U.S. Department of Housing and Urban Development
Office of Policy Development and Resource

Case Studies of Effective Management Practices within Public Housing Agencies

Volume 1

Procurement and Inventory

CASE STUDIES OF EFFECTIVE MANAGEMENT PRACTICES WITHIN PUBLIC HOUSING AGENCIES

Volume 1:

PROCUREMENT AND INVENTORY

by

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Decision Information Systems Corporation

for

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Harvey Dickerson
Project Director
November 1985

INTRODUCTION

OVERVIEW

The purpose of the contract under which this report has been prepared is to document, in a series of case studies, the effective management practices of selected well-managed public housing agencies (PHAs), such that other PHA managers can make assessments, and, where applicable, implement similar practices at their agencies. The series includes eighteen case studies that are presented in volumes addressing six functional categories of public housing operations:

Volume 1--procurement and inventory
Volume 2--maintenance and custodial
Volume 3--rental and occupancy
Volume 4--finance and accounting
Volume 5--general administration
Volume 6--security.

Generally, within each of the six functional categories, three case studies have been developed that address practices at a small (1-499 units), a medium (500-1249 units), and a large (1250+ units) PHA. There are two exceptions to this organization, as follows. The rental and occupancy category contains only two studies, which address practices at a medium and a large PHA. And second, an additional report has been prepared for a very large PHA in the area of finance and accounting, bringing the total in this functional category to four.

It must be emphasized that the effective practices described herein are not perfect. Within the universe of public housing agencies, they may not even be the "best" practices. However, the programs and activities that follow have proven to be effective for the agencies which have implemented them. These practices are offered to the public housing community as a potential means for improving agency functions, especially if a PHA has identified a particular problem area of its operation.

For further guidance in improving agency operations, the reader is referred to the Insider's Guide To Managing Public Housing (HUD-PDR-638, August 1983), the Troubled Public Housing Handbook (7475.14), and the Field Office Monitoring of Public Housing Agencies Handbook (7460.7 REV).

The case studies described herein reflect the state and local laws and federal regulations which were in effect at the time that the management practices were documented. Prior to any attempt to replicate these practices, the reader is advised to consult current applicable laws and regulations to ensure compliance.

ORGANIZATION OF THIS REPORT

This report addresses the procurement and inventory functional category and contains three case studies. Each study is similarly organized into three chapters. Chapter I provides a detailed review of the effective management practice. Chapter II describes why the practice is effective and has improved agency operations. And Chapter III discusses the transferability of the practice to other agencies and key considerations in doing so. Additionally, each study is prefaced by an executive summary that provides a quick overview.

OVERVIEW OF THE PROCUREMENT AND INVENTORY FUNCTION

The functional area of procurement and inventory involves the purchase and storage of material resources necessary to operate a public housing agency. The procurement and inventory process not only includes buying and storing goods needed to operate housing projects, it entails securing supplies and equipment for the PHA's administrative staff as well. In addition, ordering supplies for capital projects (rehabilitation, modernization, etc.) is also done within this functional category.

The procurement and inventory functional area divides naturally into two subfunctions: procurement and inventory,

which are separate but interrelated in most PHA operations. The **procurement** subfunction includes several important tasks. First, in addition to restocking inventory already on-hand, it entails responding to requests for specific goods not in stock by placing an order, and in certain cases, verifying that the purchase falls within the budget. A second task is selecting vendors that can supply the materials expeditiously and at reasonable cost. Written specifications that clearly define the requirements of the PHA are an important element of this process. Major purchases typically involve competitive bidding procedures. Upon placement, orders for goods are tracked, received, verified, and logged. Invoices are normally transfered to the finance and accounting offices for payment. Finally, the procurement subfunction is also responsible for keeping abreast of the supply market, such that information about better products is passed on to maintenance and management staff.

The **inventory** subfunction entails maintaining and accounting for goods received through the purchasing process. A PHA's inventory subfunction involves a number of basic tasks. The first is planning--deciding how many of what items to keep in stock. Demand for an item usually determines whether it is routinely carried or is ordered only when needed. Second, the inventory is maintained and accounted for to maximize availability and minimize pilferage. Storage of the inventory, whether in a central facility, on-site, or in some combination, depends on the operating needs of the PHA. The accounting system is usually consistent with the size and value of the inventory. Next, the function meets requests for supplies and accounts for their outflow. Accurate records are essential to ensure that inventory accounts match project operating budgets. Careful monitoring alerts management to problems, e.g., excessive demand for certain goods.

The purchasing and inventory functional area is closely tied to several other functional areas. The strongest link is

with the maintenance and custodial functional category, which is dependent on procurement and inventory for its supplies. Finance and accounting receives invoices from the purchasing staff, issues checks, and enters the payments into agency accounting records. The link with the general administration functional area is based on information that is required to prepare and monitor the operating budget.

ABOUT THE PROCUREMENT AND INVENTORY STUDIES

This document contains case studies describing practices at: Cumberland Housing Authority, Cumberland, Maryland, a small agency; Hopewell Redevelopment and Housing Agency, Hopewell, Virginia, a medium-sized agency; and the Housing Authority of High Point, North Carolina, a large agency.

Cumberland Housing Authority (CHA) recently implemented an improved inventory management system that is the subject of the first case study. The study describes how and why CHA consolidated several project-based inventories into one central inventory facility. This consolidation of inventory management was primarily implemented to provide better coordination with maintenance operations, which were also consolidated at the same time. CHA found that the change resulted in enhanced control of inventory through more intensive monitoring of supply usage and disposition, and in better quality and more timely management information.

Hopewell Redevelopment and Housing Authority (HRHA) also recently implemented an improved inventory management system along with an improved purchasing process. They are the subject of the second case study. HRHA achieved benefits similar to those gained by Cumberland Housing Authority. However, the HRHA study differs from the Cumberland analysis by virtue of the manner in which its inventory management function is organized. At this agency, inventory management is decentralized; several satellite locations exist at key project sites. This configuration better integrates with maintenance operations at

HRHA. As such, this case study is of high utility to agencies with, or contemplating changing to, decentralized operations.

The third study, which focuses on High Point Housing Authority, sharply contrasts with the first two. This report addresses the implementation of an automated system that supports various inventory management and purchasing functions. The Automated Material Inventory System (AMIS) has greatly streamlined the process of tracking inventory levels and usage, and replenishing inventory when it falls below established minimum levels. AMIS also supports the purchasing process in several ways, including: identifying discount opportunities; providing lists of suppliers; and automatically generating hardcopy purchase orders.

The AMIS case study is particularly relevant to larger agencies that are comtemplating computerization, or expanding automation to this functional area. The study identifies the hardware and software costs associated with AMIS, which may be a significant constraint to adopting a similar system. The case study addresses this and other factors in assessing the feasibility of such an endeavor. It also provides a detailed technical review of the AMIS system as a point of departure for comparison with other agency systems, or as a guide for future system design efforts.

With this brief overview of the procurement and inventory function, three case studies of effective management practices are presented in the remainder of this document.

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PART III. HIGH POINT HOUSING AUTHORITY

LIST OF EXHIBITS

FUNCTIONAL AREA:	**Procurement and Inventory**
EFFECTIVE MANAGEMENT PRACTICES:	**Centralized Inventory Management and Improved Monitoring Controls in Purchasing**
AGENCY:	**Cumberland Housing Authority (Cumberland, MD)**
SIZE:	**Small**

EXECUTIVE SUMMARY

This case study describes effective management practices at the Cumberland Housing Authority (CHA) in Cumberland, Maryland. The practices detailed here are:

- a centralized inventory management system; and
- an improved monitoring system for the purchase and maintenance of supplies.

Before initiating changes in its inventory and purchasing operations, CHA's inventory management was decentralized and procurements were effected through a central purchase order process coordinated by the maintenance foreman. The implementation of improved inventory management and purchasing procedures coincided with a major shift by CHA from a project-based maintenance operation to a centralized maintenance operation. The changes have resulted in better availability of maintenance parts, thereby enhancing maintenance responsiveness. As well, the changes have facilitated better overall tracking of supply usage--from receipt to actual usage, greatly enhancing needed management information. Better management information has in turn increased the efficiency of purchasing activities. And further, increased staff accountability and a reduction of vulnerability to fraud and theft have resulted from better tracking systems and functional separation of inventory from purchasing activities, another change implemented by CHA.

Chapter III addresses implementing a similar system at other agencies. Described are some basic features essential to all good inventory and purchasing systems. Other more detailed considerations, such as the agency's organization of maintenance activities and general agency staffing patterns, are also addressed.

CUMBERLAND AT A GLANCE

CHARACTERISTICS	DATA
Total Stock:	435 units of LIPH in 5 projects
• Projects for Families:	3 projects
• Projects for Elderly Tenants:	2 projects
• Unit Sizes:	efficiencies ..... 23 percent one-bedroom ..... 30 percent two-bedroom ..... 27 percent three-bedroom .... 17 percent four-bedroom ..... 3 percent
• Largest Project:	Frazier (125 units)
• Smallest Project:	Banneker (30 units)
• Oldest Project:	Frazier (1952)
• Newest Project:	Queen City (1971)
Demographics:	
• One-Parent Households:	38 percent
• Minority Tenants:	11 percent
• Children Under 18:	38 percent
Operations:	
• Operating Expenditures:	$156.13 (PUM)
• Dwelling Rentals:	$ 97.49 (PUM)
• Operating Reserve:	71 percent of allowable level
• Staffing:	16 employees: 7 administrative; 9 maintenance and custodial.

I. OVERVIEW OF CHA's INVENTORY MANAGEMENT AND PURCHASING SYSTEMS

This chapter comprehensively reviews the Cumberland Housing Authority's (CHA) improved inventory management and purchasing systems. The chapter begins with background concerning the previous inventory and purchasing systems. The subsequent section describes the key actors associated with the current system. The third and fourth sections address the inventory and purchasing functions, respectively. The concluding section presents some anticipated refinements that CHA will soon implement.

It is important to note that the implementation of improved inventory management and purchasing systems coincided with a major shift by the agency from the project-based maintenance structure to a centralized maintenance structure. Before this change, inventory management was also decentralized. There were five inventory locations, one corresponding to each of the agency's project locations. The key changes implemented in the new inventory system involve the storage location of maintenance supplies and how their use is monitored, and the generally improved controls that have been introduced in inventory management.

In the previous purchasing system, procurements were effected through a central purchase order process coordinated by the maintenance foreman. This system remained centralized after the changes; however, enhanced controls were incorporated. As well, a new position was established--purchaser/storekeeper--to consolidate ad hoc activities formerly handled by others in both the inventory and purchasing functions.

BACKGROUND

This section separately summarizes the key problems that were addressed by changes in the inventory management and purchasing systems at CHA.

The Previous Inventory Management

The previous inventory system generally suffered from a lack of adequate recordkeeping procedures. This situation resulted in the lack of an adequate audit trail for tracing and accounting for the disposition of supplies and materials. Further, the process was recognized to have three additional shortcomings: a general lack of adequate controls; a lack of needed management information; and an inefficient use of staff resources. Each of these topics is discussed below.

Inadequate Controls. Simply stated, the previous system suffered because there were no rigorous controls to prevent a maintenance person from misusing agency materials and just requesting more as actual needs arose. Checking on a post-audit basis as to how materials were being used was viewed by management to be too costly and time consuming, and staff always could use theft by residents as an excuse for missing supplies. It became clear to management that the system relied too heavily on the honesty of staff and that this vulnerability needed to be addressed in a reorganization. A related point here is that the agency felt that consolidation of storage areas from five to one would make it easier to secure the materials from theft.

Deficiencies in Management Information. The previous system delegated the accounting of parts and supplies to individuals with little training in inventory management. Typically, the list of parts on-hand, the reorder levels, and the range of supplies needed were kept "in the heads" of the on-site maintenance men. And, as often as not, parts were stored by laying them on the most convenient empty shelf. Moreover, because the maintenance men were not required to report inventory status or even to maintain inventory records in a manner that allowed others to

use them, there were no incentives to maintain proper records. As a result of inadequate records, management staff had no way of knowing how much of which parts were being used at each site, and, except for an annual inventory, how much inventory was actually on-hand.

Inefficient Use of the Maintenance Foreman. In the previous system the maintenance foreman, instead of working full-time to direct and supervise maintenance, spent about forty percent of his time initiating and tracking purchase orders and delivering goods to the projects. This was recognized to be rather inefficient and was addressed in the reorganization of the inventory system.

The Previous Purchasing Process

While CHA's inventory previously was project-based, purchasing always has been centralized. Thus, the changes in this aspect of the procurement and inventory system are more subtle than those that occurred in inventory control. However, the critical breakdowns in the system that precipitated the changes took place in purchasing. Thus, the small modifications made to purchasing procedures are quite significant.

In the prior system, while all purchasing was made through a central purchase order and all payments had to be approved by both the executive director and the chairman of the board, there was no requirement that bids be taken to identify the lowest cost vendor. This likely caused the agency to incur excessive costs for some items.

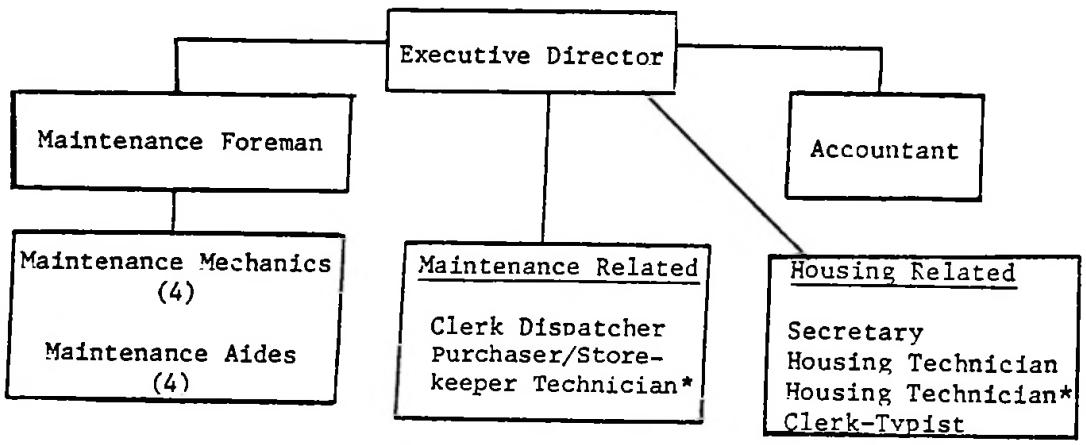
A more significant problem involved the lack of adequate manual controls. Although the agency operated on a central purchase order system, the purchase orders were not numbered. Thus, there was no way to monitor the status of open purchase orders, because no one even knew for certain how many such items existed. Also, and most significantly, one person--the executive director--had the authority to solely undertake every step in the procurement process, from initiating a purchase order to signing

the check. Where one person alone can make a purchase, it is difficult to ensure that that person will not abuse the authority and make unauthorized purchases.

KEY ACTORS

Major inventory and purchasing activities are principally handled by the purchaser/storekeeper technician. The roles and responsibilities of this individual are described below. Other persons involved to varying degrees include the executive director, clerk/dispatcher, and accountant. A CHA organizational chart displaying relationships among the key staff appears as Exhibit I-1.

EXHIBIT I-1
ORGANIZATIONAL CHART



*Indicates part-time employees.

The Purchaser/Storekeeper Technician

One of the salient features of Cumberland's project-based inventory system was that no one was principally responsible for purchasing and inventory. Maintenance men were expected to devote time to maintaining project inventories. The maintenance foreman, who primarly was responsible for directing maintenance, also was required to play a key role in procurement as well as in maintenance of inventory. When CHA's inventory was centralized it was possible to designate one person to handle purchasing and inventory.

The agency accomplished this change without a net gain in staffing. By relieving the maintenance foreman and staff of procurement and inventory tasks and establishing the purchaser/ storekeeper technician position, the agency was able to proceed without hiring additional staff. The newly created purchaser/ storekeeper technician (hereafter purchaser) position was budgeted to be a less than full-time position at thirty hours per week, appearing under the administrative category of the agency's budget. This position was filled by an incumbent maintenance person.

With respect to inventory, the responsibilities of the purchaser are:

- maintaining the storage for maintenance parts and tools;
- keeping track of the levels of stock on hand;
- determining when to reorder stock;
- maintaining the inventory on the vehicle used to handle work order requests for maintenance; and
- costing the labor and parts used by maintenance that are recorded on maintenance work orders.

With regard to purchasing, the duties of the purchaser are:

- selecting vendors to call and obtaining bids from at least three vendors for prices on goods to be purchased;

- maintaining open purchase orders between time when orders are placed and goods and invoices are received;
- verifying prices and quantities of goods received against purchase order specifications;
- transmitting purchase orders and invoices to CHA's accountant for payment; and
- maintaining a set of purchasing-related records.

The procedures associated with inventory and purchasing are described in the following two sections.

OVERVIEW OF THE INVENTORY MANAGEMENT SYSTEM

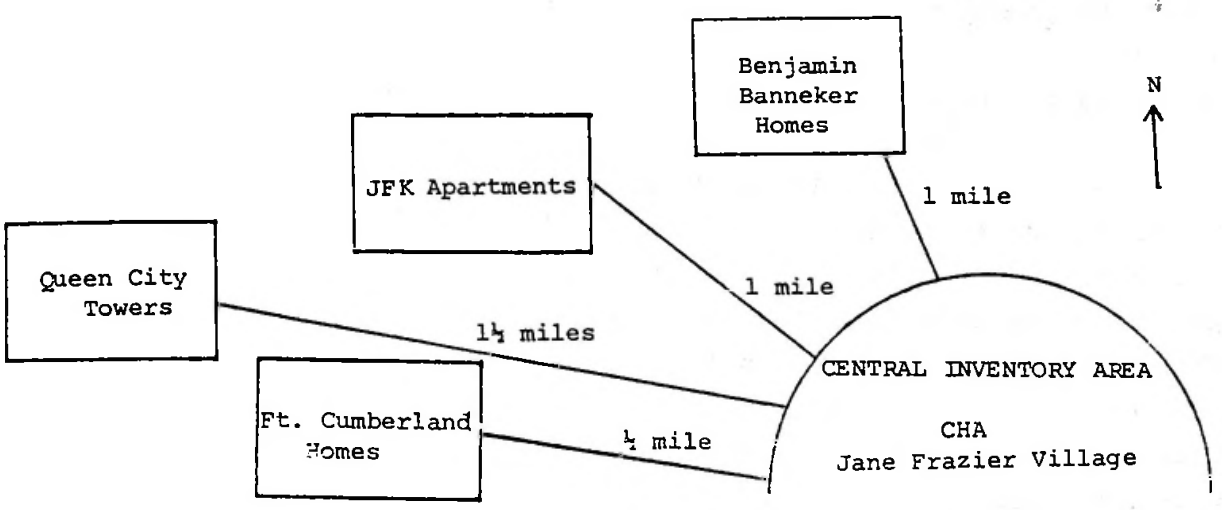
This section separately addresses procedures now in place to handle the administering of the central inventory area, and how acquisitions from inventory for maintenance and nonmaintenance items are handled. The section concludes with a brief discussion of how the agency now accounts for nonexpendable properties.

