CITY OF SACRAMENTO

DEPARTMENT OF FINANCE

JACK R. CRIST
Director of Finance

March 2, 1987
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ADMINISTRATION
BUDGET DIVISION
REVENUE DIVISION
ACCOUNTING DIVISION

Budget and Finance Committee
Sacramento, California

Honorable Members in Session:

SUBJECT: UTILITY CUSTOMER INFORMATION SYSTEM

SUMMARY

This report provides information to the Budget and Finance Committee regarding the status of the utility customer information system project and staff's intent to issue a request for a proposal for such a system and recommends that the Committee direct staff to forward the report to the City Council for its information.

BACKGROUND

The basic architecture for the City's utility billing system was designed over eight years ago. Since the initial design, numerous enhancements have been added to the basic system. The latest major enhancement of live access to customer account data and laser printed bills was implemented in 1985. In order to better serve our utility customers, staff has been investigating the benefits of a new Utility Customer Information system (UCIS) which could provide faster response on customer billing inquiries, quicker action on service complaints for missed garbage pickups and other service problems, more complaint calls per day handled by customer service operators, and fewer complaints to council members from customers.

DISCUSSION

The present system is an adequate billing and collection system. However, the present system captures little useful customer information. The City is near a decision point regarding the present utility billing system due to the planned migration of all automated systems from the present Univac computer to the IBM 4381 which should occur prior to October 1, 1988. The decision facing the City is the choice of one of the three following courses of action:

1. Convert the present utility billing system from the Univac computer to the IBM 4381 without adding the essential customer information enhancements.

2. Convert the present utility billing system from the Univac computer to the IBM 4381 and add the essential customer information enhancement (internal design and development).

3. Obtain a packaged UCIS that would include utility billing that is designed for the IBM 4381.

The first alternative is estimated to cost approximately $208,000. This is composed of $158,000 in Data Management Department staff and processing costs for the conversion effort plus $50,000 for additional data storage. The $208,000 investment would not result in improved service and would not take advantage of the strengths of the IBM 4381 processing environment. Further, it is likely that a new billing and collecting system would be required within a few years due to the dated architecture of the present system.

The second and third alternatives have been evaluated by the soon to be merged accounting firms of KMG Main Hurdman and Peat Marwick. Their evaluations and recommendation are attached to this report.

For comparative purposes, the firms developed estimates of the costs for both alternatives. The estimates are for a complete UCIS that is custom tailored to perform all the City's required and desired utility billing customer service tasks. It is anticipated that the actual cost will be less due to a scaling back of the scope of the project. This could be accomplished by deletion of desired but unnecessary or impractical components from the final system. Further cost reductions may result from changes in the City's method of operations to fit a packaged program rather than modifying the program to fit the City's method of operating.

Alternative two (internal design and development) is estimated by the consultant to cost between $699,000 and $825,000. The following provides a breakdown of the estimate:

Task	City Staff	Outside Vendors	Equipment
Initial Conversion	$158,000 - $158,000	$ -0- - $ -0-	$ -0-
Modify to include Customer Information	366,000 - 467,000	-0- - -0-	-0-
Add customer history	125,000 - 150,000		50,000
	$649,000 - $775,000	$ -0- - $ -0-	$50,000

Based upon current staffing authorizations, this alternative would require several years to implement.

Alternative three (packaged UCIS) is estimated to cost between $693,000 and $997,000. The following provides a breakdown of the estimate.

Task	City Staff	Outside Vendors	Equipment
Package Software Acquisition and Modification	$102,500 - $119,000	$478,000 - $753,000	$ -0-
Add Customer history	62,500 - 75,000	-0- - -0-	50,000
	$165,000 - $194,000	$478,000 - $753,000	$50,000

Staff believes the low range cost estimate of $693,000 is more likely for a total UCIS than the high range estimate. The high range estimate is for a data based management system. Data based management systems have high system operating costs, and the City does not currently utilize the data based management concept. Additionally, this estimate assumes the exclusive use of consultants to customize the packaged UCIS. The cost may be considerably less if the City hired limited term staff to assist in the customization process. Further, as previously discussed, less customization may be necessary if the City is willing to modify its operating policies and procedures. It would be possible to phase-in alternative three since such systems are developed by using modules that serve as building blocks for a complete system.

