/Longview Solid Waste | Community Energy Conservation |
| El Paso Data Processing | Planning Texas Innovation Group | |
| City Manager Professional Development | Bellaire Sewer System | |
| Orientation for Boards & Commissions | Garland Solid Waste | |
| Public Technology-Urban Technology System | Longview Routing Study | |
| Animal Control Information Service | Texas Innovation Group | |
| ********** [b] | Texarkana Building Codes | |
| Center Administration | Arthur Young/AACOG | |
| City Manager Matching Funds | Denton Street Inventory | |
| Boards & Commissions Matching Funds | | |
| Texas Innovation Group Matching Funds | | |
| Animal Control Information Service Matching Funds | | |
| Planning Texas Innovation Group Matching Funds | | |

[b] ******* Funds for projects below this line come from the Center's State Dollar Allocation.

Fiscal Year 1977-1978.

## Accurate Expenditures Records

The purpose of developing accurate expenditure records as part of the budget forecasting system is: 1) to determine what funds the Center has to distribute in the future, and 2) to keep the records current. The project budgets list anticipated expenditures but the Center does not always spend the money as planned. The monthly accounting sheets from TEES, TEEX, and the Research Foundation record expenditures, but they do not provide up-to-date information. Therefore, the Center was forced to develop its own records which accomplish both purposes.

### Project Budget Shortcomings

The Center staff prepares project budgets for a proposal two to four months before the project begins. During this interim, the time commitments of staff on the project budget may change so that when the project begins, they cannot work as much as expected, while others may work more. Travel expenditures can also complicate the project's fiscal status. For example, a trip anticipated in the project budget may not be taken or may be combined with a trip for another project and not charged to the first project. Therefore, the Center Director cannot be certain that project funds are spent as anticipated.

### Monthly Accounting Sheets Deficiencies

Even though the Center receives three sets of monthly accounting sheets, none of these provide accurate up-to-date records of a project's financial status. The sheets from TEES on Research Foundation projects

do not record supplies, overhead, travel, data processing, or other expenses. The Research Foundation accounting sheets are two weeks out-of-date by the time they arrive. The TEES and TEEX sheets for their own controlled projects accurately state the project status except for overhead. If the shortcomings of all the sheets were the same, the Center could up-date the sheets when they come. But since each sheet must be treated differently, it is more efficient for the Center to maintain its own records.

For longer projects, five months or greater, the Center receives accounting sheets enough in advance of the project's end to document discrepancies between the budget and actual expenditures. The Director can reprogram remaining project funds when discrepancies are indicated. On shorter projects, two to four months, the Center usually receives only one accounting sheet before the project ends. This sheet is usually received too late to make significant changes in the project funds distribution. Therefore, for short duration projects, it is essential for the Center to maintain its own records.

## Center Records

The Center bases its records on ledger sheets established when a project receives funding. The sheets are designed to have expenditures posted daily. In practice, the Center staff maintains the sheets as time permits rather than on a regular basis. However, in a relatively short time the ledger can be updated. The balance from the individual project ledger sheets are compiled on Project Summary Sheets (Figure 15).