Central Inventory Area

All maintenance-related inventory was consolidated into an area constructed for this purpose using approximately $175,000 of Comprehensive Improvement Assistance Program (CIAP) funding. The Exhibit I-2 illustrates the relationship between the central inventory area and other sites. In addition to the physical storage space, the expansion included the creation of office space that the newly-hired purchaser shares with the maintenance foreman and the dispatcher.

EXHIBIT I-2

MAP OF CENTRAL INVENTORY AREA AND OTHER SITES



In this area, a central file containing a stock card for each item of inventory was created. Each stock item was assigned a unique number for recordkeeping. The stock cards are standard 4x6 inch index cards. They contain:

- the site where the item is used;
- the amount currently in stock;
- the date of the last change to the inventory on hand;
- the work order numbers indicating the source of all acquisitions from inventory;
- the reorder level (currently being added); and
- the amount received through a replenishment of inventory.

Exhibit I-3 contains a sample standard inventory card.

Acquisitions from Inventory

This subsection describes the work flows relating to acquisitions from inventory. The flow is graphically depicted in Exhibit I-4. At CHA, the use of all parts is now tied to a maintenance work order (see Exhibit I-5). The maintenance person that performs the work writes on the work order the type and quantity of the parts used and turns the work order into the maintenance office for processing. Part of that processing includes job costing by the purchaser. To execute this subtask, the purchaser writes on each work order the cost of the parts used, as well as the labor costs involved in the job. While performing this subtask, the purchaser also keeps a separate list of the parts used, which is subsequently taken into the inventory area to make adjustments to the inventory cards. He goes through the files, finds the index card for each item used that day, and records on the card the date, the amount used, the work order to which it was charged, and the quantity remaining. If by this deduction, the balance has fallen below an appropriate level, the purchaser notes this and initiates a reorder, as described subsequently in a discussion of the purchasing process.

When reordered parts arrive, the procedure is similar. After verifying that the proper parts, quantities, and prices have been received, the purchaser takes the new items and stores them in their appropriate place in the storeroom. Then he goes to the file, finds the index card for each of the new items received, and records on it the date, the quantity received, the current balance on-hand, the vendor from whom it was purchased, and the price paid.

Inventory of Items Not Maintenance-Related

Cumberland's central inventory system refers to maintenance parts and supplies. Other areas of CHA's inventory, notably office supplies and nonexpendable equipment, are kept the same

EXHIBIT I-3
STANDARD INVENTORY CARD

DATE	STK AMT.	W.O. NO.	REC.	ISSUED	BALANCE	VENDOR	PRICE
11-6-84	46	5-4	Jim	4	42	Allstate Grocer	.65 ea
11-7-84	42	shop	Fred	1	41		
11-8-84	41	5-1	Jim	3	38		

ITEM Delta Paper Towels SITE USED: All NUMBER

EXHIBIT I-4
FLOW OF ACQUISITIONS FROM INVENTORY

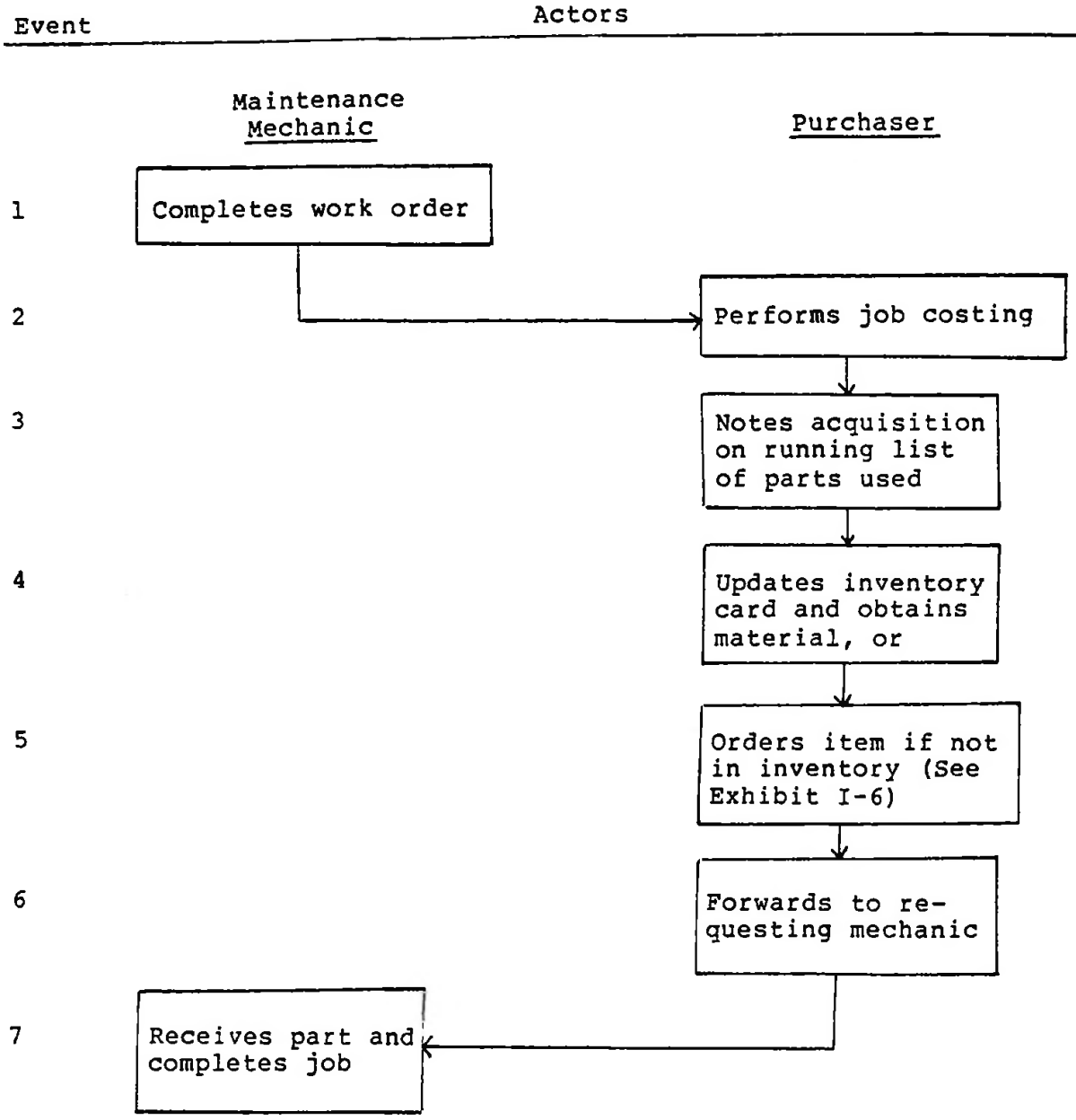


EXHIBIT I-5
WORK ORDER

THE HOUSING AUTHORITY
OF THE CITY OF CUMBERLAND, MARYLAND

MAINTENANCE SERVICE REQUEST

05702

DATE RECEIVED 6-12-85
TIME RECEIVED 2:20 A.M. (P.M.)
RECEIVED BY

LOCATION 5-1 UNIT NO. 8E OCCUPANT

Authorization to enter in Occupant's Absence YES ☒ NO ☐ Phone 222-2222

WORK REQUESTED

Repair kitchen faucet – it drips.
Issue 3 wood screws for cabinet door

Assigned To Date 6-13 TIME OUT 10:30 TIME IN 10:15

WORK COMPLETED

Repaired kitchen faucet – Took cartridge out, replaced washer and replaced cartridge.

AMT.	MATERIALS USED AND PART NO.	LABOR	COST
2	washers 002452	2.35	.20
	TOTAL	2.35	.20

Charge to ☐ Occupant ☒ Management

☒ Job Complete
☐ Not Complete
☐ Service Request No. _____

Do not sign this order if work is not complete.

_____
TENANT'S SIGNATURE

way they always have been, and this generally is outside the central inventory system. Office supplies are stored in CHA's administrative offices. These offices are adjacent to the maintenance and inventory areas, but are clearly separate parts of one building. Because the administrative staff is rather small in size at Cumberland, the volume of office supplies is not overwhelming. Generally, secretarial or occupancy staff in the office just informally keep track of supplies on-hand and when new purchases are necessary. Purchases are then fed into the central purchasing system along with all other procurements. However, CHA officials feel that detailed accounting for such items is not cost-justified as with maintenance items.

Nonexpendable Properties

The inventory of nonexpendable equipment is maintained by CHA's accountant, ordinarily in conjunction with maintenance staff. The records for this inventory are kept centrally by the accountant, but the actual storage of items is largely still decentralized, with equipment being stored at the site in which it is intended to be used. When equipment is received, it is marked with an inventory number and recorded in a log that the accountant keeps. This log notes the equipment by part number and the location to which it is assigned. Thus, in theory, a quick glance at this record will reveal the inventory of nonexpendable equipment and the quantity and location of each item. In reality, maintenance staff do not strictly keep the procedures implied by this system. For example, if a lawn mower is needed at a particular project, they often will take one that is supposed to be stored at a different project, use it, and leave it at the project where it was last used. This makes inventory reconciliation of these items more burdensome than otherwise might be the case.

OVERVIEW OF THE PROCUREMENT SYSTEM

Purchasing at Cumberland is now characterized by adequate documentation and an audit trail, and also better division of responsibilities among actors involved in the purchasing process. Exhibit I-6 illustrates the steps that are followed for each purchase.

The process is initiated after the purchaser identifies inventory replenishment needs. For all purchases over twenty dollars in value, the purchaser normally solicits three price quotations or bids for the items and completes a field purchase requisition form (FPR), shown in Exhibit I-7, and an attachment to the requisition that provides supporting documentation for the solicitation shown in Exhibit I-8. This documentation is then forwarded to the executive director for approval. Upon approval, the clerk/dispatcher prepares a purchase order as shown in Exhibit I-9. The purchase order is assigned a unique number and typical descriptive information concerning the items is also provided. The purchase order is then signed by the executive director and forwarded to the purchaser, who usually phones in the order and subsequently sends a copy of the purchase order. Upon receipt of shipment, the purchaser checks to ensure that the goods received match the shipping invoice, and that the invoice agrees with the purchase order. If all is in order, then the invoice is forwarded to the accountant, who processes payment.

The most significant difference between this purchasing system and the one that preceded it is in the controls that have been added. In the present system, no one person has access to all of the steps needed to make a purchase. All purchase orders are numbered and recorded by the clerk dispatcher, who types them up based on approved written FPRs. This maintenance of a central record of all purchases is the clerk dispatcher's only role in the purchase process, and no one can make an official purchase without her having a record of it. Other aspects of central purchasing, including the purchase orders themselves, and the procedures for making and approving payments, have been unchanged since before 1982.

EXHIBIT I-6
PROCEDURES AND RESPONSIBILITIES
IN PROCUREMENT

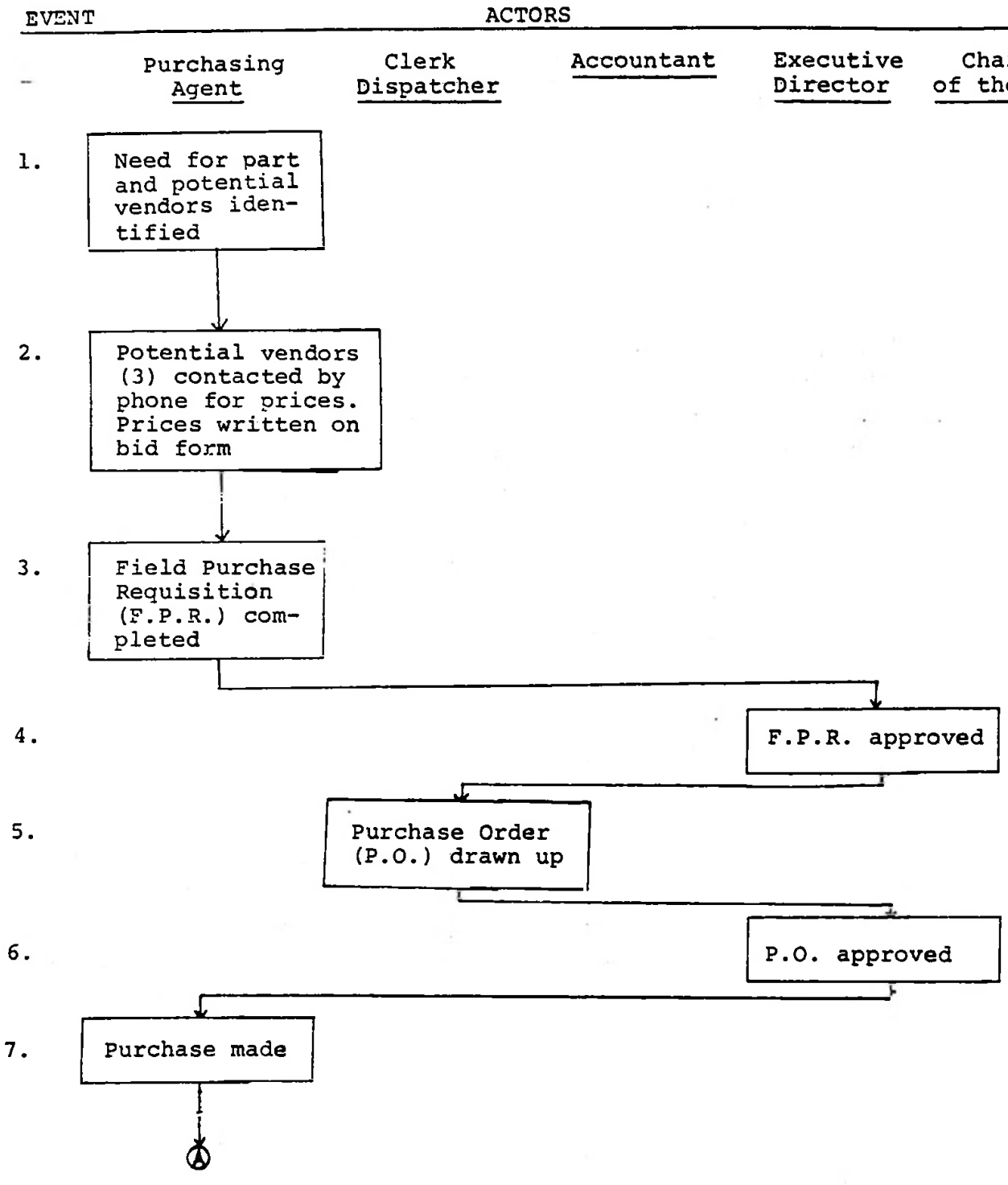


EXHIBIT I-6 (continued)

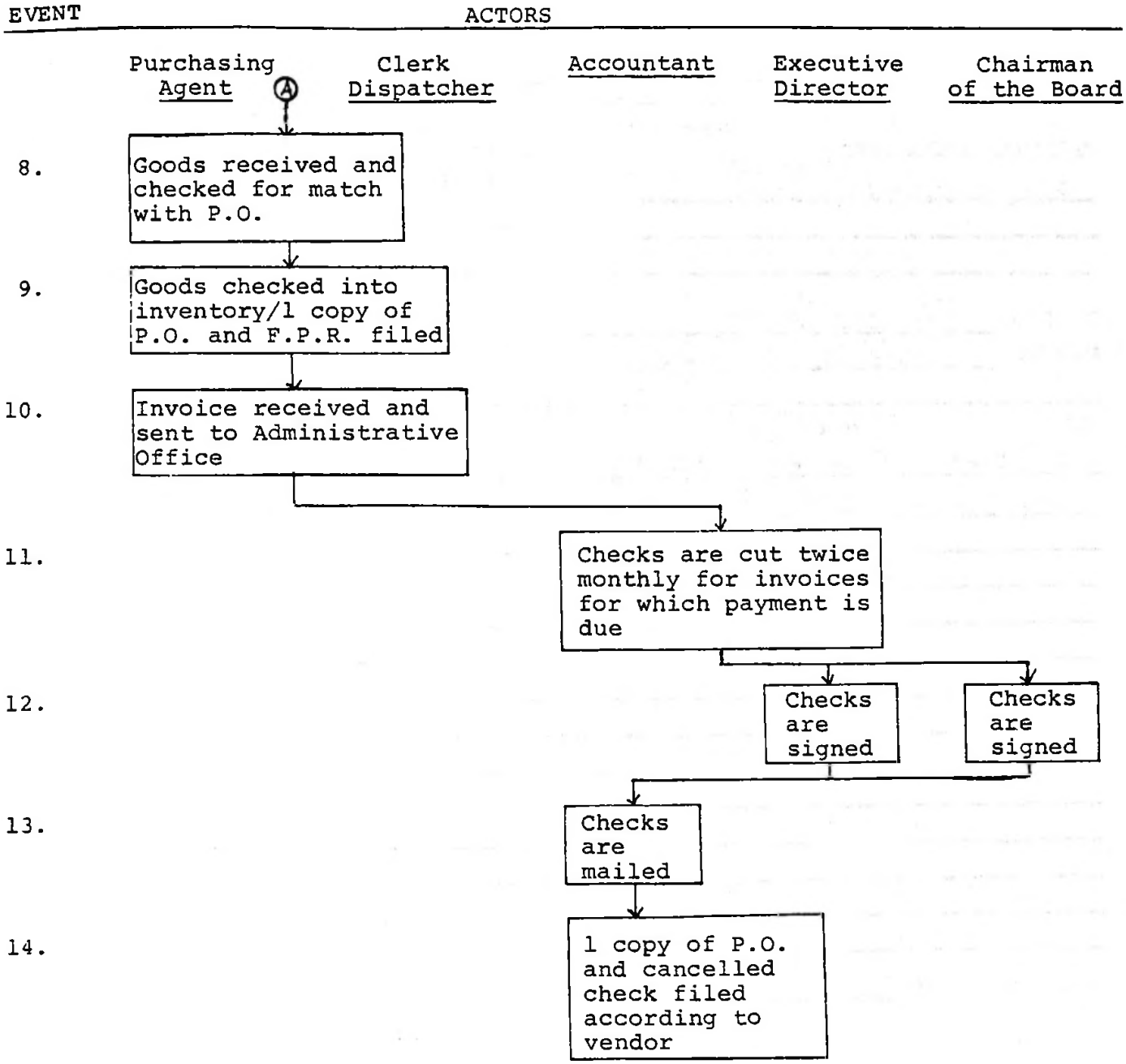


EXHIBIT I-7
FIELD PURCHASE REQUISITION

FIELD PURCHASE REQUISITION

MATERIALS NEEDED FOR:
5-1 (Jane Frazier Village)

DATE: 4-24-85
DATE REQUIRED: asap
REQUISITION NO. _____
MAIL _____ PICK-UP X
(Check One)

SUPPLIER: Hainca Co.
ADDRESS: Mechanic St., Cumberland MD

On Hand	Quantity	Your Stock No	DESCRIPTION	Price per unit	Amount
0	2	1234	B&G Circulating Pump	$100.00	$200.00

Requisitioned BY _____ Approved BY _____

EXHIBIT I-8
FIELD PURCHASE REQUISITION
ATTACHMENT

THIS FORM MUST BE PREPARED AND ATTACHED TO EACH PURCHASE REQUISITION WHERE APPLICABLE.

AT LEAST THREE PRICE QUOTATIONS MUST BE PROVIDED FOR AMOUNTS BETWEEN $20.00 AND $250.00.