One important distinction between alternative two and three is that alternative three (as proposed) does not require a significant commitment of Data Management Staff. Although a final determination has not been made, it is likely that additional support will be required to complete the migration from the Univac to the IBM 4381 by the desired October 1, 1988 date. Alternative three would contribute to a reduction in the total conversion effort.

The sources of funding are the City utility service funds either by means of the indirect cost allocation system or direct charges. Depending upon the scope of the project and the implementation schedule, the costs could be absorbed in a single year or spread out over a multiyear period. Spreading the cost of the customer information system over a several year period is prudent. The present utility service customers should not be required to pay for a system that will benefit both present and future users.

Staff has contacted several other cities that have acquired packaged UCIS. The cost of the systems (exclusive of internal staff costs) range from $135,000 to $500,000. The wide range is attributable to the number of the services provided, number of customers, and scope of the system acquired.

At this time, staff is preparing to proceed with the preparation, issuance and evaluation of a request for proposal for a packaged UCIS. Staff will evaluate the scope and costs of the proposals received and prepare a cost estimate of developing similar systems internally. Once that process is completed, staff will report back to the committee and the City Council regarding the recommended action regarding the present utility billing system.

FINANCIAL

The costs for proceeding with the request for a proposal are minimal. Solicitation of a request for a proposal is not a commitment to proceed.

RECOMMENDATION

It is recommended that the Budget and Finance Committee direct staff to forward this report to the City Council for its information.

Respectfully submitted,

BETTY MASUOKA
Director of Finance

MELVIN H. JOHNSON
Public Works Director

FOR COMMITTEE INFORMATION:

JACK R. CRIST
Deputy City Manager

Attachment

All Districts

KMG Main Hurdman

Certified Public Accountants

300 Capitol Mall   Telephone: (916) 444-2050
Suite 1100
Sacramento, CA 95814

Feburary 13, 1987

Mr Melvin H Johnson
Director of Public Works
City of Sacramento
915 I Street, Room 207
Sacramento, California   95814

Dear Mr Johnson:

We are pleased to present our recommendations regarding the implementation of a proposed Utility Customer Information System. This document presents the alternative strategies available to the Department of Public Works to meet its information processing requirements.

Our recommendations are based on an analysis of the Department's requirements presented in the Utility Customer Information System Needs Assessment Report. We compared your requirements with two basic strategy alternatives:

.   Converting and enhancing your existing software.

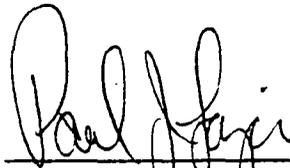.   Acquiring a new packaged software system.

In developing our recommendation, we considered the cost associated with each alternative, the benefits to be derived, and the advantages and disadvantages of each.

We appreciate the efforts and cooperation of City personnel in this project. Please contact us if you have any questions.

Very truly yours,

KMG Main Hurdman

By _____
       Paul J Lazio, Principal

CITY OF SACRAMENTO
UTILITY CUSTOMER INFORMATION SYSTEM (UCIS)

RECOMMENDATIONS REPORT

Table of Contents

I - INTRODUCTION

The City of Sacramento Department of Public Works (the Department) currently provides five utility services to 114,000 residential and commercial customers. The Department has determined that a new computerized Utility Customer Information System (UCIS) is required to provide better customer service and to automate many cumbersome manual processes.

The City now uses a Utility Billing system operating on a Sperry 90/80 mainframe computer for its billing and accounts receivable processing. The system performs its intended functions in a reliable manner. However, the present system fulfills only a portion of the City's information processing requirements. Fulfilling the requirements to automate other functions will necessitate a larger, integrated information system.

The Department retained KMG Main Hurdman and Peat, Marwick, Mitchell & Co to define requirements for a new system and evaluate the present utility billing system's capabilities.

The results of this effort are presented in the UCIS Needs Assessment Report delivered in February 1987.

We were also asked to define alternative strategies available to the Department to fulfill its information processing needs and then recommend the best strategy. The two strategies available to the Department are:

- Convert and Enhance the Existing Utility Billing
  System - The present system fulfills only a
  portion of the Department's current information
  processing requirements. To fulfill the

Department's needs defined in the Needs
Assessment Report would require converting the
existing system to the new City IBM mainframe and
developing many new functions. The City Data
Management Department estimates five to six
man-years of effort to develop the new functions.