Figure 15

Project Summary Sheet

| | | SALARIES | FRINGE BENEFITS | SUPPLIES | TRAVEL | DPC | OVER HEAD | OTHER EXPENSE |
|---|---|---|---|---|---|---|---|---|
| Denton 3922 | | | | | | | | |
| Total Proj Budget | 4731 | 2504 | 338 | 150 | 1088 | | 651 | |
| Spent as of 3/1 | 3E6486 | 2501.23 | 327 | 210 | 38430 | | 650.32 | |
| remaining til Apr15 | E66 14 | 2.77 | 11 | 14790 | 70370 | | 68 | |
| Avg spent per mo (1) | 12E829 | 833.74 | 109 | 70 | 12810 | | 216.77 | |
| Expenditures per mo to exhaust bal. | | -0- | -0- | 14790 | 70370 | | -0- | |
| TIG 3768 | | | | | | | | |
| Total Proj Budget | 123051 | 67722 | 6696 | 400 | 9800 | 903 | 35215 | 2315 |
| Spent as of 11/30 | 63966 | 37744 | 24.22 | 340 | 5890 | -0- | 16704 | 866 |
| Remaining til Apr 30 3mo | 59085 | 29978 | 4274 | 60 | 3910 | 903 | 18511 | 1449 |
| Avg spent per mo (4) | 9138 | 5392 | 346 | 49 | 841 | 0 | 2386 | 124 |
| Expenditures per mo (5) to exhaust balance | 11818 | 5996 | 855 | 12 | 782 | 181 | 3702 | 290 |
| EES 7311 | | | | | | | | |
| Total Proj Budget | 38763 | 22172 | 2402 | 200 | 2721 | | 10864 | 404 |
| Spent as of 11/30 | 27156 | 15468 | 1402 | 195 | 2343 | | 7318 | 370 |
| Remaining til Mar31 | 11607 | 6704 | 1000 | 5 | 378 | | 3486 | 34 |
| Avg spent per mo | | | | | | | | |
| Exp per mo to exhaust bal | | | | | | | | |

## Future Expenditures and Commitments

To estimate future expenditures, the Center must know the number and salary of employees in the future and anticipate the amount of other expenditures.

### Staff Salaries

The intern and a student worker developed Employee Salary Sheets (Figure 16) to record each employee's past and future salary commitments. Each month a staff member posts on the sheets how an individual's salary is charged. For future months, the sheets indicate projects the employee's salaries will be charged to, pending research proposals which could fund a portion of employee salaries and the portion of the employee's salaries not covered by funded research (unallocated dollars).

### Other Expenses

Other expenses, such as travel, supplies, printing and miscellaneous needs, vary according to the project. For example, a project requiring trips to Washington, D.C. expends more research travel funds than a project in Longview. To determine future monthly expenditures, the Center staff analyzed expenditure records for the past 18 months and found that the Center spends approximately $4,500 per month on other expenses. A sheet similar to an Employee Salary Sheet is maintained for other expenses.

### Fiscal Status

The intern and the student worker developed Budget Status Sheets to summarize all the information from each Center-developed accounting sheet. Instructions on how to complete the Budget Status Sheets are provided in

# Figure 16

## Employee Salary Sheet
## (As of March, 1979)

*for the fiscal year Sept 78 to Aug 79*

| | | September | October | November | December | January | February | March | April | May | June | July | August |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rich Kerbel | | | | | | | | | | | | | |
| State Projects | | | | | | | | | | | | | |
| Urban Studies 9128 | 439 | 127 | | | | | | 312 | | | | | |
| Pref. Dev. Helen 9129 9768 | 1648 | | 127 | | | 2939 6 | 238 @ 13 | 236 @ 13 202 | 238 | 251 @ 14 | 251 @ 14 | | |
| Total State Projects | 2087 | 127 | 127 | -0- | -0- | 293 | 238 | 152 | 238 | 251 | 251 | | |
| Funded Projects | | | | | | | | | | | | | |
| Commissioner Mark 1539 | 824 | | 92 | | | | 89 | 167 | 128 | 128 | 128 | | |
| EES 7311 | 6419 | 917 | 917 | 917 | 917 | 917 | 917 | 917 | | | | | |
| T/S 3768 | 459 | 459 | | | | | | | | | | | |
| Bellaire 3709 | 384 @ 1 | 128 | 128 | 128 | | | | | | | | | |
| Texarkana 3857 | 808 @ 11 | 202 | 202 | 202 | 202 | | | | | | | | |
| Denton 3922 | 1098 @ 20 | | | 219 @ 12 | 347 @ 19 | 531 @ 29 | 590 | | | | | | |
| Arlington Youth Center 3913 | 1101 @ 20 | | 267 | 367 | 367 | | | | | | | | |
| Dept 1637 | | | | | | 92 | | | 458 | 550 | | | |
| Total Funded Projects | 11043 | 1706 | 1706 | 1833 | 1833 | 1540 | 1045 | 1797 | 678 | 678 | 128 | | |
| Unallocated | 8029 | | | | | | | | 917 | 898 | 1448 | 1833 | 1833 |
| Total Salary | 21996 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 | 1833 |
| Proposals | | | | | | | | | | | | | |
| EES | 4585 | | | | | | | | 917 | 917 | 917 | 917 | 917 |
| IFA | 825 | | | | | | | 275 | | | | | |
| Total Proposed | 5410 | | | | | | | 275 | 917 | 917 | 917 | 917 | 917 |
| Total Projected Unallocated | 3719 | | | | | | -0- | 275 | 556 | 531 | 531 | 916 | 916 |