DATE	VENDOR	PRICE
4-24-85	Hajoca Co.	$100
4-24-85	Cumberland Pipe & Steel	$125
4-24-85	R.E. Michael Co.	$140

IF THE LOWEST PRICE WAS NOT SELECTED, AN EXPLANATION MUST BE PROVIDED BELOW:

I APPROVE THIS EXPENDITURE. X

I DISAPPROVE THIS EXPENDITURE. _____

_____
EXECUTIVE DIRECTOR

4-24-85
DATE

EXHIBIT I-9
PURCHASE ORDER

CUMBERLAND HOUSING AUTHORITY

P.O. Box 506
First St. and Memorial Ave.
Cumberland, Md. 21502

Purchase Order

TO: Hajoca Co.
Mechanic Street
Cumberland, MD

SHIP TO: Cumberland Housing Authority
P.O. Box 506
Cumberland, MD

MD tax exempt # 99999999

PURCHASE ORDER NO. 2100	SHIP VIA - Pick-up			DATE - 4-24-85			
QUANTITY ORDERED	PLEASE ENTER OUR ORDER FOR GOODS LISTED BELOW: STOCK NUMBER	DESCRIPTION	UNIT PRICE		TOTAL		QUANTITY RECEIVED
2	1234	B&G Circulating Pump	100	00	200	00	

Purchase Order Number must appear on all papers, packages, and correspondence relative to this order.

PURCHASING AGENT — THE HOUSING AUTHORITY OF THE CITY OF CUMBERLAND, MARYLAND

BY EXECUTIVE DIRECTOR

WHITE - Original, PINK - Receiving Copy, GREEN - Office Copy, CANARY - Voucher Copy, GOLDENROD - Master File

Notes on Bid and Solicitation Procedures. In identifying which vendors to seek price quotations from, the purchaser is aided by the inventory cards, which note from whom the item previously had been purchased. However, both he and the person who ordinarily initiates the purchase of office supplies generally know who the vendors are for each item. While it is formal agency policy to solicit at least three price quotes on all purchases, in some cases this is not undertaken. The purchaser knows well who the vendors are, and for many frequently used items he can recite from memory what the price charged by the various vendors will be. Additionally, when one vendor is the only source, price solicitations are foregone. In most cases, however, items are ordered by the item rather than by the class of products a vendor may carry. That is, even though one vendor may carry commode seats and plumbing supplies, CHA will solicit prices separately on these items, rather than have a general vendor offer a price on all the items he may carry. Frequently, salespersons will make calls on CHA and provide the maintenance foreman and purchaser with valuable information on new and alternative supplies. From only one or two major vendors, however, does CHA make regular purchases from salespersons. In these instances purchasing may be tied to a sales visit, rather than strictly to reorder levels of items in the inventory.

ANTICIPATED REFINEMENTS TO THE SYSTEMS

Several aspects of the maintenance inventory are still not perfected at Cumberland. One is that written reorder levels do not appear on the stock card for each item. The individual who is the purchaser is quite skilled at his job, and just by working from his knowledge of how much of each item should be kept on hand, effectively manages the inventory. However, when he is out of the office, other staff, who must fill in, lack necessary guidelines. Also the establishment of written reorder levels will help to ensure that the system continues to function

smoothly in the event that the position should have to be refilled. Staff at CHA recognize this problem and are correcting it.

Another problem in Cumberland's inventory system is posed by breakdowns in procedure. As long as the purchaser is the one who removes things from inventory, all parts used are recorded on inventory index cards. The fact the CHA procedures forbid maintenance staff from being in the inventory area helps to ensure the integrity of the inventory records. However, these procedures are not rigidly adhered to. For example, if a maintenance person needs a part, and the purchaser is not in the immediate area, he may walk into the store room and help himself to what he needs. When this happens, it is possible that the item used may not be recorded in such a way that it gets noted in the records, and the inventory records develop variances from the stock actually on-hand. Of course, the annual inventory taking readjusts such variances so that in practice the system works quite well. To some extent, this type of breakdown is inevitable, and it is not something that will lead to a change in procedures at CHA. In addressing these problems staff are just reminded frequently of what the proper procedures are and of the importance of following them.

II. WHY CUMBERLAND'S PROCUREMENT AND INVENTORY SYSTEM IS EFFECTIVE

The change in Cumberland to a centralized procurement and inventory system with a formal position created to handle purchasing and inventory and with improved controls in purchasing procedures was undertaken for two principal reasons:

- Maintenance was being centralized and central storage of parts was more compatible with such an organization in maintenance.
- The previous purchasing system had resulted in allegations of unlawful procurements.

As a result of the changes that were discussed in Chapter I individuals in Cumberland believe that the new system is operating effectively. Centralized maintenance has been achieved with good results, and the parts flow to maintenance is functioning smoothly. No imputations of wrongdoing have occurred since the new purchasing controls were implemented, and while this may in fact be due to the integrity of the individuals now involved, the current procurement procedures provide better controls by dividing responsibilities for purchasing and ensuring thorough documentation of each purchase.

Four other important functions served by the overall CHA purchasing and inventory system are:

- ensuring an adequate level of stock of parts;
- controlling the storage and use of parts;
- functional separation; and
- providing needed management information and accountability.

Adequate Stock Levels. The present system ensures an adequate level of stock because each item used is recorded and each replacement is logged into inventory records. These records are constantly kept up-to-date by the individual responsible for initiating purchases so that as soon as stock levels dip too low the purchaser is aware of the situation. In the previous system, with no written records and no formal responsibility, whether a site inventory was adequately stocked depended entirely on the diligence and expertise of the on-site maintenance person. According to the maintenance foreman, stock-outs are far more rare now than they were previously.

Controlled Storage. Because there is a specially designated place for each item in inventory and because responsibility for maintaining that inventory now is delegated to a purchasing agent instead of maintenance men, better controls in storage and usage have resulted. The purchaser now stores everything in its proper place, removes items from inventory only on authorized request, and maintains updated records of how much of what is where. In sum, this has resulted in better recordkeeping. In the previous system, where the person who was responsible for using items would store them on the nearest convenient shelf, the opportunity for loss or wasteful use was far greater.

Functional Separation. Another important aspect of the separation of responsibility for inventory from responsibility for use is that added controls against pilferage have ensued. Even where maintenance staff are very honest, frequently the ability to walk off with parts that one has responsibility for is too seductive to avoid. Separation of storage and use into two positions provides better control. Moreover, the consolidation of storage into one area (instead of five) has reduced the number of areas that have to be secured against theft, and CHA officials expressed the belief that fewer thefts occur.

Management Information. The final area in which the current system indicates improvement over the previous system lies in the management information that it provides. Currently, all parts

are charged to work orders, on which parts and labor used are recorded. Completed work orders are filed by the clerk/ dispatcher according to where the work was done. The clerk/ dispatcher also extracts information from the work orders and labor utilization in each project. This type of report can be very useful in indicating systematic problems in systems, in particular projects or buildings, and also can help to document a PHA's case for CIAP funding, all in addition to providing better accountability in the expenditure of related agency funds.

III. IMPLEMENTING CUMBERLAND'S PROCUREMENT AND INVENTORY SYSTEM IN OTHER PHAs

When Cumberland was seeking to improve its operations, one of the sources of ideas that it found most useful was informal information sharing with other PHAs. Many of the particular elements of CHA's inventory system were borrowed from another western Maryland housing agency, and that PHA substantially revised its maintenance system as a result of CHA's input. At these informal sessions, key PHA staff have visited with their counterparts at another PHA and discussed their procedures for performing particular operations. These sessions not only have led to sharing information about other systems, but also frequently have helped to refine the systems being discussed.

There are elements of any good system of procurement and inventory that are illustrated by CHA. It is good practice to have current written records of inventory levels, to have a rational and secure storage area, to tie parts usage to maintenance work orders, to purchase from the lowest bidder for comparable quality goods, and to require that all purchases over twenty dollars be made through a purchase order. Regardless of the overall organization of the system, these features should be made a part of any system.

In developing a more effective procurement and inventory system, one of the first things that CHA administrators explicitly recognized was that the purpose of such a system is to support other primary functions, most notably, maintenance. That is, goods are purchased and stored so that they will be on hand for use by PHA staff. Therefore, to be effective in any PHA, a procurement and inventory system must strike a balance between control and ease of access by the staff. Two key factors that strongly influenced CHA's design of a new procurement and inventory system were the structure of its maintenance system, and its overall staffing level. These aspects are discussed below.

Organization of Maintenance

One of the key questions in determining whether to store needed parts in a central location or whether to store at least some parts in scattered sites concerns the distance between where the parts are stored and where they will be used. Similarly, a critical question in determining whether to centralize or decentralize maintenance operations is the distance that staff will need to travel among PHA sites. Thus, assuming that a PHA has a system of maintenance that is appropriate to its needs, an inventory system that fits the maintenance system will adequately take into account the distance factor.

In Cumberland where the distance between PHA sites is never longer than three miles and where the maintenance is centralized, a centralized inventory system is quite appropriate because maintenance staff, and indeed all other PHA staff, work from a central location and make trips out to the projects. Needed supplies and materials are simply taken by the maintenance persons on their routine trips to the sites. Under the CHA system, to have decentralized storage would require inventory people traveling to the projects to maintain stock and maintenance staff also traveling to the projects to use the stock to make repairs. Such duplication would be quite inefficient.

In contrast, in a PHA where the maintenance is project- or region-based, as in a dispersed rural PHA or a large urban PHA, it would be inefficient to require that parts be transported between a central storage site and dispersed to sites for each task that was necessary. Generally, where maintenance is project-based such that maintenance staff report to work to a project where they spend all their time, at least some project-based storage of inventory is appropriate, although a central system of inventory recordkeeping is probably appropriate.

Staffing Patterns

Agencies could not be much smaller than Cumberland (435 units and sixteen staff) and maintain a procurement and inventory staffing pattern like that at CHA. One of the key management improvements at CHA was making procurement and inventory a discreet and important function by designating a formal position to it. Because they have a staff position devoted to procurement and inventory, the procedures are likely to be more effective than if no locus of responsibility was designated. At CHA, it was fortunate that a restructuring of staff assignments allowed for nearly a full-time position in procurement and inventory. In a smaller PHA, the staff time required by this function would be less, and therefore the position could be filled by a part-time person or by another current staff person as additional responsibilities.

However, where less than full-time attention is devoted to procurement and inventory, rigorous procedures similar to those in Cumberland should be implemented. Cumberland's experience demonstrates that a comprehensive set of procedures for storing and tracking inventory, for which a particular individual is assigned responsibility to keep continually up to date, is a necessary precondition to an effective inventory system.

FUNCTIONAL AREA:	Procurement and Inventory
EFFECTIVE MANAGEMENT PRACTICE:	Central Inventory Control
AGENCY:	Hopewell Redevelopment and Housing Authority, Hopewell, Virginia
SIZE:	Medium

EXECUTIVE SUMMARY

This case study describes an improved inventory control system implemented at Hopewell Redevelopment and Housing Authority (HRHA). An overview of the agency's operations appears on the following page.

The manual inventory control system recently implemented at HRHA is designed to:

- optimize inventory levels;
- track inventory flows between central and satellite inventory areas; and
- facilitate replenishment of inventory by effectively linking with the procurement process.

The system has helped HRHA to more cost-effectively manage inventory, reduce fraud and vulnerability to theft, to increase staff accountability for supply usage, and to reduce the unit costs of purchases by making competitive bidding a routine facet of procurement. The system has also improved record-keeping and the availability of management information for this important component of the agency's operations.

The Hopewell system is generally transferable to other agencies with decentralized inventory and maintenance operations, as discussed in Chapter III. It will be of particular interest to those PHAs concerned with improving coordination between multiple inventory locations and creating better documentation trails regarding supply usage. Also briefly discussed are appropriate divisions of responsibility between purchasing and inventory management functions to facilitate management control and reduce vulnerability to fraud and theft.

HOPEWELL AT A GLANCE

CHARACTERISTICS	DATA
Total Stock:	500 units in 7 projects
• Projects for Families:	Six projects
• Projects for Elderly Tenants:	One project
• Unit Sizes:	efficiency ..... 12 percent one-bedroom ..... 24 percent two-bedroom ..... 36 percent three-bedroom ... 21 percent four-bedroom ..... 6 percent five-bedroom ..... 1 percent
• Largest Project:	Piper Square (104 units)
• Smallest Project:	Bland Court (24 units)
• Oldest Project:	Davisville (1941)
• Newest Project:	Scattered Sites (1982)
Demographics:	
• One-Parent Households:	47 percent
• Minority Tenants:	58 percent
• Children Under 18:	48 percent
Operations:	
• Operating Expenditures:	$155.66 (PUM)
• Dwelling Rentals:	$ 89.16 (PUM)
• Operating Reserve:	67 percent of allowable level
• Staffing:	Approximately 20 full-time employees

I. THE NEW CENTRAL INVENTORY CONTROL SYSTEM

BACKGROUND

In 1984, Hopewell Redevelopment and Housing Authority (HRHA) implemented an improved inventory control system in response to what were perceived as gross deficiencies in its previous system. Problems involved lack of coordination among inventory sites, poor recordkeeping and an inefficient purchasing process. These topics are discussed below.

Lack of Coordination. One major problem at HRHA was a lack of coordination between the central inventory and multiple storage locations at key project sites. Under the previous system, all materials used at a given project were stored there. Maintenance personnel were responsible for maintaining and replenishing the project-based inventories, and a general restocking of all the inventories took place only once per year. This led to many stocking inefficiencies. One project might have a shortage of a maintenance item at the same time another project had a substantial surplus, and there was no system for ascertaining this condition and shifting the supplies around.

Poor Recordkeeping. There were little or no records of inventory stock at each project, or what items individual mechanics were using for repairs. In the absence of adequate documentation, it was impossible to trace supply usage and the agency was vulnerable to theft. Poor recordkeeping resulted in frequent "stock-outs" as well, as usage patterns were not monitored. This led to frequent delays in completing routine work requests. When purchases finally were made, staff frequently did not write-up purchase orders, thus making it difficult to determine what items were on-order.

Unsystematic Purchasing. The previous system also generally suffered because purchasing decisions did not reflect the amount of stock on-hand, past usage patterns, anticipated

levels of usage, or price comparisons. The number of units of each supply item purchased during the annual restocking remained virtually the same each year. In some cases, vendor representatives reviewed HRHA's stock and determined how much the agency should purchase. Routine overstocking, which was particularly a problem with the items for which vendors were determining stock levels, needlessly tied up cash for items that would be infrequently used, if at all. Purchasing was often done by clerical employees who had little knowledge of the subject and sometimes ordered the wrong parts, or paid higher unit costs from lack of comparison shopping.

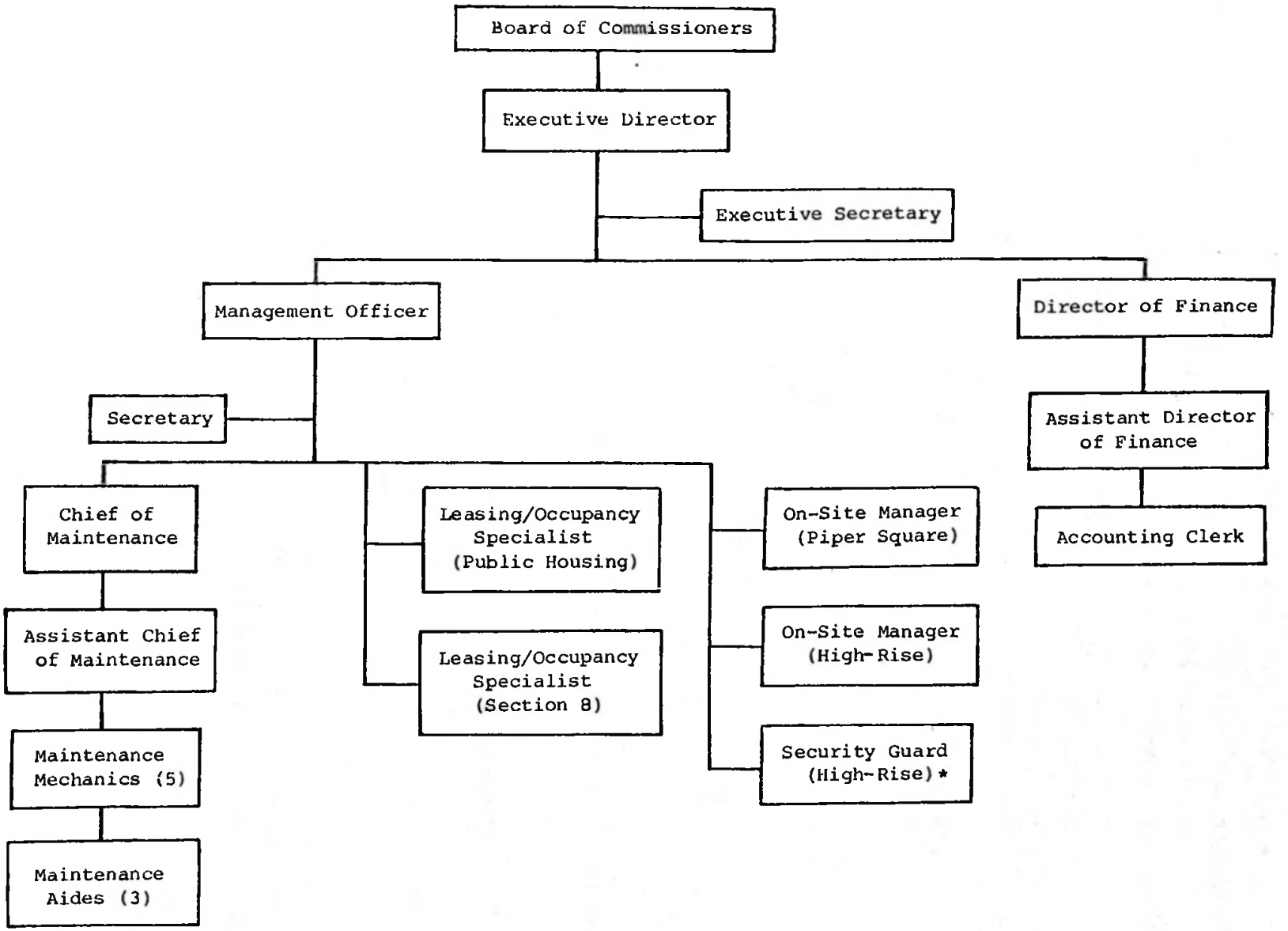
All of the above deficiencies were addressed in a major overhaul of the inventory management function, which is described in the remainder of this chapter. The essential changes included: the realignment of staff roles and responsibilities without changing overall staff levels; the general upgrading of all inventory storage areas and the formal designation of one area as the central inventory and the others as satellite locations; and the implementation of improved manual controls and documentation standards. The costs of these changes are estimated at approximately $5,000--largely attributable to a thorough restocking of the entire inventory. Some of that amount also went towards new shelving and other costs incurred to upgrade the inventory areas.

KEY ACTORS

Exhibit I-1 presents an organizational chart of HRHA. The assistant chief of maintenance is the primary actor involved in inventory management. This individual's major responsibilities are:

- maintaining the agency's central inventory;
- restocking the project inventories, both routinely and in response to specific requests from project maintenance personnel;

EXHIBIT I-1
HOPEWELL REDEVELOPMENT AND HOUSING AUTHORITY
ORGANIZATION CHART



* Part-time employee

- initiating the purchase of new supplies; and
- verifying the receipt of shipments.