- Acquire and Implement a New UCIS Software
  Package - The Department could develop a Request
  for Proposal (RFP) based on its requirements and
  submit the RFP to utility information system
  vendors. The Department would acquire UCIS
  software and implementation services that would
  meet the requirements defined in the Needs
  Assessment Report. This strategy represents a
  "turnkey" approach in that the system would be
  fully implemented by outside vendors and/or
  consultants. Data Management staff resources
  would not be required.

This report presents our analysis and recommendations
regarding these alternatives. It is organized into the following
sections:

- Introduction
- Requirements Definition
- Alternative Strategy Analysis
- Recommendations

Although basic information processing requirements are outlined in
this report, the UCIS Needs Assessment Report (provided under
separate cover) defines the requirements in greater detail.

II - REQUIREMENTS DEFINITION

A - UTILITY CUSTOMER INFORMATION SYSTEM (UCIS) REQUIREMENTS

This section outlines the functional requirements of a UCIS system required by the Department. A detailed presentation of these requirements is found in the UCIS Needs Assessment Report dated February 1987. The requirements for a UCIS are:

- **Customer Information**

  - New Account (Service Location) Records
  - New Customer (Property Owner) Records
  - Close Accounts
  - Query Customer Information
  - Change Customer/Account Information
  - Commercial Water Consumption Read Information
  - Audit Trails

- **Work and Repair Order Management**

  - On-Line Processing
  - Batch Processing
  - Work and Repair Order Processing
  - Management Reporting
  - Supplemental Billing
  - Table Maintenance

- **Solid Waste Route Scheduling**

  - Schedule Table Inquiry
  - Schedule Planning System Interface

- **Billing**

  - Maintain Billing Tables
  - Billing Table Modeling
  - Commercial Metered Water Consumption Calculations
  - Bill Calculations
  - Delinquency Notices
  - Time Pay Agreement Notices
  - Supplemental Billing
  - Final Bills
  - Accounts Receivable Interface

- **Accounts Receivable**

  - .. Payment Processing Service Bureau Interface
  - .. Payment Processing
  - .. Refund Processing
  - .. Adjustment Processing
  - .. Suspense Processing
  - .. Transaction Audit
  - .. General Ledger Interface
  - .. Lien Processing

- **Time Pay Agreements**

  - .. New Time Pay Agreement
  - .. Time Pay Payments

- **Meter Activities**

  - .. Meter Reading Subsystem Interface
  - .. Upload Meter Data to Mainframe

- **Management Reporting and Analysis**

  - .. Operations Summary Reporting
  - .. Management Reporting
  - .. Ad Hoc Reporting
  - .. Mailing Lists/Labels by Council District, Collection Routes

Although the current Utility Billing System accomplishes the billing and accounts receivable functions adequately, many information needs are unmet because of the system's limited scope. A new UCIS would automate many manual processes and offer an integrated systems approach for providing information to City management, staff, customers, and City Council members.

The major deficiencies of the current system can be characterized as follows:

- Substantial effort is now required to modify the system for changing requirements such as billing for new services, due to inflexible system design architecture.

- Five to six man-years of system development effort would be required to modify and enhance the present system to fulfill current needs.

- Considerable manual processing still exists.

- No on-line historical billing and service information for management and staff users.

- "User-unfriendliness"--too much use of difficult codes on screens and microfiche.

B - BENEFITS

The benefits to be derived from a new UCIS system presented in this report are, by necessity, more generic than quantifiable. If a new system is implemented, or the current system converted and enhanced, then quantification of benefits will be more precise. The benefits presented imply reductions in cost and increases in the level of service.

The benefits to be derived from a new system fall into the following categories:

- Faster response on customer billing inquiries and complaints.

- Quicker action on service complaints for missed garbage pickups and other service problems.

- Customer service operators will be able to handle more complaint calls per day.

- Fewer complaints to City Council members from customers.

- Improved cash flow.

- Reduced outstanding accounts receivable.

- Reassignment of current system maintenance resources to new system development.

- Reassignment of current system clerical resources to new system analytical needs.

- Additional and more customized information available for direction, control, and performance of utility services.

III - ALTERNATIVE STRATEGY ANALYSIS

This section describes the two viable alternatives for implementing a Utility Customer Information System:

- Convert and enhance the existing billing system.

- Acquire and implement a new UCIS software package.