Figure 17. Column 6 of this sheet indicates whether or not the Center will exceed its State dollar appropriation.

## Project Evaluation

Although the Budget Forecasting System is thorough in design; in practice, the Center has problems maintaining accurate records. When the student worker responsible for keeping the records graduated and left the Center's employ, the records were not maintained for two months. In training a new employee, the intern found the ledger sheets too difficult to keep accurate. Since accurate records are essential to the Budget Forecasting System, the system ceased to function. Currently, the intern is simplifying the ledger sheets to eliminate time-consuming calculations and anticipates that the Budget Forecasting System will be operational in April, 1979.

## Evaluation of the Intern's Role

This experience taught the intern two lessons:

- how to anticipate revenue needs for an organization that receives funds from various sources; and
- that cumbersome record keeping procedures can prevent a system from accomplishing its goals.

In the future, the intern will use these lessons when developing financial record keeping systems.

## Figure 17
## Instructions for Completing Budget Status Sheets

Center for Urban Programs
Budget Status Sheets
As of ____Date____

| | (1) Expenditures to Date | (2) Balance Secured Research Funds & State Dollars | (3) Committed Secured Funds | (4) Uncommitted Secured Funds | (5) Needed Funds | Budget Surplus or Deficit |
|---|---|---|---|---|---|---|
| Salaries - Center Staff | (Employee Salary Sheet)* | _____ | (Employee Salary Sheet) | _____ | (Total Unallocated from Employee Salary Sheets) | (Column 4 Minus Column 5) |
| - Faculty | (Project Summary Sheet minus Center Staff) | _____ | (Original Project Budget) | _____ | -0- | |
| - Total | (Project Summary Sheet) | (Project Summary Sheet) | (Add above columns) | (Column 3 minus Column 2) | (Total Above) | |
| Other Expenses | (Project Summary Sheet) | (Project Summary Sheet) | (Fringe Benefits & Overhead for Total Salary) | | (Total Unallocated from Other Expense Sheet) | |
| Total | | | Proposal | Budget | | |

The following pending proposals are not included in this summary.

* The notes in parenthesis indicate how to derive the information.

# CHAPTER VIII

# COLLEGE STATION PARKS AND RECREATION BOARD

To fulfill the third objective of the internship, "to gain insight into the decision making process of local government," the intern served on a city advisory board. Dr. Gary Halter, one of the intern's academic committee members, also serves as a College Station City Council member. Dr. Halter secured the intern's appointment on the City Parks and Recreation Board.

## Objective

According to the ordinance creating the Parks and Recreation Board "the Board shall...advise and recommend to the City Council all matters concerning the establishment, maintenance, and operation of all parks within the City and the establishment and operation of recreation programs conducted by the City of College Station for its inhabitants."[14] To implement its role, the Board not only advises the city council but also interprets city policy for the Parks and Recreation Department staff.

## Organization

The Board consists of seven members all appointed by the City Council. One Council member serves as liaison between the Board and the City Council. The Parks and Recreation Director, Steve Beachy, reports directly to the City Manager on operational matters concerning the department but receives advice on policy matters from the Board.

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[14] College Station, Texas, Ordinance #1137, (1978), Section 1.