Although the assistant chief of maintenance plays the largest role in inventory management and spends about half-time on this activity, several other persons are involved, as shown below.

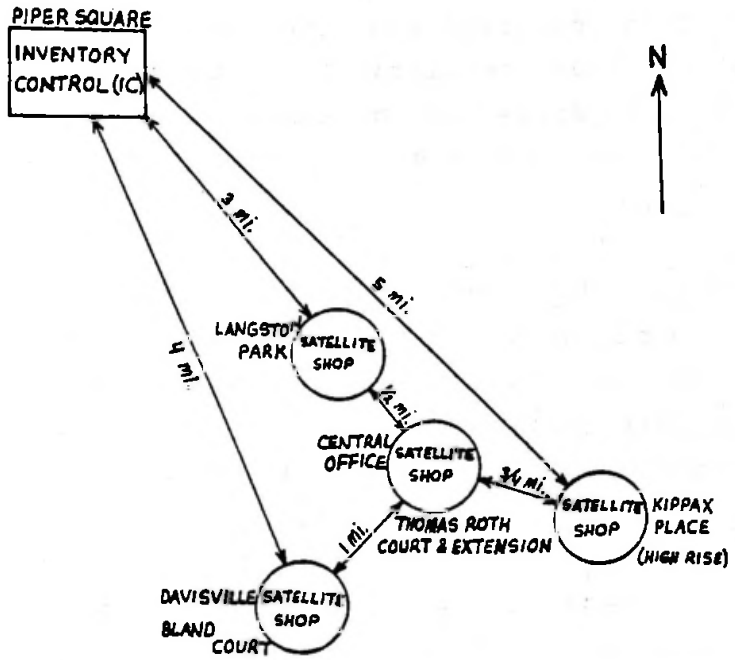
Individual	Responsibility
• Chief of Maintenance	• Approves all maintenance-related supply requsitions
• Maintenance Mechanic	• Completes supply requisitions and work order forms
• Accounting Clerk	• Prepares purchase orders and performs various record-keeping tasks
• Executive Director	• Approves all purchase orders

OVERVIEW OF INVENTORY MANAGEMENT AT HRHA

HRHA's inventory is managed via a central inventory area that is supplemented by four satellite inventory areas located at key family project sites, and a maintenance van that is stocked to respond to weekend work requests. Exhibit I-2 on the next page illustrates the relationship between the central inventory area and the other sites. The central inventory, located at a large family site, is a typically constructed stock room. It contains approximately five hundred items individually stored in bins on metal shelves. Each has a stock card affixed to it that permits keeping running totals of the amounts on-hand. Under Hopewell's system, virtually every item valued at more than one dollar and used in maintaining housing units is tracked from purchase to final use. Each item tracked has a red sticker attached to denote this point. Two

EXHIBIT I-2

MAP OF CENTRAL INVENTORY AREA AND OTHER SITES



types of items are not tracked, however. The first is durable goods, such as refrigerators, stoves and office equipment. The other type is office supplies. They are ordered and received directly by the administrative office, and distributed and controlled from that location.

Each of the satellite areas are laid out similarly to the central inventory, but have only approximately four hundred items on-hand, in smaller quantities than are kept at the central inventory. In fact, satellites usually have only two spares of each item on-hand at the beginning of each month, unless usage patterns indicate otherwise. All inventory areas, including the central inventory, are secured by lock and key.

Three individuals have keys: the chief of maintenance, the assistant chief of maintenance and the maintenance mechanic assigned to that location.

The essential feature of the improved system is systemmatic coordination between the central and satellite inventories. This coordination involves tracking the final disposition of supplies acquired from inventory, and routine restocking of all areas on a fixed cycle to reduce stock "outages." These topics are addressed in the following subsections.

Acquiring Parts from Inventory

HPHA's maintenance services are organized on a decentralized basis. Most family sites have a full-time supervising maintenance mechanic and maintenance mechanic on-site to respond to all routine requests for maintenance. Once a request has been received, a work order is completed (see Exhibit I-3). The work order form captures four types of information: 1) descriptive information such as the tenant's name and unit number; 2) a description of the nature and type of work requested and materials used; 3) costing information for the necessary project and tenant accounting updates; and 4) if an appliance is installed, appropriate control information such as serial number, etc.

If all supplies needed to perform the job are available in current inventory, the mechanic simply "pulls" the parts and appropriately updates the running counts maintained at the storage locations. Upon completing a job, the mechanic distributes the work order form as follows: one copy of the work order is sent to the agency's administrative office and placed in the file of the unit being serviced; a second copy is sent to the tenant; and a third copy is sent to central inventory for use by the assistant chief of maintenance in monitoring inventory levels.

On the other hand, if on-hand supplies are depleted or

EXHIBIT I-3

WORK ORDER FORM

HR & HA WORK ORDER/TENANT CHARGES

UNIT NO: 1011 PROJECT NO: VA-55 DATE: 6/7/85

NAME: _____ PHONE NO: 458-1234 TIME: 8:02 AM

WORK ORDER

WORK REQUESTED: Kitchen sink stopped up
Check bathroom sink.

TYPE OF WORK:
PLUMBING (X)
ELECTRICAL ( )
CARPENTRY ( )
MISC. ( )

MATERIALS: 3/4 Qt. Biatron

COST: $ 3.75

JOB TIME: 20 min.

DATE COMPLETED 6/7/85

WORK PERFORMED BY: _____

HR RATE: $ _____
HR RATE: $ 12.00
HR RATE: $ _____

TOTAL CHARGES LABOR AND MATERIALS: $ 7.75

CHARGE TENTANT: MATERIALS _____ LABOR: _____

APPLIANCE INSTALLATION

MODEL NO. _____ MANUFACTURER: _____

STOVE: FROM: _____ TO: _____ SERIAL NO: _____

REFRIGERATOR: FROM: _____ TO: _____ SERIAL NO: _____

Remarks: Put Biatron down both drains.
Told tenant to wait 30 minutes
and flush with cold water.

DISTRIBUTION:

White - Accounting
Yellow - Inventory Control
Pink - Unit Maintenance File
Goldenrod - Tenant Copy

near depletion, a process is initiated, as shown in Exhibit I-4, to acquire the items from central inventory. The satellite requisition form, shown in Exhibit I-5, serves as a source document for this process. The mechanic completes and signs this form and forwards it to the chief of maintenance for approval. He reviews the request and indicates approval by signing. The requisition form is then forwarded to the assistant chief of maintenance. Upon receiving the request, the assistant chief of maintenance checks to see if the item is in the central inventory. If it is, he takes the item from the inventory, updates the running totals, and delivers it to the requesting project. The process usually takes less than twenty-four hours if the items are in central inventory and seventy-two or more hours if they are not. The item is not deleted from inventory, however, until the work order is returned, as described above.

Replenishment of Inventories

This section addresses how the satellite, van, and central inventories are periodically replenished.

Satellites and Vans. The assistant chief of maintenance routinely restocks the satellite inventories on a monthly basis. This is accomplished through a trip to each site. As mentioned previously, current guidelines require that each satellite have two units of each item on-hand at the beginning of each month, unless usage patterns suggest more or less stocking. Before making trips to the satellites, the assistant chief of maintenance reviews the previous month's work orders (indicating parts used) and updates inventory level records; he uses these as a guide to each satellite's replenishment needs. However, when on-site, the assistant visually scans the stock shelves to detect any other deficiencies. Upon return to the central inventory records, he checks to detect any inconsistencies between his records and actual stock levels. Irreconcilable differences occur infrequently and are resolved in

EXHIBIT I-4
PROCEDURES AND RESPONSIBILITIES IN
HOPEWELL'S SATELLITE INVENTORY REQUISITION PROCESS

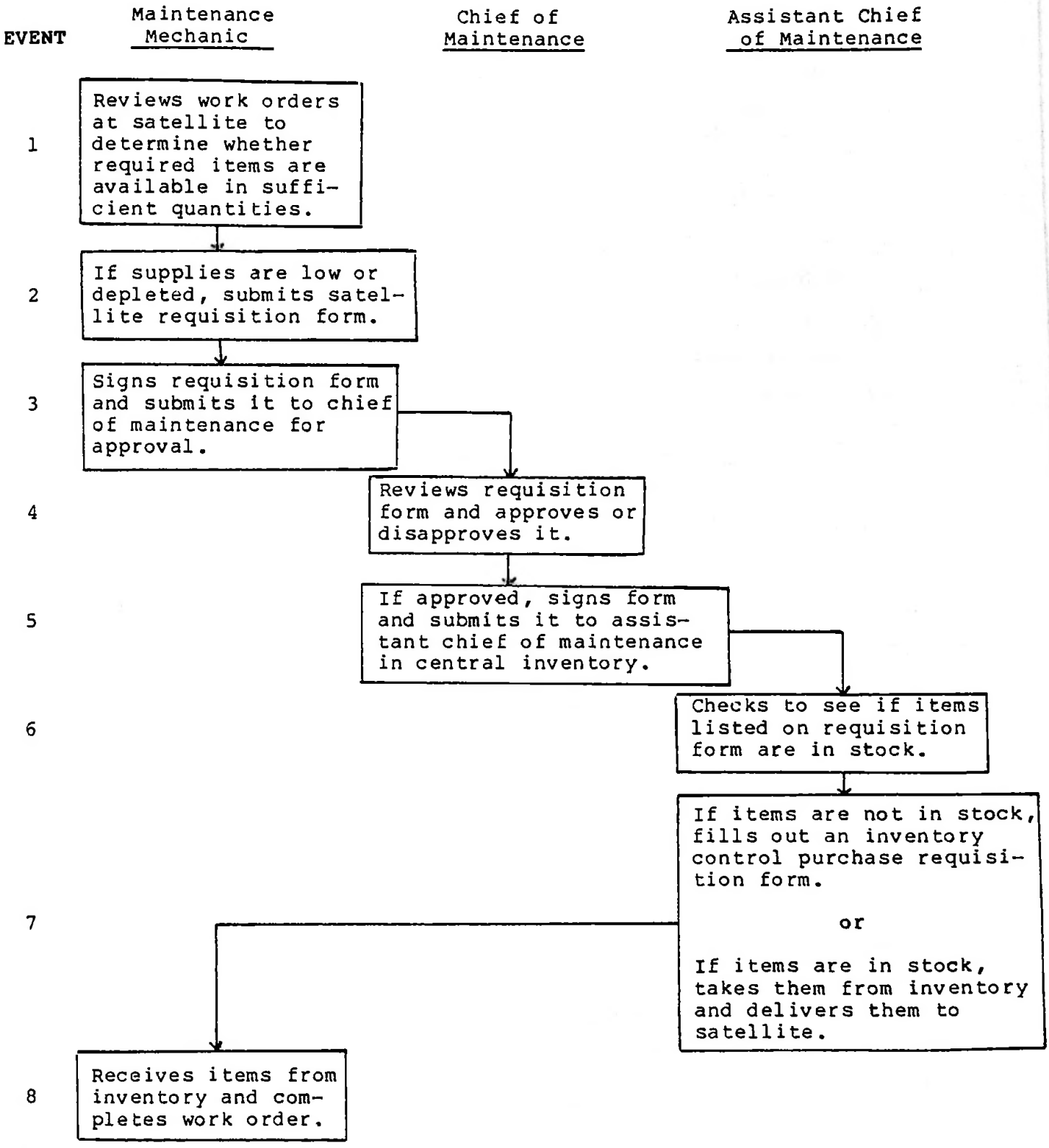


EXHIBIT I-5

SATELLITE PROJECT REQUISITION FORM

Note: This form is to be completed by maintenance personnel and resident managers for ordering of supplies and materials from inventory control. Form will be submitted to maintenance supervisor. Not to be used for office supplies.

ITEM AND QUANTITY	NO IN STOCK
Tub Diverter - 3 ✓	None
Shades 30x48" - 5 ✓	None
Shower Head - 1 ✓	One
1¼" Trap - 2 ✓	None
Biotron - 2 qts.	None

Kelda OK

REQUESTING SATELLITE: VA 52454 DATE: 7/19/84

SIGNATURE: _____

REQUISITION

RECEIVED BY: _____ DATE: 8/9/84

MAINTENANCE SUPERVISOR

COMMENTS:

consultations between the mechanics and the chief of maintenance.

Similarly, the assistant chief of maintenance also regularly restocks the van that operates for maintenance on weekends. The rate at which the van is restocked varies seasonally but averages about twice a month. As with the satellites, the assistant chief of maintenance determines replenishment needs by tallying the supply usage recorded on the work orders submitted at the end of each weekend by the truck maintenance person.

Replenishment of Central Inventory. The system is designed to trigger procurement activity whenever the quantity of a given item in the central inventory falls below a minimum acceptable level, and to facilitate procuring a fresh supply before the current one is exhausted.

Minimum levels are currently set based on the collective judgment of maintenance personnel. For most items, the assistant chief of maintenance seeks to have on-hand the equivalent of two units per project plus half again as many units in reserve. Items used more or less frequently than average, however, are kept in somewhat greater or lesser quantities. In addition, the levels for some items vary seasonally, to correspond with fluctuations in demand for the item. More furnace filters, for example, are stocked as the heating season approaches. When actual levels fall below minimum, the assistant chief of maintenance fills out an inventory control purchase requisition form. This form triggers the purchasing process, which is described in the next section.

Purchasing for Inventory

The assistant chief of maintenance also plays a key role in executing procurements. This person reviews a list of current and previous vendors organized by commodity type. He then contacts selected vendors to obtain price quotes for the

items to be purchased. For items already in use, he routinely seeks two copies from past or current suppliers. For new inventory items, four or more quotes are solicited from new or current suppliers.

Based on the best overall quotation, the assistant chief of maintenance then completes a purchase requisition form (see Exhibit I-6) and forwards it to the executive director for approval. Although the agency is required to seek competitive bids on all purchases that exceed $5,000, orders are seldom that large. Upon approval, the executive director forwards the approved requisition form to the finance department, where the assistant to the director of the department drafts a purchase order (see Exhibit I-7). The finance department staff places the order by telephone and sends the purchase order to the vendor to confirm the telephone order and also places additional copies of the order in the vendor file. When the goods are received by the assistant chief of maintenance, the contents of the shipment are compared to the purchase order (a copy of which is forwarded from finance). If the merchandise received matches the merchandise requested, he notifies the finance department to forward payment. The director of finance then reviews the procurement documents (requisition and order) and, if all is in order, approves payment. A check is then sent to the vendor.

In parallel with the above, the goods are checked into inventory by the assistant chief of maintenance. He attaches red ball stickers to those items valued at more than one dollar and updates the cards containing quantity-on-hand information to complete the procurement process.

EXHIBIT I-6

INVENTORY CONTROL PURCHASE REQUISITION FORM

NUMBER: _____

INVENTORY CONTROL PURCHASE REQUISITION

VENDOR
Wolverine Brass Works
648 Monroe Ave, NW
Grand Rapids, MI 49503

DATE
April 1983

MATERIAL REQUIRED BY:
DATE:
ASAP

CONTACT PERSON:

PHONE NUMBER:
1-800-253-9002

ACCOUNT NUMBER:

QUANTITY:	STOCK NO./DESCRIPTION	UNIT PRICE	TERMS TOTAL
3	Spour Assemblies	$13.55	$40.65
12	H/C Canopy Handles	$ 7.09	$85.08
12	H/C Stems	$ 8.51	$102.12

NEEDED: _____ WANTED: _____ ASAP: X

PROJECT TO BE CHARGED:
VA 54/55

INVENTORY CONTROL STOCK: YES ✓ NO _____

APPROVED _____ DATE _____

APPROVED (ACCOUNTING) _____ DATE _____

EXHIBIT I-7

PURCHASE ORDER

PURCHASE ORDER

HOPEWELL REDEVELOPMENT
AND HOUSING AUTHORITY
P. O. Box 1361
HOPEWELL, VIRGINIA 23860

(804) 458-5160 748-4290

Show this Purchase Order Number on all correspondence, invoices, shipping papers and packages. 2109

TO Glenwood Range Co.
435 Bank Avenue
Delaware, Ohio 43015

DATE 5/13/85

REQUISITION NO

SHIP TO 211 South 7th Ave.
Hopewell, VA 23860

REQUISITIONED BY	WHEN SHIP	SHIP VIA	F.O.B. POINT	TERMS
Ewsinger	ASAP			

QTY. ORDERED	QTY. RECEIVED	STOCK NO. / DESCRIPTION	UNIT PRICE	TOTAL
5		20-inch Gas Ranges GAP 22AA-043	188 32	941 60

Total cost this P.O. $941 60

Contract # H.C. 132-73

Authorized by: _____

II. WHY HRHA'S INVENTORY CONTROL IS EFFECTIVE

At the time this case study was prepared, Hopewell's new system had been operational less than one year. Therefore, truly meaningful quantitative measures of the system's impact on procurement and inventory activities were not yet available. Key Hopewell staff involved with the changes, however, already believe that the system has significantly improved operations. The following presents the salient factors that make the new system effective, in their view.

Foremost, the new system greatly enhances inventory control through more intensive monitoring of stock levels in all phases of inventory management. This yields several benefits. First, inventory levels are kept within nominal ranges--between minimum and maximum levels. Previously, such standards did not exist. As a result, stock "outages" at central or satellite locations rarely occur under the new system. This has a positive impact on maintenance response time because mechanics do not have to "chase down" parts needed immediately, or defer jobs because of unavailable parts. A second benefit of more intensive monitoring of stock usage is that it reportedly fosters greater accountability, and reduces the agency's vulnerability to unauthorized inventory shrinkage. The system is more effective in this regard because it has adequate audit trails for tracing supply usage, and reconciliation mechanisms to detect imbalances in inventory levels at all locations on a frequent and routine basis. A third benefit is that the agency is able to obtain better prices on materials because the inventory is replenished in a systematic fashion, thus permitting adequate time to search for the best prices. Over the long run, this will result in cost savings.

Another reason cited for the system's effectiveness is that it enhances control over the purchasing process. As described in Chapter I, there is better division of respon-

...ng. This
...to fraud and theft in the
...cess. And further, the system is more effective because it explicitly defines the documentation requirements and approvals needed to execute purchases. A prepayment audit is performed by the finance director to ensure that all necessary documentation is in-place and that needed approvals have been obtained before payment is authorized. This also greatly enhances control.

III. IMPLEMENTING SIMILAR INVENTORY CONTROL PRACTICES

Hopewell's central inventory control system has characteristics common to any good system of inventory control. It facilitates the systematic monitoring of inventory levels, establishes appropriate documentation and audit trails to track supply usage, and has good linkages with the purchasing process, which was also tightened as part of the new system. For these reasons, Hopewell provides good examples to other agencies seeking a low cost way to improve their inventory management function without additional staff or computerization. Two key factors that may justify active consideration of implementing a Hopewell-type system are: chronic understocking of key inventory items that results in frequent emergency purchase orders and degradation of maintenance responsiveness; and/or significant amounts of obsolescent materials in current inventory, or other symptoms of overstocking. Additionally, other agencies should review their system to determine whether there are adequate controls and divisions of responsibility and authority between the purchasing and inventory functions. This latter analysis is a prerequisite to assessing the agency's vulnerability to fraud and abuse, another reason to implement a tighter system.