Each strategy's associated conversion and implementation activities; cost and time estimates; and advantages and disadvantages are described.

ALTERNATIVE 1 - CONVERT AND ENHANCE EXISTING BILLING SYSTEM

The first alternative strategy available to the City to satisfy its UCIS requirements is to convert and enhance the existing Utility Billing system.

A - Conversion and Implementation Activities

The current Utility Billing system consists of 29 batch and one interactive programs. Converting the original Utility Billing system programs from the Sperry Univac to the IBM computer system will involve the following activities:

- Loading, compiling, and testing batch COBOL programs from the Sperry to the IBM system.

. Rewriting interactive on-line programs to function
in an IBM teleprocessing (CICS) environment.

. Compiling and testing the new interactive on-line
programs.

The tasks required to enhance the current Utility Billing
system to meet the defined UCIS functional requirements will include:

. Develop Work and Repair Order Sub-System

.. Analyze user requirements
.. Define file requirements
.. Design maintenance criteria
.. Design screens
.. Write, test, document, and implement programs

. Expand records to allow more services

.. Redesign the Utility Billing master record
.. Modify all programs that access the Utility
Billing record

. Develop comment history file of customer calls

.. Analyze user requirements
.. Design history file
.. Develop file maintenance procedures
.. Design screens
.. Write, test, document, and implement programs

- Develop on-line rate change function with testing and budget forecasting

  - .. Create screen to allow the user to input new rates
  - .. Modify existing test program
  - .. Create on-line budget forecasting criteria

- Modify billing programs for monthly (currently bimonthly) cycles

  - .. Modify receipt and prorating programs
  - .. Modify meter reading program
  - .. Modify billing process
  - .. Modify screens

- Develop on demand billing function

  - .. Develop proration program
  - .. Develop printer interface
  - .. Maintain internal customer record function

- Develop route and day changes by address range functions

  - .. Create route file
  - .. Create route sub-system interface
  - .. Interface with Geo-code file

- Redesign screens for better readability

  - .. Rewrite codes into English
  - .. Program code conversion table
  - .. Redesign screens for extra characters

- Write automatic lien clear program

  .. Develop internal record maintenance function

- Develop message printing function on bills by customer type

  .. Devise criteria for different types
  .. Create an on-line screen to maintain messages

- Develop interface with LGFS (City Financial System)

- Develop 3 years of on-line billing history

  .. Design file specifications
  .. Design file maintenance program
  .. Design file access screens

- Develop service history by location (regardless of owner)

  .. Define history requirements
  .. Design services history file
  .. Design purge criteria
  .. Design chaining mechanism

- Develop meter information history file and inquiry capability

B - Cost and Time Estimates

Each major task is listed below with an estimate of Data Management and City User staff hours required to complete the task:

Task	Data Management	User Staff
Project Administration and Control	500-600	500-600
Conceptual Design	200-300	200-300
Develop Work and Repair Order Sub-System	1,700-1,900	425-475
Expand records to allow more services	1,400-1,600	350-400
Develop comment history file of customer calls	400-600	100-150
Develop on-line rate change function with testing and budget forecasting	700-1,000	175-250
Modify billing programs for monthly (currently bimonthly) cycles	300-500	75-125
Develop on demand billing function	300-500	75-125
Develop route and day changes by address range functions	500-800	125-200
Redesign screens for better readability	1,100-1,400	275-350
Write automatic lien clear program	100-200	25- 50
Develop message printing function on bills by customer type	200-400	50-100
Develop interface with LGFS (City Financial System)	100-200	25- 50
Enter 3 years of on-line billing history	1,000-1,200	4,000-4,800
Develop service history by location (regardless of owner)	900-1,000	225-250
Develop meter information history file and inquiry capability	900-1,000	225-250
User Documentation and Training	500-600	2,000-2,400
Total	10,800-13,800	8,850-10,875

The estimates of time required to complete these tasks were provided by Data Management personnel. Although time and costs are not directly charged to user departments, Data Management uses $25 per hour as a basis for estimating project cost. The extended cost for Data Management to complete the modifications and enhancements of the Utility Billing system ranges from $270,000 to $345,000.

For the purposes of this analysis, we also calculated the value of City user staff time devoted to this project at $25 per hour. The cost for user staff time ranges from $221,000 to $272,000.