The Board meets once a month for regular meetings and occasionally has a workshop session another day during the month. The meetings are chaired by Dr. Lou Hodges, a professor in the Texas A&M Parks and Recreation Department. Depending on the topic, the meetings consist of either a presentation from the Director with follow-up discussion led by the Chairman or a request for action from concerned citizens or developers with discussion led by the Chairman.

## Projects

During the internship, the Board recommended actions to the Council on several matters including subdivision dedications, park improvements, park land purchase and recreation programs. Three examples of major decisions and their outcomes provide insight into the intern's experience on the Parks and Recreation Board.

### Holik Tract Park

A brochure prepared for a bond issue approved by the College Station voters indicated that a portion of the Holik Tract would be purchased for park land. Subsequently, the owners of the tract proposed to the Board and the Board recommended to the City Council other land in the area be purchased. At the intern's first meeting, residents of the area protested the Board's most recent decision. The Board agreed to reconsider the issue but made no decision at that meeting. Two meetings later, the Board reversed itself and recommended the City Council purchase the original piece of property.

Revenue Sharing Budget

In September, 1978, the City Council asked the Board to recommend parks and recreation expenditures to be included in the 1978-79 fiscal year revenue sharing budget. These expenditures were in addition to the regular city budget. The Board recommended the Council spend approximately $10,000 installing playground equipment, buying needed maintenance equipment, and purchasing a pool cover. The staff provided cost estimates for each of the items recommended. The following month, the staff informed the Board that even though the Council approved the Board's recommendations only half of the equipment could be purchased because the estimates were incorrect. The Board except for one member accepted the information with no comment.

Subdivision Park Dedications

City ordinances require dedication of one acre of park land for each 133 dwelling units created. The Parks and Recreation Board recommends to the Planning and Zoning Commission the area of a proposed subdivision acceptable for dedication. During the internship, the Board reviewed two subdivisions. For both subdivisions, the Board had the same philosophical discussion whether the land dedicated should support an active park for recreation such as tennis or softball or a passive park of essentially preserved woodlands. According to long time members of the Board, the Board has had the same discussions for over two years. The Board has not decided for each of the subdivisions in question, but is leaning toward an active park.

## Evaluation

The intern found the Parks and Recreation Board was weak in three areas he had not anticipated:

1. Lack of sufficient records - The decision making on the Holik track could have been easier if adequate records of previous meetings were available. With complete minutes, the Board would have known previous Board's recommendations and not relied on the memory of individuals.

2. Inaccurate budget estimates - When recommending action on the revenue sharing budget, the Board acted with cost estimates that were not reasonable approximations of actual costs. In the future, the Board should require the staff to provide more accurate cost estimates.

3. Lack of commitment to one course of action - For both the Holik Tract Park and the subdivision park dedication issues, the Board exhibited indecisive decision making. If the Board committed to one course of action, the residents in the Holik Tract area would not have been as frustrated and developers of new subdivisions could plan for a specific type of park.

The City of College Station recognizes these problems. Mr. Beachy, newly hired as Parks and Recreation Director, is taking corrective action. The City is also working with the Center for Urban Programs on the Orientation for Boards and Commission Members project described in Chapter III.

In the future when the intern works for local government, he can expect similar problems with the boards and commissions. From this experience, the intern gained insight into how he can more efficiently have the boards and commissions operate.

# CHAPTER IX

# EVALUATION OF INTERNSHIP

The evaluation of the internship relates to fulfillment of three internship objectives. This chapter's organization corresponds to each objective. The intern also developed competence in unanticipated areas. The last section of this chapter is devoted to these accomplishments.

## Increase the Intern's Technical Competence in Problems Facing Local Governments

Prior to the internship the intern worked for a local government as an engineer and studied theoretical engineering principles. The internship provided an opportunity to blend his practical experiences and engineering coursework in solving technical local government problems. New areas of technical expertise developed during the internship include community energy conservation planning, evaluating street maintenance needs, determining the cause of sewer system failures, and modifying building codes.