If improvements are warranted, the forms, reports and workflows described in Chapter I are a good starting point for identifying and designing changes. Together, they illustrate a system that is well-coordinated between a central inventory and satellite inventories located at project locations. These tools will have to be adapted to conform to other agencies' organizational and staffing configurations in their maintenance, inventory management, and purchasing functions. Moreover, the Hopewell system illustrates how simple "triggers" can be set to initiate purchases when stock levels run low and to establish proper controls such that purchases are made in a competitive and appropriate manner.

FUNCTIONAL AREA:	Procurement and Inventory
EFFECTIVE MANAGEMENT PRACTICE:	Automated Material Inventory System (AMIS)
AGENCY:	The Housing Authority of High Point, North Carolina
SIZE:	Large

EXECUTIVE SUMMARY

This case study focuses on the Automated Material Inventory System (AMIS) implemented at the High Point Housing Authority (HPHA). An overview of HPHA's operations appears on page III-5.

AMIS, an automated system, supports HPHA inventory management and related functions in three fundamental ways. First, the system efficiently tracks quantity levels of over 3,000 items maintained in the agency's inventory. Second, AMIS streamlines the accounting and recordkeeping function for supplies used in maintenance operations through its automated interface with a work order system. And third, it streamlines the purchasing process by identifying items in low supply, highlighting relevant discount opportunities, and automatically generating hardcopy purchase orders.

Several aspects of HPHA operations have benefited from the implementation of AMIS, and they are described in Chapter II. The system has greatly improved tracking, which has increased staff accountability for supply usage and decreased unauthorized use. Maintenance operations have improved because fewer requests are deferred due to the unavailability of parts, and maintenance vans can be deployed more productively because of an automatic restocking feature in the system. Inventory costs are expected to decline over time as a result of the intensive monitoring of stock levels available through the system. The purchasing function has been aided as well. System-generated purchase orders significantly reduce the time required over the previous manual process. And finally, management control has been enhanced as a result of the implementation of system and manual controls facilitated by AMIS.

The AMIS system is transferrable to other agencies with similar size inventories. However, in-house computer capa-

bilities will greatly facilitate adoption of a similar system. Hardware acquisition costs can range from $15,000 to $25,000, and needed software can add an additional $3,500 to $8,500, depending on the features adopted. HPHA implemented AMIS later in the phased implementation of a comprehensive management information system. Thus, hardware costs were minimal, and total costs were largely those related to software development, which was handled through in-house programmers. Other agencies without such resources may be required to obtain outside assistance. These and other factors, such as assessing the technical feasibility of an AMIS-like system, are described in Chapter III.

HIGH POINT AT A GLANCE

CHARACTERISTICS	DATA
Total Stock:	1,654 units in 13 projects
• Projects for Families:	9 projects
• Projects for Elderly Tenants:	3 projects
• Unit Sizes:	efficiency ..... 6 percent one-bedroom .... 28 percent two-bedroom .... 30 percent three-bedroom .. 26 percent four-bedroom .... 7 percent five-bedroom .... 3 percent
• Largest Project:	Clara Cox Homes (250 units)
• Smallest Project:	Beamon Courts (60 units)
• Oldest Project:	Daniel Brooks Homes (1941) Clara Cox Homes (1941)
• Newest Project:	Scattered Sites (1984)
Demographics:	
• One-Parent Households:	77 percent
• Minority Tenants:	80 percent
• Children Under 18:	50 percent
Operations:	
• Operating Expenditures:	$186.54 (PUM)
• Dwelling Rentals:	$ 99.69 (PUM)
• Operating Reserve:	63 percent of allowable level
• Staffing:	60 employees (15 part-time): 35 administrative (6 part-time); 25 maintenance (9 part-time, seasonal).

I. HOW THE AUTOMATED MATERIAL INVENTORY SYSTEM SUPPORTS INVENTORY AND MAINTENANCE OPERATIONS

BACKGROUND

In the early 1980s, staff at the High Point, North Carolina Housing Authority (HPHA) developed the Automated Material Inventory System (AMIS). The impetus for AMIS arose from two sources: a lack of fundamental information concerning the status of the agency's inventory of supplies and materials; and the successful implementation of a comprehensive automated management information system (MIS).

Prior to AMIS, good inventory information was rarely available at High Point. This created several problems. First, there was an over-reliance on sporadic, ad hoc purchases of maintenance supplies. Maintenance personnel often spent considerable time searching for, and purchasing parts needed to complete jobs because the inventory was depleted. As a result, maintenance response time lagged, the cost per maintenance call increased, and purchasing costs were higher than they would have been if staff had "comparison shopped" and purchased the material in quantities sufficient to obtain vendor discounts. At the same time, the agency tended to overstock some parts due to a lack of information on how often they were used. Consequently, cash was needlessly tied up in items not frequently used. In fact, some items became obsolete or deteriorated in storage and were never used. Additionally, the lack of inventory information made it difficult to determine the source of inventory losses with any degree of confidence, thereby making the agency vulnerable to theft.

The second factor facilitating AMIS's adoption was the agency's implementation, in a phased manner, of a comprehensive management information system. Beginning in 1976, HPHA has developed a series of computer programs for the purpose of automating many recordkeeping functions. Exhibit I-1 on the next page lists the ten main components of the MIS and their

dates of implementation. As shown, implementation of AMIS was not undertaken until 1983.

EXHIBIT I-1

PHASED IMPLEMENTATION OF HPHA'S MANAGEMENT INFORMATION SYSTEM

Component	Date of Implementation
• Tenant Accounting System	1976
• Payroll System	1977
• General Ledger System	1979
• Occupancy Application System	1980
• Accounts Payable System	1981
• Turnkey III Homeownership System	1982
• Maintenance Records System	1983
• Section 8 Program	1983
• Material Inventory System	1983

Because the management information system was fully operational by 1983, most of the computer hardware needed to operate AMIS had been purchased and installed. The mini-computer, configured with two hard disks, eight terminals, and two printers was acquired for approximately $83,000. The nine software components identified above required an additional investment of approximately $109,000. All software developed between 1976 and 1981 was custom-developed through a contract with a software vendor. After 1981, software development has been handled by two HPHA staff members, without outside assistance.

Thus, the agency's lengthy experience with the development of the management information system gave HPHA staff substantial experience in developing and using software. This factor undoubtedly predisposed HPHA officials toward developing AMIS. It was clear from on-site interviews that the management information system has significantly improved planning and operational efficiency. This experience made further developments, including AMIS, more attractive and less intimidating

than otherwise would have been the case, and also eliminated additional hardware-related costs to support subsequent application software development. Further, there was no need to rely on outside consultants because the staff had acquired considerable expertise in computer programming.

OVERVIEW OF AMIS

The basic purpose of High Point's Automated Material Inventory System is to help the agency maintain an accurate and current inventory of parts used by the maintenance department. This is accomplished by allowing the staff to examine and manipulate a database with information on all supplies in stock. In this regard, AMIS performs two basic functions.

First, AMIS allows staff to easily create and update a comprehensive inventory record for each item in stock. Each record contains descriptive information, including the item's name, type, size, stockroom location, manufacturer, vendor, the quantity on hand, the desired minimum and maximum quantities, the unit price, the price discount (if any) for quantity purchases, and the length of time required to receive deliveries. With this information, the system generates various reports on individual items, groups of items, or all items in stock. These reports include quantities on-hand versus reorder levels, inventory value, differences between actual and "book" inventory values, costs of goods on-order but not received, and other quantity analyses and utilization rates for parts.

Second, AMIS supports the purchasing process by generating purchase orders using descriptive and other data. These purchase orders serve as the basic source document for the procurement process.

A detailed technical description of AMIS can be found in Appendix A. The remainder of this chapter provides a user-oriented description of how the system operates. The discussion is organized around the three major functions that AMIS

supports: disbursement of supplies and materials from inventory; replenishment of inventory by augmenting the purchasing process; and taking annual inventory counts. These discussions are prefaced by a brief overview of the key users of AMIS.

KEY ACTORS

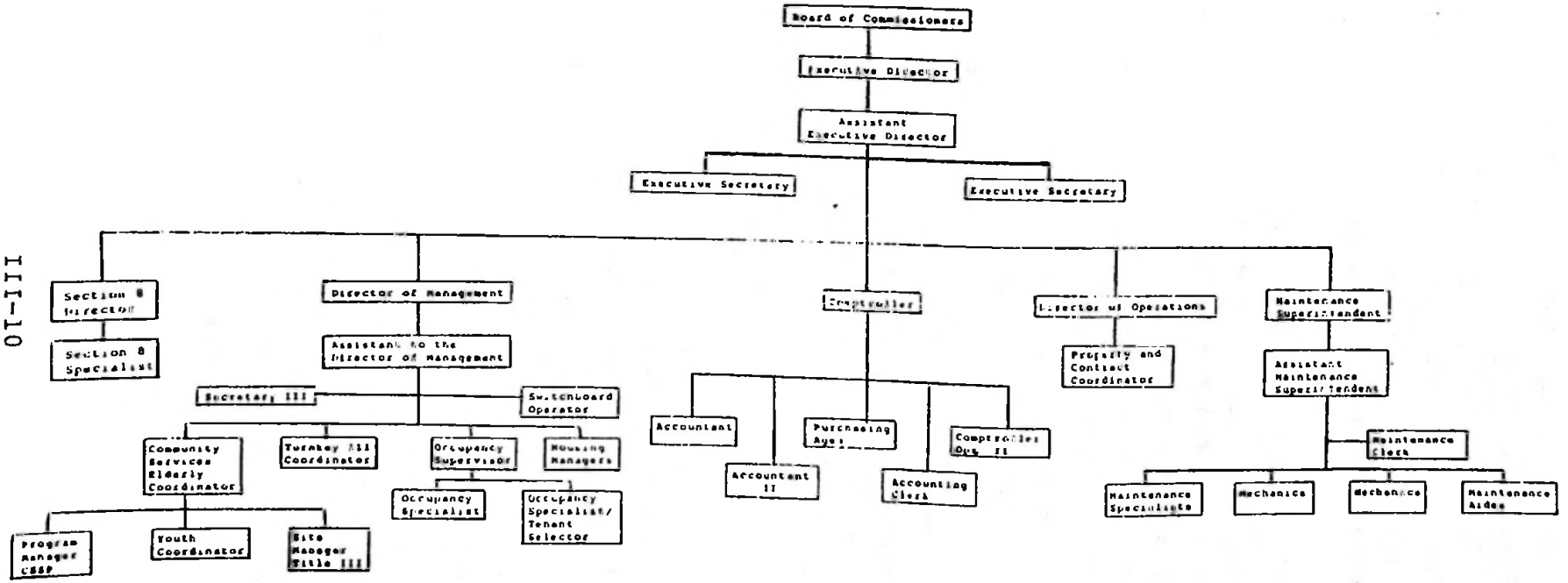
The purchasing agent for HPHA is the key actor in the operation of AMIS and inventory administration in general. The purchasing agent, under the general supervision of the comptroller (see Exhibit I-2) is responsible for:

- maintaining the agency's inventory of supplies, materials, and equipment;
- conferring with sales representatives about new products, prices and purchasing; and
- generating and processing purchase orders for inventory replenishment.

Pursuant to these general responsibilities, the purchasing agent physically receives and labels all supplies, verifies that what is received matches what was ordered, maintains the stockroom, and issues supplies to maintenance employees. He also helps improvise parts and materials when the stock of a needed item is temporarily depleted. Additionally, the agent has other ancillary duties. These include soliciting bids, negotiating for all types of insurance for the agency, and filing all insurance claims. Finally, and most important to this study, the purchasing agent has primary responsibility for maintaining and using AMIS.

One maintenance clerk plays an auxiliary role in maintaining inventory data. One of his specific duties is to enter into the computer all reductions in inventory resulting from the use of supplies by maintenance mechanics. These entries are made through an interface between AMIS and the Maintenance Work Order System--one of the ten MIS components. The purchasing agent and the maintenance clerk must have ready

EXHIBIT I-2
ORGANIZATIONAL PLAN



access to on-line computer terminals because of the need to update files frequently. HPHA has placed one computer remote terminal (CRT) in the purchasing agent's office and another in the maintenance office for this reason. The CRTs are connected to the agency's central minicomputer, which operates all of the management information system software.

HOW AMIS SUPPORTS DISBURSEMENT OF INVENTORY SUPPLIES

AMIS is designed to operate in conjunction with the workflow of the maintenance department, allowing HPHA officials to track supplies and establish accountability for their use. As supplies are used, the automated system adjusts the inventory and ultimately triggers the procurement of replacement supplies. Maintenance activity at HPHA is coordinated from a central maintenance building that also houses the central inventory. The agency's twenty-five full-time maintenance employees are dispatched from this location using a fleet of twenty vans. Each van is equipped with the supplies needed for routine maintenance tasks in HPHA's projects. The following discussion elaborates on how AMIS supports this process, which is illustrated in Exhibit I-3.

Work Flow

The two maintenance clerks take phone and walk-in requests for maintenance, draw up work orders, and schedule maintenance calls. After receipt of a request, the maintenance clerks log in the name and address of the caller, note the nature of the problem, and assign a work order number to the request using the sample log sheet shown in Exhibit I-4.

The data are entered into the Maintenance Work Order System and a hardcopy work order is generated by the computer (see Exhibit I-5). Each work order contains the tenant name, unit number, work to be done, assigned personnel, repairs to be made, estimated time required to make the repairs, and vehicle used. On the basis of the work request, maintenance workers

EXHIBIT I-3

DISBURSEMENT OF MAINTENANCE SUPPLIES

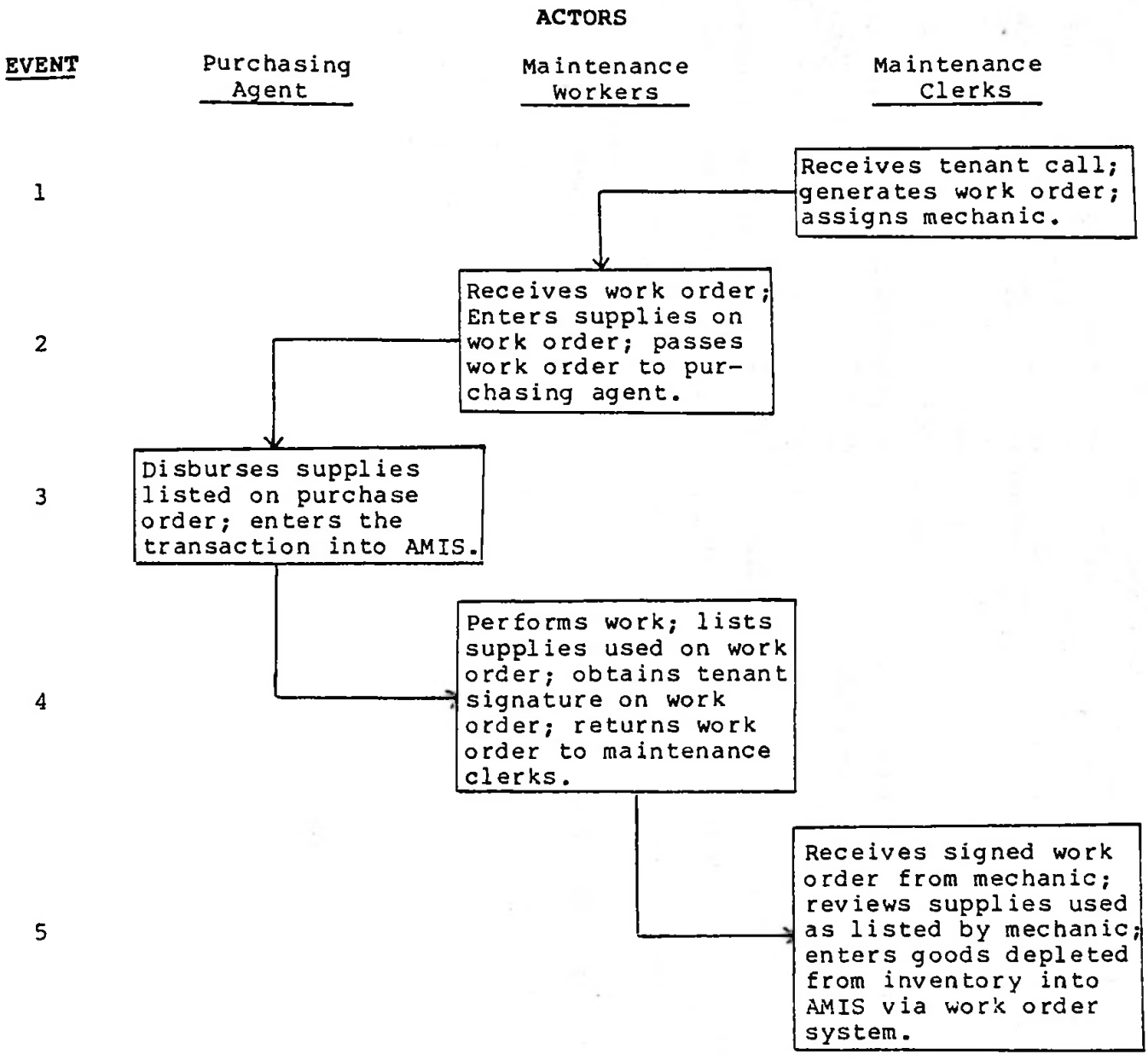


EXHIBIT I-4
HPHA LOG SHEET

DATE 6/ /1985
PAGE 15

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
MAINTENANCE WORK ORDER LOG

W/O NO. CREATED. TIME. / UNIT #. SCHEDULE	PTY ENT	SVC	SERVICE DESCRIPTION.....	TENANT'S NAME..... / UNIT ADDRESS.....	REQUESTED BY...	PHONE NO / LEASED..	FAMILY STATUS.
#167591 06/05/85 13:16 606-733	4 Y	999	MISC. SERVICES	4CO ANAHEIM			
REPAIR NO. 1 : REMOVE REFRIGERATOR				ASSIGNED TO: 19	DATE: 06/05/85	TIME: 13:16	
#167592 06/05/85 13:17 602-266	5 Y	060 1	CLEAN & PPR VACANT UNIT	MARY CHARLES 1441-E WEST		883-9671 05/31/67	ELD
REPAIR NO. 1 : CLEAN & RPR VACANT UNIT				ASSIGNED TO:	DATE:	TIME:	
#167593 06/05/85 13:17 602-266	5 Y	061 1	VACANT APT CLEAN CONTRACT	MARY CHARLES 1441-E WEST	MAINTENANCE	883-9671 05/31/67	ELD
REPAIR NO. 1 : CONTRACT CLEANING OF VACANT UNIT				ASSIGNED TO:	DATE:	TIME:	
#167594 06/05/85 13:17 602-266	5 Y	101 1	PAINT VACANT APT	MARY CHARLES 1441-E WEST	MAINTENANCE	883-9671 05/31/67	ELD
REPAIR NO. 1 : PAINT VACANT UNIT				ASSIGNED TO:	DATE:	TIME:	
#167595 06/05/85 13:17 602-266	5 Y	064 1	INSPECT COMPLETED VACANT UNIT	MARY CHARLES 1441-E WEST	MAINTENANCE	883-9671 05/31/67	ELD
REPAIR NO. 1 : INSPECT COMPLETED VACANT UNIT				ASSIGNED TO:	DATE:	TIME:	
#167596 06/05/85 13:17 602-266	3 Y	321 1	CHANGE LOCKS ON VACANT UNIT	MARY CHARLES 1441-E WEST	MAINTENANCE	883-9671 05/31/67	ELD
REPAIR NO. 1 : CHANGE LOCKS ON VACANT UNIT				ASSIGNED TO:	DATE:	TIME:	
#167597 06/05/85 13:19 601-368	4 Y	963	RPR FAUCETT	621-C GRIMES			
REPAIR NO. 1 : FAUCETT LOOSE ON KITCHEN SINK AND PIPES UNDER REPAIR NO. 2 : SINK LEAKING REPAIR NO. 3 : NO HOT WATER				ASSIGNED TO: 20	DATE: 06/05/85	TIME: 13:19	
#167598 06/05/85 13:21 601-368	4 Y	969	UNSTOP BATHROOM SINK	621-C GRIMES			