These costs must be added to the estimate for converting the existing software from the Sperry to the IBM system. Data Management provided a cost estimate of $158,000 to convert the existing software.

The cost estimate for the City to convert, modify, and enhance the current system to fulfill the UCIS requirements would range between $649,000 to $775,000.

Hardware costs for additional disk storage devices (estimated to be $50,000) and terminals will be equal for both alternative strategies. Therefore, this comparative analysis does not include hardware costs.

C - Advantages and Disadvantages

Alternative Strategy #1 has the following advantages:

- The functions of the current system do work and users are familiar with the system procedures. Users will not have to learn new methods for billing and accounts receivable functions.

- The converted and enhanced system will fulfill the City's UCIS requirements.

This option has the following disadvantages:

- Based on the current budget, the Data Management Department does not have sufficient personnel resources to develop the UCIS system. Because of the Sperry to IBM system conversion activities for other City computer applications, new development work for this project could <u>not even begin</u> until April of 1988.

- Data Management personnel will have to develop many UCIS functions from scratch that would already be found in a packaged software solution.

- This strategy will take longer to implement than the option of acquiring and implementing a new software package.

- Benefits to be realized from a UCIS will be delayed because of the longer implementation schedule.

- The current Utility Billing system is based on an outdated batch-oriented design architecture. Converting, enhancing, and modifying an already outdated system may present future problems and/or user dissatisfaction.

- Converting the base Utility Billing interactive programs to an IBM mainframe on-line environment is less desirable than implementing packaged UCIS software that was designed for use in the IBM hardware and teleprocessing software environment.

.   More time will be required of City personnel to
assist Data Management programmers and analysts
in defining and validating requirements, reviewing
project progress, and participating in system
tests. This will occur because many functions
that are pre-programmed in packaged software will
have to be developed from scratch.

ALTERNATIVE 2 - ACQUIRE AND IMPLEMENT A NEW UCIS SOFTWARE PACKAGE

The second alternative strategy available to the Department
to satisfy its UCIS requirements is to acquire and implement a new
UCIS software package. The Department would acquire UCIS software
and implementation services that would meet the requirements defined
in the Needs Assessment Report. This strategy represents a "turnkey"
approach in that the system would be fully implemented by outside
vendors and/or consultants with annual commitment of Data Management
staff resources.

Although the City has some unique information processing
requirements including lien processing and partial payment distribu-
tion, our experience indicates that software packages do exist that
could meet Sacramento's needs. Some software modification would be
necessary, but this is typical for any UCIS software installation.
We recommend that the City also evaluate some of its utility billing
procedures to determine if some might be changed to better fit a
software package.

This section describes the associated conversion and
implementation activities; implementation schedule; cost and time
estimates; and advantages and disadvantages.

A - Implementation Activities

The tasks associated with implementing new UCIS software
include:

- Project Administration and Control

    .. Orientation and Start-Up
    .. Management and Control

- Initial Software Package Installation and Test

    .. Prepare technical environment for baseline
       package installation and test
    .. Install baseline package
    .. Execute installation test
    .. Review installation test results
    .. Installation test sign-off and approval

- Detail Design and Requirements Validation

    .. Design/modify system output
    .. Design/modify system input
    .. Design/modify database structure
    .. Design/modify functional processing modules
    .. Design/modify system interfaces
    .. Design input, output, processing, and system
       controls for the automated data conversion
    .. Prepare design report

- Prepare Detail Modification Specifications

    .. Analyze processing modules to determine
       changes to individual programs

.. Prepare modification specifications
.. Review specifications
.. Review and update programming schedule

- Development and Implementation Plans

  .. Prepare plans for modification and
     development activity
  .. Develop overall strategy and approach for
     systems and acceptance testing
  .. Prepare overall plan for training
  .. Develop approach and plan for conversion and
     implementation activities

- Development (Programming and Unit Test)

  .. Prepare for development
  .. Modify/code program modules
  .. Conduct unit test for each program
  .. Document test results
  .. Resolve unit test difficulties

- Conduct Subsystem Tests

  .. Review and confirm test plan
  .. Develop test environment
  .. Execute string test
  .. Conduct quality assurance review

- Documentation

  .. Review package documentation
  .. Update system documentation
  .. Update program documentation
  .. Update operator documentation
  .. Review and finalize documentation