## Improve the Administration of the Center for Urban Programs so that the Center Can More Effectively Serve Texas Local Governments

The intern brought with him financial and administrative skills developed while managing an eight million dollar construction project. Administration of the Center's budgets offered the intern his first opportunity to anticipate needed revenue. He improved his management skills by directing and coordinating the work of the Center's student employees and faculty researchers. In addition, the intern gained proficiency in

analyzing administrative processes and suggesting corrective actions.

## Gain Insight Into The Decision Making Process Of Local Government By Active Participation

The intern's service on the College Station Parks and Recreation Board was a valuable experience. The pressures on a local government decision maker are now familiar to the intern. He can use this knowledge to more effectively deal with citizen committees in the future.

## Other Accomplishments

Four unanticipated results of the internship were:

- understanding the operation of a private consulting firm,
- establishing personal contacts with many Texas local government officials,
- developing grantsmanship expertise, and
- improving written communication skills.

These hidden benefits add depth to the intern's engineering and management skills.

# CHAPTER X

## SUMMARY

This report described Richard Kerbel's internship experience at the Center for Urban Programs. The purpose of the internship was to enhance the intern's ability to work for local government in an engineering management position. The report documented and evaluated the experience.

The internship organization, the Center for Urban Programs, is a part of the Texas Engineering Experiment Station (TEES), the engineering research branch of Texas A&M University. The Center exists to bring the University's resources to Texas cities. The Center's staff consists of four professionals, a Director and three Assistant Directors of which one is the intern.

The intern's responsibilities included work on Center-directed and Center-coordinated research projects and Center administration. Center-directed research projects in which the intern participated included: Texas Innovation Group, Public Technology Incorporated's Urban Technology System, Professional Development for City Managers, Orientation for Boards and Commission Members, San Antonio Area Regional Energy Profile, Flood Resistant Construction Techniques, Rural Community Energy Conservation, and Evaluation of the State Energy Conservation Plan. Center-coordinated research projects were the Bellaire Sewer System Analysis, Texarkana Building Code Modification, Sherman Police Study, and McAllen Data Processing Study. Administrative tasks of the intern included administering the Center's budgets, proposal processing, employee supervision and responding to university reporting requirements.

The intern directed the Community Energy Conservation (CEC) project

of the Texas Energy Extension Service as one of four major projects of the internship. Texas is one of ten states funded to establish Energy Extension Services testing the effectiveness of various methods of distributing energy conservation information. The intern provided technical and managerial guidance for five Texas cities developing prototypical city energy conservation programs.

For the Denton Street Inventory project the intern developed a method for objectively determining street maintenance priorities. The basis of the system is an inventory of street surface conditions. The intern used the system to establish priorities for 40 miles of Denton city streets.

The intern served as University Coordinator for the Garland Urban Observatory. In this position the intern coordinated two research projects: The Garland Communications System Study and the Garland Energy Use Patterns Study. The intern, as liaison between the city staff and the researchers, insured that the researchers interpreted the project results in a form usable by the city staff.

As the fourth major project, the intern developed a Budget Forecasting System. Each year TEES appropriates to the Center enough funds to pay for a portion of the Center's operating costs. By using the Budget Forecasting System, the Center Director schedules the Center's expenditures among the various projects and predicts the status of the Center's budgets.

In addition to his duties at the Center, the intern served on the College Station Parks and Recreation Board. This position allowed the intern to gain insight into local government decision making from a citizen advisory viewpoint. Usually, local government staff members do not

have equivalent opportunities.

In evaluating the internship, the intern found that it fulfilled all the objectives set forth by the intern, his internship supervisor, and his academic committee chairman. The intern increased his technical competence in solving problems facing local governments. He effectively handled administrative responsibilities at the Center and he participated in the decision making process of local government. The intern also developed personal contacts with local, state, and federal government officials.

In conclusion, the internship exceeded the intern's expectations. He is well prepared to serve a local government in an engineering management capacity. A similar experience at the Center for Urban Programs would be valuable to a Doctor of Engineering candidate with an equivalent work history, academic background, and career goals.