EXHIBIT I-5
HPHA WORK ORDER

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
POST OFFICE BOX 1779
HIGH POINT, NORTH CAROLINA 27261

WORK ORDER

ADMINISTRATIVE OFFICES: 919 887-2661
MAINTENANCES DEPARTMENT 919 883-9159

DATE WORKED	TIME STARTED	TIME STOPPED	MILEAGE OUT	MILEAGE IN	VEH. NO.	POSTING STAMP
5-1-85	3:30	4:30			29	

	DESCRIPTION OF REPAIRS MADE	CODE	CH?	EMP NO.	TIME	O?	DESCRIPTION OF MATERIALS USED	QTY.	UM	STOCK NUMBER
1	Replaced Commode	970	Y N	279	1.0		Wax Ring	1	/	922252
2			Y N							
3			Y N							
4			Y N							
5			Y N							

TTT-14

ORDER NO.	DATE/TIME RECEIVED	WORK REQUESTED BY	RESIDENT'S NAME	FAMILY STATUS
165801	04/24/85 09:34			NON ELDERLY

UNIT NO.	PTY	CODE	SVC DESCRIPTION	ADDRESS	BR	PHONE NO.
611-047	4	970	RPR COMMODE	2327-G GRANVILL	3	

DESCRIPTION OF WORK TO BE DONE
1 COMMODE UPSTAIRS WHEN FLUSHED OVER FLOWS &
2 FLOODS BATHROOM
3 KITCHEN CELING ABOUT TO FALL IN FROM COMMODE
4 UPSTAIRS OVER FLOWING
5 Painter need to fix Celing in Kitchen, Work order 166132

INCOMPLETE

ORDER NO.	RECEIVED	PTY	DESCRIPTION	SCHEDULED
165800	04/24/85	4	19 MISC. SERVICES	

OTHER REFERENCE	ORDER NO.	WORKED	EMP NO.	ORDER NO.	WORKED	EMP NO.	OTHER MISCELLANEOUS
CALL BACK	162628	03/11/85	263				

DATE LEASED	CHG	ENTRY	SCHEDULED	RESIDENT'S OR SIGNATURE OF PERSON WHO REQUESTED WORK	DATE SIGNED	SUPERVISOR
03/27/80		YES		✓		

MAINTENANCE

usually are able to estimate the type and quantity of materials needed for repairs. These items are entered on the work order in the section labeled "Description of Materials Used." If mechanics do not already have the supplies in their vans, they take the work orders from the maintenance shop to the central inventory area. Central inventory consists of a stockroom containing approximately 3,000 types of items and the office of the purchasing agent. The agent's office is located between the stockroom and the maintenance building's common area. One door connects the office to the stockroom and another leads to the common area. A pass-through window faces from the office onto the common area. The stockroom is a secured area with limited access by key.

Maintenance mechanics request materials by presenting work orders to the purchasing agent through the pass-through window. The official procedure calls for the purchasing agent to enter the stockroom, locate the parts by referring to the stock numbers and material descriptions entered on the work orders, return to the window, and issue the items to the mechanics. However, personnel turnover at the agency has been high recently, and this has necessitated some variance from official policy. Because the current purchasing agent is still familiarizing himself with the inventory, and the maintenance mechanics do not always know the stock numbers of items they are requesting, they sometimes accompany the purchasing agent into the stockroom to help identify the items sought. Agency officials consider this practice undesirable and plan to end it once the staff learns the inventory and stock numbers.

Inventory Accounting

After the purchasing agent has issued an item, he records the transaction in AMIS. At HPHA, the term "warehouse" includes not only the central inventory but individual maintenance vehicles as well. Thus, each vehicle is assigned a warehouse number. Upon issuing items from central storage to a mechanic,

the purchasing agent records the transaction as a transfer from the central inventory--Warehouse 01--to the mechanic's vehicle--Warehouse 02, for example. This reduces the inventory levels in central storage but increases them at the other "warehouse." All other AMIS records detailing the quantity of supplies at various locations are automatically updated. It should be emphasized that inventory is not deleted from the AMIS records at this point. This occurs only after the mechanic completes the work, obtains the tenant's signature on the work order, makes any adjustments to reflect actual parts used, and returns a copy of it to the maintenance office. (The tenant's signature is considered positive indication that the work has been performed.) Only then does the maintenance clerk reduce inventory levels within the database. Until the signed work order is returned (and some time may elapse before this occurs if the tenant was not immediately available), the items are the mechanic's responsibility. Supplies that turn out to be unnecessary for a repair may be returned to central storage or kept in the mechanic's vehicle. As long as the supplies remain in the mechanic's vehicle or possession, however, they remain recorded in the vehicle's inventory.

Manual and Systems Controls

Two types of controls have been built into this process. First, requiring mechanics to obtain the tenant's signature prevents them from diverting supplies to their own use. Second, having maintenance department personnel reduce inventory levels only upon actual use of supplies prevents the purchasing agent from arbitrarily reducing the inventory levels. AMIS makes it impossible for the purchasing agent to reduce inventory levels because that individual does not have official access to the Work Order System, which is the only means for reducing inventory counts.

HOW AMIS SUPPORTS INVENTORY REPLENISHMENT

The Automated Material Inventory System is designed both to systematically identify inventory replacement needs and to facilitate the procurement process itself. In this regard, AMIS has an automated interface with the procurement system, much the same way as it interfaces with the Work Order System as discussed previously.

Identifying Replenishment Needs

The system's most important procurement function is to help staff maintain a minimum quantity of each stock item held in the central inventory. System files contain elements indicating the minimum acceptable inventory levels for each stock item. (These are now based primarily on the staff's judgment regarding usage.) By accessing a file sorted by stock numbers or another sorted by vendors, staff can generate lists of items whose inventories are below minimum acceptable quantities. Exhibit I-6 provides examples of two AMIS generated lists used for this purpose--"Reorder Report by Stock Number" and "Reorder Report by Vendor Number."

Another central function of AMIS is to help avoid overstocking by specifying the maximum quantity of each item that should be kept on-hand. These maximum levels are meant to provide an adequate margin for unexpectedly high levels of short-term use and, at the same time, help staff avoid overstocking items or purchasing them too frequently.

Once the purchasing agent determines which items are in short supply through the above lists, the system generally directs him to order a quantity equal to the difference between the maximum and minimum allowable inventory levels. However, the reorder reports contain information about price advantages for buying larger quantities that may affect the actual quantity ordered. Once the desired quantity has been established the agent uses the system to write a purchase order for each vendor, as shown in Exhibit I-7. (It should also be noted that

EXHIBIT I-6
AMIS REPORTS: "REORDER REPORT BY STOCK NUMBER" AND "REORDER REPORT BY VENDOR NUMBER"

DATE 6/25/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
REORDER REPORT - BY STOCK NO.

STOCK # WH	NAME..... TYPE.....	PRJ SIZE.....	UM	VENDOR..... VNDR #/VNDR STK NO.	MIN INSTK	MAX ORDER	PRICE BREAK	LST OR'D LST USED	UNIT. PRICE	PROJ'TD COST...
0000013 01	PAPER, COMPUTER 4 PART 1/2 GREEN BAR	14 7/8 X 11	BX	GIBBS BUSINESS FORMS CO. 100014 144112GR 4 PART	1 0	3 3	0	02/20/84 / /	46.34	139.02
0000024 01	PAPER, COMPUTER 3 PART CUSTOM	7 X 11	BX	GIBBS BUSINESS FORMS CO. 100014	2 1	4 3	0	/ /	0.00	0.00
0000303 01	PAPER, COPY (FOR CANON) 1BX=10RM	8 1/2 X 14	BX	CAROLINA RIBBON 100009 134504	2 1	16 15	15	05/28/84	42.50	637.50
0360980 01	THRESHOLD, VINYL TOP MODEL 850 ZIP 91390	30 INCH	EA	NOBLIT BROTHERS & CO 200004 ZIP 91390	1 0	18 18	1	/ /	2.60	46.80
1100010 01	PAINT, EXTERIOR EXTERIOR	GALLON	GL	CAMCO PAINTS 120002	20 0	370 370	2.000	09/15/83	6.19	2,290.30
1100020 01	PAINT, EXTERIOR EXTERIOR	GALLON	GL	PPG INDUSTRIES, INC. 120001	20 0	250 250	1	04/13/81	5.41	1,352.50
1100110 01	PAINT, TRAFFIC YELLOW MARKING 11-4	5 GAL	GL	PPG INDUSTRIES, INC. 120001 11-4 PAINT	1 0	10 10	5	09/09/83 08/14/84	14.25	142.50

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
REORDER REPORT - BY VENDOR NO.

STOCK # WH	NAME..... TYPE.....	PRJ SIZE.....	UM	VENDOR..... VNDR #/VNDR STK NO.	MIN INSTK	MAX ORDER	PRICE BREAK	LST OR'D LST USED	UNIT. PRICE	PROJ'TD COST...	$ D
4400090 01	CORD, EXTENSION 16 GAUGE 3 WIRE	50 FEET	EA	BROOKS MILLIKEN 000047 2592020	1 0	8 8	1	06/06/83 10/19/81	5.88	47.04	
0000303 01	PAPER, COPY (FOR CANON) 1BX=10RM	8 1/2 X 14	BX	CAROLINA RIBBON 100009 134504	2 1	16 15	15	05/28/84	42.50	637.50	
0000013 01	PAPER, COMPUTER 4 PART 1/2 GREEN BAR	14 7/8 X 11	BX	GIBBS BUSINESS FORMS CO. 100014 144112GB 4 PART	1 0	3 3	0	02/20/84 / /	46.34	139.02	
0000024 01	PAPER, COMPUTER 3 PART CUSTOM	7 X 11	BX	GIBBS BUSINESS FORMS CO. 100014	2 1	4 3	0	/ /	0.00	0.00	
1100020 01	PAINT, EXTERIOR EXTERIOR	GALLON	GL	PPG INDUSTRIES, INC. 120001	20 0	250 250	1	04/13/81	5.41	1,352.50	
1100140 01	PAINT, PORCH AUTUM BROWN 6-587	GALLON	GL	PPG INDUSTRIES, INC. 120001 AUTUM BROWN LTX	1 -10	6 6	1	12/05/83 03/06/84	20.67	124.02	
1300080 01	HANDLE, ROLLER PAINT ROLLER EXTEN	48"	EA	PPG INDUSTRIES, INC. 120001 749-302	1 0	2 2	1	06/06/83 / /	2.49	4.98	

EXHIBIT I-7
SAMPLE PURCHASE ORDER

PURCHASE ORDER

HOUSING AUTHORITY
of the
City of High Point

Purchase Order No. : 950523
Purchase Order Date: 05/06/85

ADMINISTRATIVE AND MAINTENANCE OFFICES: 500 EAST RUSSELL STREET, HIGH POINT, NORTH CAROLINA 27261 PHONE (919) 887-2661

TO: J. A. SEXAUER, INC.
10 HAMILTON AVE.
WHITE PLAINS NY 10601

VENDOR NO.: 900001

INVOICE #.	VENDOR ITEM #..	##	PART #.	PART NAME.....	PART TYPE.....	PART SIZE.....	QTY...	UNIT	UNIT PRICE	TOTAL PRICE
074559		01	9301190	KIT, DELTA			6	EA	1.47	8.82
118356		02	9200980	TUBE,EXTENSION		1 1/2 X 6	6	EA	3.70	22.20
062844		03	9200300	TAIL PIECE	062844	1 1/2 X 8	6	EA	3.70	22.20
086454		04	9300040	COMMODE FLOAT BALL	BLUE SPOT 058909		12	EA	0.96	11.52
072595		05	9200030	AERATOR, FAUCET	(MALE) 072595	7259	6	EA	1.50	9.00
046524		06	9100080	STEM, FAUCET	046524		6	EA	5.50	33.00
050518		07		FLAT WASHERS			6	C	10.40	62.40
061820		08	9200370	CONNECTOR, CHAIN	BEADED 061820		36	EA	0.12	4.44
051227		09		O RINGS			1	C	12.00	12.00
051250		10	9100400	O RING	051250	#5	100	EA	0.16	16.00
027177		11	9600090	STEM, TUB	ELJER 027177	027177	6	EA	9.50	57.00
038869		13		PACKING			50	EA	0.50	25.00
070565		15	9100120	STEM, FAUCET	070565		12	EA	1.50	18.00
070557		16		PACKING			50	EA	0.50	25.00
032235		17	9600290	STEM, TUB	KOHLER 032235		6	EA	9.95	59.70
046706		18	9500250	STEM, TUB	AM STD 2-32 S/A		10	EA	8.50	85.00
060459		19	9300230	BOLT, CLOSET	COMMODE 060459		50	EA	0.68	34.00
036616/HM1911		20	9300290	HOLDER, TISSUE	ROLLER 036616		12	EA	0.75	9.00
004648		21	9201420	INSERT, HANDLE	1-6 11605 1-6	1-6	12	EA	1.25	15.00
074914		22	9100470	SEAT, FAUCET	074914		50	EA	0.80	40.00
071456		23	9500750	SEAT, FAUCET	071456		24	EA	0.95	22.80
074856		24	9100500	SEAT, FAUCET	HARCRAFT 074856		24	EA	0.80	19.20

SUB TOTAL	611.28
TAX	27.51
TOTAL	638.79

CERTIFICATION : This instrument has been preaudited in the manner required by the Local Government Fiscal Control Act.

CERTIFIED BY : _____, COMPTROLLER

REQUISITIONED BY: _____, _____

APPROVED BY : _____, EXECUTIVE DIRECTOR DATE: _____

HPHA participates in HUD's Consolidated Supply program.) For each item, the order lists the stock number, quantity, date needed, unit price, and total cost.

Executing Inventory Replenishment

As have other agencies, HPHA has implemented a set of approval procedures and processes based on the overall dollar value of the purchase. Exhibit I-8 provides a summary of the HPHA practices.

Once a purchase order is finalized by signature or bid, the purchasing agent sends a copy to the accounting department. An accounting clerk places the order, usually by phone, with the vendor. A copy of the purchase order is not usually sent to the supplier. When the vendor's invoice arrives, an accounting clerk enters the transaction into the Accounts Payable System and then transfers the invoice to the purchasing agent, who keeps the hardcopy purchase order on file.

Receipt of Goods and Payment

Upon receipt, the purchasing agent verifies the accuracy of the shipment by checking the contents against the original purchase order, the invoice (if it has been received), and the delivery ticket. If the goods and documents agree, he signs the invoice and forwards it to the accounting department. The agent then enters a transaction to add the new stock into AMIS, which automatically updates all quantity information maintained by the system. The accounting staff considers a signed invoice proof of receipt and authorization for final payment. The accounting department then generates a check for the vendor and updates the Accounts Payable System to reflect the purchase.

Partial Shipments. If a partial shipment is received, the agent manually checks off on the invoice those items included in the shipment. Planned software improvements will eliminate this problem in the near future by providing a separate transaction for partial shipments. At present, only when all items

EXHIBIT I-8

PROCUREMENT POLICIES/PROCEDURES AT HPHA

Dollar Value	Required Approvals	HPHA Competitive Procedure
less than $100	• Purchasing Agent • Comptroller	• informal price quotations
$100 to $500	• Purchasing Agent • Comptroller • Asst. Exec. Director	• informal price quotations
$500 to $1000	• Purchasing Agent • Comptroller • Asst. Exec. Director	• informal price quotations
$1,000 to $10,000	• Purchasing Agent • Comptroller • Asst. Exec. Director • Exec. Director	• required to obtain three price quotations
$10,000 and over	• Purchasing Agent • Comptroller • Asst. Exec. Director • Exec. Director	• formal sealed bid required

have been received does the agent update AMIS. This transaction is handled as if a single shipment corresponding to the purchase order had been received.

Placing Stock in Inventory

After the above paperwork has been completed, the purchasing agent prepares the new items for the inventory area. Two AMIS files, entitled "Request Stock Labels" and "Print Stock Labels," facilitate this process by generating necessary labels. The label includes: the item's stock number; assigned stockroom section and shelf number (location); name, size, type, and unit of measure; and year of purchase. Once all the necessary labeling has been done, the items are checked into the stockroom and the inventory replenishment process is complete and the materials are available for distribution.

HOW AMIS SUPPORTS ANNUAL INVENTORY COUNTING

A third major activity to which AMIS contributes significantly is the taking of inventory. This task is done at High Point on an annual basis. However, AMIS will accommodate more or less frequent intervals. AMIS helps to simplify this process in two important ways. First, staff can quickly identify on-hand stock by generating a computerized list of each stock item in storage location sequence. Prior to implementing AMIS, staff at High Point did not record the locations of supplies. As a result, conducting inventory counts involved not only physically counting each item, but also identifying each item to be counted (by stock number). The AMIS-generated stock label, with precise descriptive information, makes it easier to identify and locate each item and significantly reduces the time associated with this task.

A second way that AMIS helps the inventory process is by automatically calculating the difference between the "book" count and the actual physical count, and the dollar value of these differences after the staff has entered the counts into AMIS. After performing these calculations, AMIS automatically updates all related system files. It should be noted, however, that the purchasing agent cannot unilaterally alter any quantity data in the AMIS database that an inventory shows to be incorrect. Prior to entering the appropriate transactions in AMIS, these changes must be approved by the comptroller, as a system control feature.

ITEMS NOT TRACKED BY AMIS

AMIS tracks most supplies used by the agency. Two types of goods are exceptions, however. The first is durable goods, such as stoves, refrigerators, office equipment, and vehicles. HPHA maintains separate storage facilities and separate record-keeping procedures for these items. Other goods not tracked by AMIS include low-cost bulk commodities, such as nails and paper that the agency purchases in quantity and makes available on

demand. Management believes that the time and effort required to track these items in AMIS is not justified by their value.

PLANNED ENHANCEMENTS

Disbursement activities may be significantly revised soon. High Point's executive director intends to have the purchasing agent automatically restock vehicles with all parts needed for common repairs throughout the agency's projects. This would reduce the need for mechanics to acquire supplies from central inventory on an as-needed basis to perform routine maintenance tasks. An AMIS file called "Restock Vehicles" can produce a report about each vehicle identifying items that have fallen below specified minimum quantities. In the future, the purchasing agent will set this quantity based on estimates of demand, and will automatically restock the truck when the supplies fall below minimum levels. This change will not materially effect how supplies are tracked by AMIS. The purchasing agent would "charge" the mechanic for supplies from central inventory and record them in the Warehouse Transfer file and the vehicle inventory would only be reduced upon receipt of signed work orders. However, the change is expected to improve maintenance productivity because trucks will not be required to return to the central inventory for routine supplies before proceeding to a job.