- User documentation and training

  - Prepare user documentation
  - Review training plans
  - Develop training material
  - Identify supervisory personnel to be trained as trainers
  - Execute Training Plan
  - Finalize user documentation
  - Conduct specialized training for analysts
  - Conduct specialized training for computer operations

- Integrated System Test

  - Review and revise test plan
  - Establish system test environment
  - Execute system test
  - Validate system test

  - Review system test results with user divisions
  - Execute acceptance test
  - Review acceptance test results

- Conversion

  - Review conversion work plan and assign responsibilities
  - Prepare detail conversion specifications
  - Develop conversion programs
  - Unit, String, and system test conversion programs
  - Verify and validate existing data
  - Perform manual entry of newly required data
  - Enter 3 years of on-line billing history

.   Implement software

    .. Prepare for implementation
    .. Install new system
    .. Convert data files
    .. Conduct system cutover
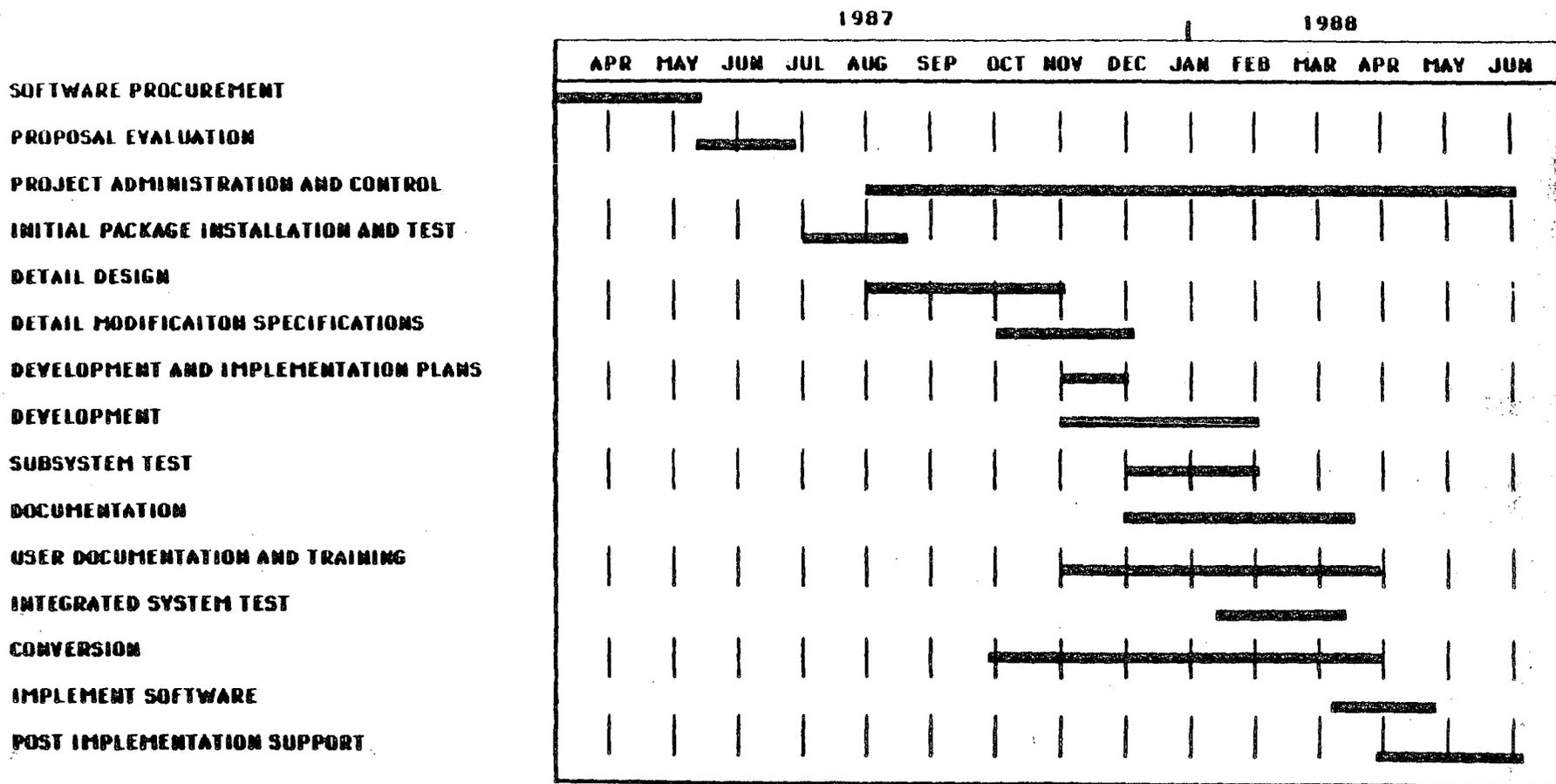   .. Commence initial operation