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# APPENDIX A

DENTON STREET INVENTORY
SUMMARY SHEET

FLEXIBLE PAVEMENT

Category 1 - No Immediate Maintenance Needs

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume ADT | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | | | | | | |
| Panhandle | Coit | Bolivar | 0.2 | Local Access | - | 1978 | | 1 | 10 |
| Payne | Bonnie Brae | Westgate | 0.5 | Collector | - | 1978 | | 2 | 10 |
| Windsor | Sherman | Glenwood | 0.2 | Collector | 1957 | 1975 | 2,500 | 2 | 8 |
| Bernard | Roselawn | Willowood | 0.6 | Local Access | 1976 | - | | 1 | 6 |
| Scripture | Bonnie Brae | Thomas | 0.2 | Collector | - | - | 2,600 | 1 | 2 |
| Mulberry | Bell | Industrial | 0.1 | Collector | - | - | | 1 | 0 |
| Windsor | Old Orchard | Nottingham | 0.4 | Collector | 1974 | - | | 1 | 0 |
| | | | 2.2 | | | | | | |

DENTON STREET INVENTORY
SUMMARY SHEET

FLEXIBLE PAVEMENT

Category 2 - Maintenance Needed

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume ADT | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | | | | | | |
| Avenue C | Mulberry | Oak | 0.2 | Local Access | 1960 | 1973 | 13,500 | 2 | 43 |
| Stuart | Hercules | Sherman | 1.0 | Collector | 1961,1966,1968 | 1975 & 1974 | 6,000 | 2 | 42 |
| Windsor | Glenwood | Nottingham | 0.6 | Collector | 1967 & 1964 | 1975 | | 1 | 40 |
| Scripture | Thomas | Jagoe | 0.5 | Collector | - | - | 4,100 | 2 | 40 |
| Bell | University | McKinney | 1.0 | Collector | 1963 | 1975 | 11,000 | 2 | 39 |
| Mulberry | Elm | Bernard | 0.4 | Collector | - | 1973 | | 2 | 39 |
| Mulberry | Industrial | Elm | 0.2 | Collector | - | - | | 2 | 39 |
| Ruddell | Paisley | McKinney | 0.4 | Collector | 1961 | - | | 2 | 38 |
| Montecito | Hobeon | Granada | 0.8 | Collector | 1973 & 1965 | 1976 | | 1 | 37 |
| Woodrow | Bridge | Spencer | 0.6 | Arterial | - | 1974 | | 3 | 37 |
| Ector | Scripture | University | 0.8 | Collector | 1950 | 1976 | | 1 | 35 |
| Paisley | Mulkey | Woolford | 0.2 | Collector | 1972 | 1978 | | 1 | 35 |
| Willowood | Bonnie Brae | 2110 | 0.2 | Collector | - | 1976 | | 2 | 35 |
| Willowood | 1512 | McCormick | 0.1 | Collector | - | 1976 | | 2 | 35 |
| Sycamore | Welch | Bell | 1.0 | Collector | - | 1973 | 3,500 | 1 | 35 |
| Hinkle | Greenbriar | Windsor | 0.7 | Collector | 1976 | - | | 1 | 33 |
| Paisley | Frame | Ruddell | 0.5 | Collector | 1967 | 1976 | | 2 | 33 |
| Willowood | Bernard | Leslie | 0.1 | Collector | - | 1976 | | 2 | 33 |
| Mill | Industrial | Robertson | 0.4 | Collector | 1961 | - | | 1 | 32 |
| Mulberry | Avenue A | Bernard | 0.3 | Collector | - | - | | 2 | 32 |
| Northridge | Hinkle | Bolivar | 0.5 | Local Access | 1971 | 1974 | | 1 | 32 |
| Willowood | 2110 | Highland Pk | 0.2 | Collector | - | 1976 | | 2 | 32 |

FLEXIBLE PAVEMENT

Category 2 (Cont.)