II. WHY THE AUTOMATED MATERIAL INVENTORY SYSTEM IS EFFECTIVE

Quantifiable measures of the Automated Material Inventory System's impact will not be available until HPHA completes its 1984 inventory and a meaningful period of time has elapsed after the system is fully operational. It was clear at the time this case study was prepared, however, that the agency's staff firmly believed that the system benefits HPHA's operations in several ways. One broad but quite important benefit of AMIS is that the improved tracking of inventory aided by AMIS greatly increases staff accountability for supply usage. Reportedly, this single factor has already fostered increased staff efficiency and reduced unauthorized use of agency supplies and materials. The director of management, who played a central role in designing and implementing AMIS, enumerated several more specific improvements. These include enhancements to purchasing, inventory management, and maintenance operations.

IMPROVEMENTS IN PURCHASING

The purchasing function benefits from AMIS in three concrete ways. First, the time needed for creating a purchase order has been reduced significantly--from about ten minutes to three minutes. Second, AMIS-aided changes in manual controls have reduced the agency's vulnerability to fraud and theft in the purchasing process. Under the previous system, staff sometimes ordered supplies although no purchase order was prepared. Now, all vendor payments must be based on a validated purchase order. AMIS made drafting purchase orders quick and easy; this facilitated management's ability to implement these tighter procedures. A third way that AMIS aids the purchasing function and the agency in general is by allowing the purchasing agent to take better advantage of price discounts. This is because AMIS maintains information on vendor discounts for each stock item. Thus, the agent is better informed about discount opportunities, and can save the agency considerable money.

IMPROVEMENTS IN INVENTORY MANAGEMENT

AMIS has greatly improved this function as well. First, through various reports, AMIS makes it easy for staff to identify items in short supply and reorder them as appropriate. When used properly, this feature reduces costs in several ways. For example, it helps to minimize work orders that cannot be completed due to the unavailability of supplies and reduces the need for maintenance and other staff to "scavenge" for spare parts because the central inventory is depleted. Further, AMIS allows staff to fine-tune reorder levels by monitoring item usage rates. This is done by examining the year-to-date usage levels displayed in several of the reports AMIS generates. Similarly, AMIS also helps minimize overstocking. Because the system contains a "desired" maximum inventory level for each item, the purchasing agent can easily determine the amount to reorder. Cost-effective management of stock levels in this manner improves the agency's cashflow.

A final benefit of AMIS is that it greatly simplifies the inventory-taking process by making it easy to visually identify on-hand stock items and calculate their quantity and value. This feature significantly reduces the time required and increases the accuracy of annual and interim stock inventories.

IMPROVEMENTS IN MAINTENANCE

High Point's maintenance operations have been improved as a result of better availability of supplies and materials. A more significant AMIS-aided change to maintenance operations, which was discussed previously, is the automatic restocking of maintenance vehicles. When this feature is implemented, significant cost savings and improved response time will occur. This is because maintenance trucks and crews will have a well-stocked inventory on-board and will be dispatched on-demand by radio. Thus, they will not have to return to the maintenance building for supplies, as was the case previously. This change is expected to significantly increase staff productivity.

III. IMPLEMENTING A SYSTEM SIMILAR TO THE AUTOMATED MATERIAL INVENTORY SYSTEM

Public housing agencies interested in adopting systems similar to High Point's AMIS need to examine closely the feasibility and desirability of such an endeavor. It is recognized that this may be quite difficult without in-house computer expertise. Qualified consultants could help in this regard. The following discussion lays out some key considerations in conducting a feasibility study, whether done in-house or by consultants.

ASSESSING NEED

First consideration should be given to an assessment as to whether an agency needs a system as sophisticated as AMIS. For smaller public housing agencies, especially those with limited procurement and inventory functions, inventory size may not justify the expenditure required to implement such a system. High Point's inventory consists of approximately 3,000 items used in thirteen projects. Well-designed manual control systems may prove to be cost-effective at agencies with significantly smaller inventories because many functions performed by AMIS can be done quite effectively on a manual basis, although an AMIS-like system might greatly facilitate task performance. On the other hand, in larger agencies with essentially centralized inventory, automating procurement and inventory recordkeeping can result in significant timesavings and better management control. Benefits similar to those enumerated in Chapter II would be likely. Thus, large agencies should seriously consider AMIS-like systems if they have not already done so.

The issue is not as clear-cut with medium-sized agencies. It would be advisable for most medium-sized agencies to carefully evaluate their situation. It may be productive to engage a consultant to accurately assess the agency's needs and

outline the costs and benefits of automation, if that is an attractive alternative.

A related point here is that agencies should not prematurely dismiss AMIS because either their inventory, maintenance or purchasing flows are structured differently from High Point's. Although High Point's systems are largely centralized, a system like AMIS could be used by agencies that have project-based inventory. Just as a terminal in the HPHA's purchasing agent's office can be linked to the agency's minicomputer, a terminal located at another agency's multiple inventory locations could be linked to a central computer, using software similar to that which High Point uses.

CHANGES IN ORGANIZATION AND STAFFING

Other agencies may be required to alter the types of positions in their organizational structure or upgrade the skill levels required of particular positions to accomodate a new automated system, as was required at High Point. The chief of maintenance did the purchasing before AMIS was installed and for the first few months that the system was operational. The responsibility was then transferred to the newly created position of purchasing agent and supervision for that position was transferred to the comptroller. One reason for this change was accountability. Agency officials felt that separating the procurement and inventory function from the maintenance function would establish more effective checks and balances over supply use. This is consistent with widely accepted management theory. Another contributing factor to High Point's administrative changes was staff resistance to AMIS within the maintenance department. Aside from the more stringent accountability for supplies fostered by AMIS, some employees resisted the change to a computerized system. This phenomenon is not uncommon when organizations adopt an automated system to replace a conventional manual system. Not only do long-tenured workers tend to find a new system more

constraining, but they may often be intimidated by the need to learn new job skills.

High Point's experience here suggests at least two lessons. First, an agency with a sizable inventory should probably have a full-time purchasing agent to manage inventory-related matters. If the agency already has a purchasing agent, additional personnel to operate AMIS probably would be unnecessary; just a realignment of responsibilities likely would be required. Second, agencies should anticipate staff resistance to automation. This particularly would be the case if the new system engenders tighter controls. This resistance can substantially retard or halt implementation of any system, and reorganization is sometimes the only means of overcoming this obstacle. This does not imply that personnel changes must occur in the face of automation. AMIS is relatively easy to master for any person with knowledge of basic inventory control techniques. The more relevant factors probably are the degree of employee commitment to the organization, to learning the new system, and to the availability of good user training and documentation.

CURRENT COMPUTER CAPABILITIES

In-house computer resources, both equipment and human, significantly affect the feasibility of adopting a system like AMIS. This is because the cost of implementation could be achieved at much lower cost if an in-house computer could be adapted to accomodate AMIS. In these cases, the cost would be limited principally to acquiring and customizing the software. If existing staff members could develop or customize the software, the cost would be minimal and there might be little or no need to hire consultants to design and implement the system.

Agencies that lack in-house computer capabilities would face significant acquisition and operating costs. As mentioned previously, High Point staff members estimate that it would cost roughly $15,000 to $25,000 to purchase the hardware needed

to implement a system to track inventory. AMIS software, if purchased commercially, would cost an additional $3,000 to $3,500. Maintenance work order software, which further enhances inventory control, would add another $4,000 to $5,000. Another significant cost that should be considered is the cost of maintaining the system once it is operational. A major item here would be staff costs for any additional inventory and maintenance personnel that might be needed in operations or to run the computer. Operating costs also include vendors to repair the system when it breaks down and the incidental costs of supplies and materials.

Clearly, installing an AMIS system from scratch would be costly. For this reason, agencies may wish to consider implementation of automated support for inventory and purchasing within a larger context and priority scheme for agency automation. You will recall that AMIS was the tenth application to be implemented by High Point. Other agencies may wish to examine automation needs in other areas to establish a coordinated, comprehensive strategy.

APPENDIX A
SYSTEM DESCRIPTION

High Point Housing Authority's Automated Material Inventory System is supported by an impressive hardware configuration, highlighted by a Data General Nova 4 minicomputer with 256 KB of memory. The configuration also includes two 25 megabyte fixed disks, a magnetic tape unit, seven computer remote terminals, two printers, and one printer/terminal.

All software utilized by HPHA is written in Data General Extended Basic and/or Data General Assembly Language. AMIS software consists of three major components: 1) the Main Menu and related files; 2) the Purchasing Menu and related files; and 3) the Reporting Menu and related files. Each component is discussed in some detail below, beginning with a list of documentation basic to the AMIS system.

LIST OF EXHIBITS

LISTS OF EXHIBITS (continued)

THE MAIN MENU

The Main Menu, shown in Exhibit A-1, is the first display to appear once the system has been activated. It contains two substantive sub-menus, Inventory Master Files and Other Functions, and a third sub-menu, Other Menus, which simply allows the user to reach the system's two other menus (the Purchasing Menu and the Reporting Menu). Each sub-menu is discussed below.

EXHIBIT A-1

MAIN MENU

```
MATERIAL INVENTORY
   MAIN MENU
   CHOICE: __

INVENTORY MASTER FILES
  10 = CREATE STOCK ITEM
  11 = UPDATE STOCK ITEM
  12 = INQUIRE STOCK ITEM
  13 = DELETE STOCK ITEM

OTHER FUNCTIONS
  20 = WAREHOUSE TRANSFER
  21 = UPDATE WAREHOUSE REC
  22 = PRINT TRANSFER TICKE
  23 = RECORD PHYSICAL COUN

OTHER MENUS
  97 = PURCHASING
  98 = REPORTING

  99 = BYE
```

The Inventory Master Files

The first four available options are: Create a Stock Item; Update a Stock Item; Inquiry Regarding a Stock Item; and Delete a Stock Item. These four master files are used to create, update, delete, and display a Material Inventory Record. Exhibit A-2 provides a sample record.

EXHIBIT A-2

MATERIAL INVENTORY RECORD

MATERIAL INVENTORY SYSTEM

STOCK NO.: _____

SECTION : _
SHELF : _
UNIT OF MEASURE: _
ITEM NAME : _____
ITEM TYPE : _____
ITEM SIZE : _____
MANUFACTURER : _____
VENDOR NUMBER : _____
VENDOR STOCK NO: _____
MAXIMUM LEVEL : _____
MINIMUM LEVEL : _____
UNIT PRICE : _____
PRICE BREAK : _____
LEAD TIME (WKS): _____
LABEL (Y/N) : _
PROJECT NO. : _____

Each record contains 16 descriptive pieces of information on the inventory item the user wishes to track. Included are several data elements that might not routinely be kept, such as the manufacturer of the item, any price break for quantity purchases, lead time (anticipated elapsed time between order and receipt of an item), and the name of the project in which the item is used.

Other Functions

The Main Menu also contains several file options other than those contained in the Inventory Master Files. Three of the four--Warehouse Transfer, Update Warehouse Records, and Print

Transfer Ticket--permit the user to track inventory by storage location where multiple locations are used and where inter-warehouse transfers occur. The term warehouse can be defined, as it is in High Point, to include not only structures, such as a central inventory building, but also vehicles. Thus, inventory can be measured and tracked both by item and by specific storage location.

The Record Physical Count file permits the user to enter data obtained through actual inventory of existing stock, whether it is the traditional annual inventory or one performed more or less frequently. This entry provides baseline data against which the user can add and delete stock, using the Receipt of Stock file and the Maintenance Work Order system, respectively.

THE PURCHASING MENU

Selection 97 on the Main Menu brings a second menu, the Purchasing Menu, to the terminal screen. This menu is presented in Exhibit A-3.

EXHIBIT A-3

PURCHASING MENU

```
                    MATERIAL INVENTORY SYSTEM
                        PURCHASING MENU
                          CHOICE: _

PURCHASE ORDERS                        REPORTS
 01 = CREATE                            81 = PRINT P.O.'S
 02 = MODIFY                            82 = OUTSTANDING P.O.'S
 03 = INQUIRE                           83 = MONTHLY REPORT
 04 = DISPLAY
 05 = ADD PO ITEMS                     REFERENCE INDEX
 06 = DELETE PO ITEMS                   85 = PO'S BY VENDOR NO.
                                        86 = PO'S BY DATE
STOCK RECEIPT & RETURNS
 15 = RECEIVE STOCK                    OTHER MENUS
 16 = RETURN STOCK                      98 = REPORTING
 17 = REQUEST LABELS                    99 = MAIN MENU

VENDOR RECORDS
 18 = INQUIRE
 19 = DISPLAY
```

The Purchasing Menu contains five sub-menus: Purchase Orders; Stock Receipt and Returns; Vendor Records; Reports; and Reference Index. All are, in one way or another, related to procuring items for inventory and entering them into the inventory database.

Purchase Orders

The six Purchase Order files allow the user to create, modify, inquire about, and display orders for one or more inventory items. The basic information needed to create the order is entered via the Create file. When the user selects this file, two forms--Purchase Order Creation and Purchase Order Entry--appear in sequence to prompt the entry of the data needed to generate a purchase order. These forms are displayed in Exhibits A-4 and A-5. The remaining files on this sub-menu are used basically to modify or display the information entered with the Create file.

EXHIBIT A-4

PURCHASE ORDER CREATION

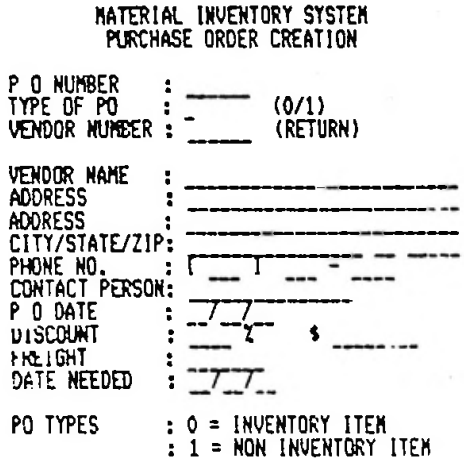
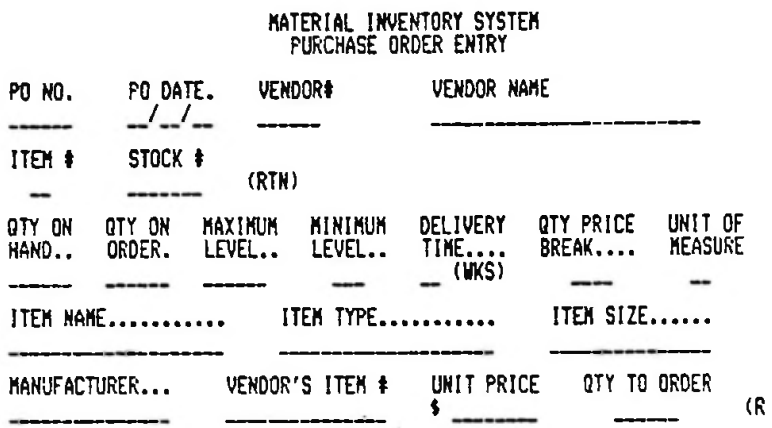


EXHIBIT A-5

PURCHASE ORDER ENTRY



Stock Receipts and Returns

This sub-menu contains three files, Receive Stock, Return Stock, and Request Stock Label, which permit the user to enter shipments received, to reduce inventory levels for goods received but later returned, and to generate storage labels for goods to be added to inventory. All other files containing quantity-on-hand information are automatically updated in response to changes in the first two of these files: an entry that stock has been received increases the quantities; an entry that stock has been returned decreases the quantities.

Vendor Records

This sub-menu contains two files that allow the user to inquire about the name, address, phone number, and contact person for a specific vendor, or to display the phone number and contact person for each of up to fifteen vendors at a time. Such information is useful for seeking prices and placing additional orders.

Reports

The Report files allow the user to print purchase orders created with the Purchase Order files. Exhibit A-6 provides a sample purchase order.

EXHIBIT A-6

SAMPLE PURCHASE ORDER

PURCHASE ORDER

HOUSING AUTHORITY of the City of High Point

Purchase Order No. : 840195
Purchase Order Date: 02/28/84

ADMINISTRATIVE AND MAINTENANCE OFFICES: 500 EAST RUSSELL STREET, HIGH POINT, NORTH CAROLINA 27261 PHONE (919) 887-2661

TO: D & L APPLIANCE PARTS,INC
P. O. BOX 31816
CHARLOTTE, NC 28231

NOTE: Order needed by 03/10/84

VENDOR NO.: 700001

VENDOR ITEM NO.	PHA STOCK NO.	ITEM NAME.....	ITEM TYPE.....	SIZE.....	QTY...	UNIT	UNIT PRICE	TOTAL PRICE
15400 SWITCH	01 8200640 01	SWITCH, LIGHT RANGE	NO. 154-3 RANGE		6	EA	1.25	7.50
VC4700-020	02 8200060 01	THERMOSTAT, OVEN	VC4700-020		3	EA	56.23	168.69
VW110-202	03 8200130 01	CONTROL, WATER HTR	VW110-202		2	EA	61.43	122.86
CH2835	04 8400810 01	BAKE UNIT 6-12	CH2835	19 INCH	6	EA	9.89	59.34
VPL4	05 8500600 01	VENTS, DRYER	VPL-4	4 INCH	12	EA	2.23	26.76
XL-100 T & P VA	06 9500100 01	VALVE, T & P RELIEF	XL-100		12	EA	4.38	52.56
-100 T & P VA	07 9500100 01	VALVE, T & P RELIEF	XL-100		12	EA	4.38	52.56
							SUB TOTAL	490.27
							TAX	22.06
							TOTAL	512.33

CERTIFICATION : This instrument has been preaudited in the manner required by the Local Government Fiscal Control Act.

CERTIFIED BY : _____ , COMPTROLLER

REQUISITIONED BY: _____ , _____

APPROVED BY : _____ , ASSISTANT EXECUTIVE DIRECTOR DATE: _____

Each order contains the vendor number, the vendor's name and address, the vendor's item number, the agency's stock number, the item's name, its type, its size, the quantity desired, the unit price, the total price, and the date by which the item is needed.

These files also permit the user to generate a list of outstanding purchase orders (those for which stock has not yet been received) and a summary report of all purchase orders issued over the past month. Exhibits A-7 and A-8 present samples of these reports.