.   Post implementation support

    .. Support initial operations
    .. Resolve problems/provide functional support

B - Implementation Schedule

Exhibit 1 provides a schedule of the elapsed time required to acquire and implement the new UCIS software.

EXHIBIT 1

CITY OF SACRAMENTO
UTILITY CUSTOMER INFORMATION SYSTEM
SOFTWARE ACQUISITION AND IMPLEMENTATION SCHEDULE

	1987									1988				
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN

SOFTWARE PROCUREMENT

PROPOSAL EVALUATION

PROJECT ADMINISTRATION AND CONTROL

INITIAL PACKAGE INSTALLATION AND TEST

DETAIL DESIGN

DETAIL MODIFICAITON SPECIFICATIONS

DEVELOPMENT AND IMPLEMENTATION PLANS

DEVELOPMENT

SUBSYSTEM TEST

DOCUMENTATION

USER DOCUMENTATION AND TRAINING

INTEGRATED SYSTEM TEST

CONVERSION

IMPLEMENT SOFTWARE

POST IMPLEMENTATION SUPPORT

-20-

C - Cost and Time Estimates

We estimate that a project of this scope will require significant effort. Based on our experience with other metropolitan UCIS implementations, we have estimated the hours required for a project of this scope.

This strategy represents a "turnkey" approach in that the system would be fully implemented by outside vendors and/or consultants. Implementation of major systems require careful planning and monitoring. Each major task is listed below with an estimate of Vendor/Consultant and City User staff hours required to complete the task:

Task	Vendor/ Consultant	User Staff
Project Administration and Control	350-420	350-420
Initial Software Package Installation and Test	200-250	100-125
Detail Design/Requirements Validation	600-700	200-233
Prepare Detail Modification Specifications	200-300	
Development and Implementation Plans	200-300	25-37
Development (Programming and Unit Test)	400-500	
Conduct Subsystem Tests	200-250	
Documentation	200-300	
User documentation and training	700-800	2,800-3,200
Integrated System Test	200-250	100-125
Conversion	260-300	520-600
. Enter 3 years of on-line billing history		2,500-3,000
Implement software	120-160	
Post implementation support	400-500	
Total	**4,030-5,030**	**6,595-7,740**

We estimate that between 4,030 and 5,030 vendor and consultant hours will be required to support a UCIS implementation. At an average industry rate of $100 per hour, including expenses, the fees would range between $403,000 and $503,000.

The cost of user staff time for this project, at $25 per hour will range from $165,000 to $194,000.

Packaged UCIS software systems range in price from $75,000 for packages that do not include Data Base Management System (DBMS) to $250,000 for those that do include DBMS. Although using a DBMS within the application software system will cost more for the DBMS purchase and in-house technical support staff. It may offer advantages to the City, such as easier reporting capability and faster maintenance.

The projected cost of this option will range between $643,000 and $947,000.

D - Advantages and Disadvantages

Alternative Strategy #2 has the following advantages:

. A packaged software solution will reflect current, state-of-the-art system design techniques.

. Acquiring packaged software provides a proven solution with the benefit of many man-years of research, development, and UCIS experience already invested in the software package. The City Data Management staff will not have to "reinvent the wheel."

- A customized, packaged software system will fulfill the City's UCIS requirements.

- No major commitment of City Data Management personnel resources.

- Benefits will be realized sooner with this solution because of the shorter implementation schedule.

- The software vendor and/or implementation support consultants can be contractually held accountable for delivering a fully-functioning system that meets the City's requirements.

- A packaged software system will be designed for use in the IBM hardware and teleprocessing software environment.

- Less time will be required of City user personnel in this option. This will occur because many functions are pre-programmed in a packaged software solution that will not have to be defined, developed, and tested.

This option has the following disadvantages:

- Additional training will be required of users and system support personnel for new utility billing software procedures.