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume ADT | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | | | | | | |
| Hickory | Ruddell | RR Tracks | 0.5 | Local Access | 1966 | - | | 1 | 32 |
| Georgetown | Bowling Green | University | 0.7 | Local Access | 1969 & 1966 | 1977 | | 1 | 31 |
| Willowood | Westwood | Leslie | 0.2 | Collector | - | 1976 | | 3 | 31 |
| Willowood | Highland Pk | 1512 | 0.3 | Collector | - | 1976 | | 1 | 31 |
| Scripture | Jagoe | Bryan | 0.2 | Collector | - | - | 3,800 | 1 | 30 |
| Paisley | Audrea | Mulkey | 0.1 | Collector | - | 1978 | | 2 | 30 |
| Eagle | Avenue D | Myrtle | 1.0 | Arterial | 1962 | 1975 | 11,400 | 1 | 28 |
| Linden | Malone | Bonnie Brae | 0.6 | Collector | 1953 & 1956 | 1976 | | 2 | 27 |
| Hinkle | University | Greenbriar | 0.3 | Collector | 1976 | 1978 | 2,900 | 2 | 26 |
| Malone | University | Scripture | 0.8 | Collector | 1963 | 1974 | 10,000 | 1 | 26 |
| Scripture | Bryan | Ponder | 0.1 | Collector | - | - | | 1 | 25 |
| Hickory | Welch | Carroll | 0.4 | Arterial | - | 1978 | 9,700 | 1 | 25 |
| Kings Row | Stuart | Yorkshire | 0.7 | Collector | 1960 & 1966 | 1977 | 1300 | 1 | 25 |
| Paisley | Woodford | Ruddell | 0.2 | Collector | - | 1978 | | 3 | 25 |
| Ruddell | Wilson | Hickory | 0.4 | Collector | 1970 & 1977 | - | | 1 | 22 |
| Fulton | Oak | University | 1.0 | Collector | 1960 | - | 6,000 | 1 | 20 |
| Avenue C | Lindsay | I-35 | 0.3 | Local Access | 1966 | 1974 | | 1 | 20 |
| Panhandle | Bonnie Brae | Malone | 0.7 | Local Access | 1951 & 1953 | 1978 | | 1 | 20 |
| Panhandle | Alice | East | 0.1 | Local Access | 1949 | 1978 | | 1 | 20 |
| Bell | Sherman | Windsor | 0.7 | Collector | 1977, 1972, 1963, 1961 | 1977 | 600 | 2 | 19 |

Category 2 (Cont.)

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume ADT | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | | | | | | |
| Bernard | I-35 | Eagle | 0.6 | Local Access | 1976, 1961 | 1973 | | 2 | 19 |
| Pennsylvania | I-35 | Sandpiper | 0.9 | Collector | 1969, 1971,1974 | 1976 | | 1 | 18 |
| Hickory | Y | Bonnie Brae | 0.1 | Arterial | 1964 | - | | 1 | 18 |
| Ruddell | Mingo | University | 0.5 | Arterial | 1964 | 1975 | 2,400 | 1 | 18 |
| Woodrow | McKinney | Bridge | 0.5 | Arterial | - | 1974 | | 2 | 18 |
| Willowood | McCormick | Westwood | 0.1 | Collector | - | 1976 | | 2 | 17 |
| Bob-O-Link | Bellaire | Cardinal | 0.4 | Local Access | 1969 | 1978 | | 1 | 15 |
| West Oak | Y | Bonnie Brae | 0.1 | Arterial | - | - | | 2 | 15 |
| Panhandle | Malone | Alice | 0.6 | Local Access | 1950 | 1978 | | 1 | 15 |
| Linden | Alice | Malone | 0.6 | Collector | 1951 | 1978 | | 1 | 15 |
| Windsor | Hinkle | Bonnie Brae | 1.0 | Arterial | 1977 | - | | 1 | 13 |
| | | | 25.4 | | | | | | |

DENTON STREET INVENTORY
SUMMARY SHEET

FLEXIBLE PAVEMENT

Category 3 - Reconstruction Needed

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume ADT | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | | | | | | |
| Bolivar | Parkway | Congress | 0.1 | Collector | - | 1974 | | 4 | 100 |
| Bolivar | Congress | University | 0.8 | Collector | - | 1974 | | 4 | 95 |
| Avenue C | I-35 | Mulberry | 0.7 | Collector | 1960 | 1973 | 11,800 | 2 | 85 |
| Hickory | Carroll | Cedar | 0.1 | Arterial | 1964 | 1978 | 8,900 | 2 | 75 |
| Hickory | Avenue C | Bonnie Brae | 0.7 | Arterial | 1964 | - | 11,000 | 2 | 72 |
| Hickory | Avenue C | Welch | 0.4 | Arterial | 1964 | - | 9,300 | 3 | 72 |
| West Oak | I-35 | Y | 0.3 | Arterial | - | - | | 4 | 70 |
| Hickory | Cedar | Austin | 0.2 | Arterial | - | 1978 | 9,500 | 2 | 67 |
| Bernard | Willowood | I-35 | 0.1 | Local Access | 1976 | - | | 3 | 65 |
| Oak | Bolivar | Jagoe | 1.0 | Arterial | 1960 | - | 9,600 | 1 | 65 |
| Nottingham | University | Windsor | 0.8 | Arterial | 1960 | 1975 | 2,800 | 2 | 62 |
| Scripture | I-35 | Bonnie Brae | 0.5 | Collector | - | 1974 | 1,400 | 3 | 62 |
| Carroll | Northridge | Ross | 0.5 | Arterial | - | - | 3,400 | 2 | 60 |
| Welch | Eagle | Chestnut | 0.4 | Collector | - | 1973 | 6,200 | 2 | 59 |
| Ruddell | Paisley | Willis | 0.2 | Collector | - | - | | 4 | 58 |
| Welch | Chestnut | Oak | 0.3 | Collector | - | - | 8,800 | 1 | 57 |
| Bernard | Hickory | Eagle | 0.6 | Arterial | - | 1973 | | 2 | 55 |
| Oak | Austin | Bolivar | 0.2 | Arterial | - | - | 7,500 | 2 | 55 |
| Bell | University | Sherman | 0.3 | Collector | - | 1977 | 6,200 | 3 | 53 |
| Hickory | Austin | RR | 0.3 | Arterial | - | 1978 | 10,700 | 2 | 52 |
| Oak | RR | Austin | 0.2 | Arterial | - | - | 8,600 | 2 | 50 |
| West Oak | Bonnie Brae | Joage | 0.7 | Arterial | - | 1974 | 4,500 | 2 | 50 |
| | | | 9.4 | | | | | | |

DENTON STREET INVENTORY
SUMMARY SHEET

RIGID PAVEMENT

Category 1 - Need No Maintenance

| Street Name | Boundaries | | Length (Miles) | Classification | Date Constructed | Date Maintained | Traffic Volume ADT | Riding Quality | Distress Points |
|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | | | | | | | |
| Carroll | Ross | Hickory | 1.4 | Arterial | - | - | 19,700 | 1 | 10 |
| Carroll | Hickory | Eagle | .5 | Arterial | - | - | 11,700 | 1 | 0 |

# VITA

Richard Ira Kerbel

Mr. Kerbel was born on July 20, 1950 in New York City. His wife is the former Claudia Leigh Mitzel. His parents are Gilbert and Sherry Kerbel of Ardsley, New York.

Mr. Kerbel graduated from Ardsley High School with a Regents diploma. Subsequently, he received a Bachelor of Science in Civil Engineering degree from Tufts University at Medford, Massachusetts in 1972 and a Master of Public Administration degree from the University of Colorado at Boulder in 1977.

Currently Mr. Kerbel is Assistant Director of the Center for Urban Programs at Texas A&M University. Previously he served as Assistant County Engineer for Boulder County, Colorado. He is a registered Professional Engineer in the State of Colorado (#14512).

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