EXHIBIT A-7

LISTING OF OUTSTANDING PURCHASE ORDERS

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
LISTING OF OUTSTANDING PURCHASE ORDERS

PO NO.	TYPE	VNDR #	VENDOR NAME	PO DATE	NEEDED	TOTAL PRICE
830561	0	200008	RUSSO DIVISION	08/19/83	10/25/83	29,454.90
840141	1	500005	CITY CHEVROLET COMPANY	02/10/84	03/10/84	16,501.30
840142	1	500005	CITY CHEVROLET COMPANY	02/10/84	03/10/84	28,448.20
840189	0	200004	NOBLIT BROTHERS & CO	02/24/84	03/05/84	964.61
840195	0	700001	D & L APPLIANCE PARTS,INC	02/28/84	03/10/84	509.88
840499	1	003001	DATA GENERAL CORP.	05/10/84	06/10/84	1,316.70
840545	1	008144	CUNNINGHAM ASSOCIATES INC	05/18/84		238.26
840546	1	008144	CUNNINGHAM ASSOCIATES INC	05/18/84		79.42
840547	1	008144	CUNNINGHAM ASSOCIATES INC	05/18/84		238.26
840573	0	700001	D & L APPLIANCE PARTS,INC	05/22/84	05/22/84	181.54
840615	1	120007	GLIDDEN COATINGS & RESINS	05/21/84	05/21/84	6,148.59
840647	1	100039	LANIER BUS. PRODUCTS, INC	06/12/84		822.36
840656	1	100039	LANIER BUS. PRODUCTS, INC	06/13/84		187.94
840657	1	008144	CUNNINGHAM ASSOCIATES INC	06/13/84		1,332.17
840693	0	200007	DAUGHERTY WHOLESALE	06/06/84	06/06/84	4,624.11
840694	0	900002	MARLIN MFG. CO., INC.	06/12/84	06/12/84	99.09
840698	1	100015	GRIFFITH OFFICE EQUIP.CO.	06/19/84		1,074.52
TOTAL PO'S: 17						$2,222.05

EXHIBIT A-8

MONTHLY REPORT ON PURCHASE ORDERS

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
MONTHLY REPORT ON PURCHASE ORDERS

PO NO.	TYPE	PO DATE	VENDOR NO	VENDOR NAME	NEEDED	RECEIVED	VOIDED	DISCOUNT	FREIGHT	TOTAL PRIC
830561	0	08/19/83	200008	RUSSO DIVISION	10/25/83			0.00	0.00	29,454.9
840141	1	02/10/84	500005	CITY CHEVROLET COMPANY	03/10/84			0.00	0.00	16,501.3
840142	1	02/10/84	500005	CITY CHEVROLET COMPANY	03/10/84			0.00	0.00	28,448.2
840189	0	02/24/84	200004	NOBLIT BROTHERS & CO	03/05/84			0.00	0.00	964.6
840195	0	02/28/84	700001	D & L APPLIANCE PARTS,INC	03/10/84			0.00	0.00	509.8
840382	0	04/02/84	700001	D & L APPLIANCE PARTS,INC		06/20/84		0.00	0.00	280.6
840406	0	04/17/84	300133	GUILFORD ELECTRONIC		06/20/84		0.00	0.00	64.5
840422	1	04/25/84	003021	SUMMIT MODULAR CONST.INC		06/20/84		0.00	0.00	19,996.2
840478	0	04/26/84	100038	SOUTHEASTERN ELECTRONICS		06/20/84		0.00	0.00	178.0
840480	1	04/26/84	300054	McMANUS LOCKSMITH SUPPLY		06/20/84		0.00	0.00	23.6
840482	1	05/09/84	800001	SEARS, ROEBUCK & CO.		06/20/84		0.00	0.00	3,920.0
840499	1	05/10/84	003001	DATA GENERAL CORP.	06/10/84			0.00	0.00	1,316.5
840545	1	05/18/84	008144	CUNNINGHAM ASSOCIATES INC				0.00	0.00	238.2
840546	1	05/18/84	008144	CUNNINGHAM ASSOCIATES INC				0.00	0.00	79.1
840547	1	05/18/84	008144	CUNNINGHAM ASSOCIATES INC				0.00	0.00	238.2
840573	0	05/22/84	700001	D & L APPLIANCE PARTS,INC	05/22/84			0.00	0.00	181.0
840614	0	05/18/84	200007	DAUGHERTY WHOLESALE		06/20/84		0.00	0.00	745.0
840615	1	05/21/84	120007	GLIDDEN COATINGS & RESINS	05/21/84			0.00	0.00	6,149.5
840645	1	06/12/84	300157	SPENCER-PARLIER BROTHERS		06/20/84		0.00	0.00	448.1

Reference Index

The Reference Index contains two files. The first displays all purchase orders directed to a particular vendor, and the second displays all purchase orders by date they were created.

The Reporting Menu

The Reporting Menu, shown in Exhibit A-9, allows the user to track various inventory characteristics. It contains four sub-menus: Analysis Reports; Reorder/Restock Reports; Master File Reports; and Other Reports.

EXHIBIT A-9

REPORTING MENU

MATERIAL INVENTORY SYSTEM
REPORTING MENU
CHOICE: _

ANALYSIS REPORTS
51 = CURRENT USAGE
52 = INVENTORY VALUE
53 = ON ORDER COSTS
54 = QUANTITIES ON ORDER

REORDER/RESTOCK REPORTS
55 = REORDER BY NUMBER
56 = REORDER BY VENDOR
57 = RESTOCK VEHICLES

MASTER FILE REPORTS
60 = DESCRIPTIONS BY NUMBER
61 = DESCRIPTIONS BY CLASS & NAM
62 = INVENTORY QUANTITIES
63 = VENDOR LISTING

OTHER REPORTS
64 = PHYSICAL COUNT
65 = SHORTAGES/OVERAGES
66 = STOCK LABELS

OTHER MENUS
97 = PURCHASING
99 = MAIN MENU

Analysis Reports

There are four Analysis Reports. The first, Current Usage, provides information on the use of each stock item during the desired reporting period (year or quarter, for example) and the dates the item was last issued and last purchased. The second, Inventory Value, gives a full description of each item along with quantities on hand, unit price, unit of measure and total stock value. The third and fourth, On-Order Costs and Quantities On-Order, interface with the Purchase order module to generate reports on the value and quantity of supplies on order. Exhibits A-10 through A-13 provide samples of these four reports.

EXHIBIT A-10

YEAR-TO-DATE STOCK UTILIZATION REPORT

DATE 6/20/1984 HOUSING AUTHORITY OF THE CITY OF HIGH POINT
PAGE 1 YTD STOCK UTILIZATION

NUMBER	WH	NAME	TYPE	UM	BEGINNING	BOUGHT	USED YTD	ON HAND	ISSUED..	PURCHASED	PO N
0000010	01	PAPER, COMPUTER	1 PART 1/2 GREEN BAR	BX	4	8	10	2	06/08/84	05/17/84	8403
0000012	01	PAPER, COMPUTER	3 PART 1/2 GREEN BAR	BX	2	14	7	4	06/08/84	03/27/84	8403
0000013	01	PAPER, COMPUTER	4 PART 1/2 GREEN BAR	BX	0	2	2	0	/ /	02/20/84	8308
0000020	01	PAPER, COMPUTER	1 PART BLANK PERF	BX	5	3	7	2	05/17/84	01/02/84	8306
0000021	01	PAPER, COMPUTER	2 PART BLANK PERF	BX	6	0	1	5	04/23/84	09/16/83	8305
0000022	01	PAPER, COMPUTER	3 PART BLANK PERF	BX	3	14	5	3	06/08/84	03/27/84	8403
0000023	01	PAPER, COMPUTER	2 PART CUSTOM	BX	0	0	2	3	06/08/84	09/16/83	8305
0000024	01	PAPER, COMPUTER	3 PART CUSTOM	BX	0	0	0	1	/ /	/ /	
0000050	01	FORMS, RENT STA'MNTS	2 PART CUSTOM	BX	5	18	5	18	05/17/84	05/17/84	8403
0000051	01	FORMS, RENT STA'MNTS	2 PART CARBON SNAP	BX	3	0	0	3	/ /	/ /	
0000052	01	FORMS, DELINQ/TERM	2 PART SELF MAILER	BX	0	16	3	13	06/08/84	01/18/84	8306
0000053	01	FORMS, WORK ORDER	CUSTOM FORM	BX	25	0	8	17	06/08/84	/ /	
0000102	01	LABELS, DP	2 UP	M	0	0	0	0	/ /	09/16/83	8305
0000200	01	RIBBONS, CARTRIDGE	DATA GEN LP2 BLACK	EA	18	36	12	66	04/23/84	03/23/84	8403
0000201	01	RIBBONS, CARTRIDGE	DATA PROD B300 BLACK	EA	12	36	12	72	04/23/84	03/23/84	8403
0000202	01	RIBBON,CARTRIDGE	#493 IBM PRINTERS	EA	0	12	0	12	/ /	03/26/84	8403
0000300	01	PAPER, COPY	(FOR SAVIN) 1BX=10RM	BX	0	0	1	13	05/28/84	/ /	
0000301	01	PAPER, COPY	(FOR SAVIN) 1BX=10RM	BX	0	0	0	4	/ /	/ /	
0000302	01	PAPER, COPY	(FOR CANON) 1BX=10RM	BX	0	0	7	22	06/08/84	/ /	
0000303	01	PAPER, COPY	(FOR CANON) 1BX=10RM	BX	0	0	3	1	05/28/84	/ /	
0000400	01	ENVELOPE, WINDOW	#10 W/RETURN ADDRESS	BX	0	0	10	91	06/08/84	/ /	

EXHIBIT A-11

INVENTORY VALUE REPORT

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
INVENTORY VALUE REPORT

STOCK #	WH	SC	SF	LBL	NAME	TYPE	SIZE	UM	ON-HAND	UNIT PRICE	STOCK VALUE
1100010	01	63	2	N	PAINT, EXTERIOR	EXTERIOR	GALLON	GL	0	6.19	0.00
1100020	01	63	2	N	PAINT, EXTERIOR	EXTERIOR	GALLON	GL	0	5.41	0.00
1100030	01	AB	C	Y	PAINT, SHELLAC	PIGMENTED	QUART	QT	0	3.70	0.00
1100040	01	AB	C	Y	PAINT, EXTERIOR	METAL BROWN/BLACK	CASE	GL	12	11.86	142.32
1100050	01	63	1	N	PAINT, EXTERIOR	HISTORIC TAN	GALLON	GL	111	15.43	1,712.73
1100060	01	63	1	N	PAINT, EXTERIOR	REVERE GREEN	GALLON	GL	158	15.84	2,502.72
1100070	01	63	1	N	PAINT, EXTERIOR	OLD SALEM	GALLON	GL	123	8.21	1,013.94
1100080	01	63	1	N	PAINT, EXTERIOR	LENNOX WHITE	GALLON	GL	199	13.44	2,674.56
1100090	01	63	1	N	PAINT, EXTERIOR	EXTERIOR PRIMER	GALLON	GL	71	10.99	780.29
1100110	01	AA	1	N	PAINT, TRAFFIC	YELLOW MARKING 11-4	5 GAL	GL	1	14.25	14.25
1100140	01	AA	1	N	PAINT, PORCH	AUTUM BROWN 6-587	GALLON	GL	-10	20.67	206.70-
1100150	01	AA	1	N	PAINT, PRIMER	ZINC CHROMATIC#NA472		EA	-2	15.00	30.00-
1100200	01	AA	A	Y	PAINT, PRIMER	GLIDDEN WHITE #590	GALLON	GL	5	13.90	69.50
1100210	01	AA	A	Y	PAINT, EXTERIOR	#LP-893 1073 GREEN	GALLON	GL	0	19.36	0.00
1100220	01	AA	A	Y	PAINT, EXTERIOR	#LP-492 C31281 BROWN	GALLON	GL	-2	11.55	23.10-
1100230	01	AA	A	Y	PAINT, EXTERIOR	ACRYLIN WHITE LP400	GALLON	GL	0	14.20	0.00
1100240	01	AA	A	Y	PAINT, EXTERIOR	PECAN STAIN	QUART	QT	0	4.23	0.00
1100270	01	AA	1	Y	PAINT, EXTERIOR	STAIN #720	GALLON	GL	0	13.89	0.00
1100280	01	AA	1	Y	PAINT, EXTERIOR	FLAT BLACK 6-7855	GALLON	GL	2	12.10	24.20
1100300	01	AA	1	N	PAINT, EXTERIOR	LP 997	GALLON	GL	0	26.48	0.00
1100310	01	AA	1	N	PAINT, EXTERIOR	TEK MID JD-93	GALLON	GL	0	22.68	0.00

EXHIBIT A-12

ANALYSIS OF ON-ORDER COSTS

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
ANALYSIS OF ON-ORDER COSTS

#830561 DATE: 08/19/83 RUSSO DIVISION

VENDOR ITEM NO.	PHA STOCK NO.	ITEM NAME.....	ITEM TYPE.....	SIZE.....	QTY...	UNIT	UNIT PRICE	TOTAL PRI
MODEL 2100S	01 0560101 01	STEEL SCREEN DOORS	W/ALUMINUM SCREENS	AS MEASURED	280	EA	101.15	28,322.0
								29,454.9

****

#840141 DATE: 02/10/84 CITY CHEVROLET COMPANY

VENDOR ITEM NO.	PHA STOCK NO.	ITEM NAME.....	ITEM TYPE.....	SIZE.....	QTY...	UNIT	UNIT PRICE	TOTAL PRI
070-80-14-0200	01	VAN 1/2 TON	CHEV CG11005	1/2 TON	2	EA	7,933.33	15,866.6
								16,501.3

****

#840142 DATE: 02/10/84 CITY CHEVROLET COMPANY

VENDOR ITEM NO.	PHA STOCK NO.	ITEM NAME.....	ITEM TYPE.....	SIZE.....	QTY...	UNIT	UNIT PRICE	TOTAL PRI
070-[illegible]-50-0000	01	SEDAN, 5 PASS. 4000#	CHEV CITATION II	MIDSIZE	4	EA	6,838.52	27,354.1
								29,448.1

EXHIBIT A-13

ANALYSIS OF QUANTITIES ON-ORDER

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
ANALYSIS OF STOCK ITEM QUANTITIES ON-ORDER

STOCK #	WH	NAME.....	TYPE.....	SIZE.....	UM	ON-HAND	ON-ORDR	MAX	MIN	EXPECTED	+/- M
0560101	01	DOOR, STEEL SCREEN	W/ALUMINUM SCREENS	AS MEASURED	EA	0	280	280	0	280	
2400070	01	HANDLE, DOOR	MODEL LL7C		EA	12	24	50	6	36	-
2400510	01	SCREEN, DOOR	5/16 CHANNEL	30 7/8 X 26 7/8	EA	34	150	100	10	184	
2400520	01	SCREEN, DOOR	5/16 CHANNEL	26 7/8 X 26 7/8	EA	38	150	100	10	188	
2400530	01	SCREEN, WINDOW	1/4 CHANNEL	17 7/8 X 36 5/8	EA	11	200	100	10	211	1
2400540	01	SCREEN, WINDOW	1/4 CHANNEL	24 1/8 X 47 1/4	EA	16	200	100	10	216	1
2400550	01	SCREEN, WINDOW	1/4 CHANNEL	18 X 47 1/4	EA	4	200	72	12	204	1
2400570	01	SCREEN, WINDOW	1/4 CHANNEL	17 3/4 X 47	EA	17	200	100	10	217	1
3500040	01	DOOR STOPS	05345-3/P158-31	#303	EA	101	300	360	20	401	
3500050	01	TAPE	MASKING	2 INCH	RL	1	72	42	6	73	
3600010	01	BATTERY, LANTERN	TW1X	6 VOLT	EA	35	-12	36	3	23	-
3700060	01	KNOB, CABINET	#250	1 1/2 INCH	EA	29	48	140	10	77	-
3700070	01	KNOB, CABINET	#656 CHROME	1 1/2 INCH	EA	10	24	75	10	34	-
3700080	01	HINGE, CABINET	#502		EA	36	24	75	4	60	-
3700090	01	HINGE, CABINET	MODEL 501		EA	15	24	24	4	39	
5600050	01	BOLT, TOGGLE	ASSORTED SIZES	1/8 X 3-4	EA	10	200	1,000	10	210	-7
5600230	01	MIRROW HOLDER	PLASTIC NO. 6092	1/4 INCH	EA	45	100	120	8	145	
5800280	01	CONTAINER, GASOLINE	MODEL 9805 PLASTIC	6 GALLON	EA	-1	8	8	1	7	
6300620	01	CAULKING GUN	MODEL 60465		EA	-4	24	15	0	20	
6302340	01	GLOVES	JERSEY MODEL 92J		PR	-34	60	30	6	26	
6302350	01	GLOVES	LEATHER MODEL 626	LARGE	PR	0	60	15	0	60	

Reorder/Restock Reports

This sub-menu contains three files, Reorder by Number, Reorder by Vendor and Restock Vehicle, which play an important role in system management. The files allow the user to easily identify items for which inventory levels have fallen below a prespecified minimum, and to determine the number of units that should be ordered to bring inventory levels up to the desired maximum desirable level. With this information, the user can routinely trigger the reordering of quantities sufficient to restore stock on-hand to satisfactory levels. This mechanism can prevent understocking and overstocking, if the minimum and maximum levels are prudently set.

The first two of these files are used to identify depleted supplies and to reorder items kept in central storage. The user can sort and print these items by either stock number or vendor number. Sample reports from these two files can be seen in Exhibits A-14 and A-15.

EXHIBIT A-14

REORDER REPORT BY STOCK NUMBER

DATE 6/25/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
REORDER REPORT - BY STOCK NO.

STOCK # WH	NAME..... TYPE.....	PRJ SIZE.....	UM	VENDOR..... VNDR #/VNDR STK NO.	MIN INSTK	MAX ORDER	PRICE BREAK	LST OR'D LST USED	UNIT. PRICE	PROJ'TD COST...	# D
0000013 01	PAPER, COMPUTER 4 PART 1/2 GREEN BAR	14 7/8 X 11	BX	GIBBS BUSINESS FORMS CO. 100014 144112GB 4 PART	1 0	3 3	0	02/20/84 / /	46.34	139.02	
0000024 01	PAPER, COMPUTER 3 PART CUSTOM	7 X 11	BX	GIBBS BUSINESS FORMS CO. 100014	2 1	4 3	0	/ /	0.00	0.00	
0000303 01	PAPER, COPY (FOR CANON) 1BX=10RM	8 1/2 X 14	BX	CAROLINA RIBBON 100009 134504	2 1	16 15	15	05/28/84	42.50	637.50	
0360980 01	THRESHOLD, VINYL TOP MODEL 850 ZIP 91390	30 INCH	EA	NOBLIT BROTHERS & CO 200004 ZIP 91390	1 0	18 18	1	/ /	2.60	46.80	
1100010 01	PAINT, EXTERIOR EXTERIOR	GALLON	GL	CAMCO PAINTS 120002	20 0	370 370	2,000	09/15/83	6.19	2,290.30	
1100020 01	PAINT, EXTERIOR EXTERIOR	GALLON	GL	PPG INDUSTRIES, INC. 120001	20 0	250 250	1	04/13/81	5.41	1,352.50	
1100110 01	PAINT, TRAFFIC YELLOW MARKING 11-4	5 GAL	GL	PPG INDUSTRIES, INC. 120001 11-4 PAINT	1 0	10 10	5	08/09/83 06/14/84	14.25	142.50	

EXHIBIT A-15

REORDER REPORT BY VENDOR NUMBER

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
REORDER REPORT - BY VENDOR NO.

STOCK # WH	NAME..... TYPE.....	PRJ SIZE.....	UM	VENDOR..... VNDR #/VNDR STK NO.	MIN INSTK	MAX ORDER	PRICE BREAK	LST OR'D LST USED	UNIT. PRICE	PROJ'TD COST...	# D
4400090 01	CORD, EXTENSION 16 GAUGE 3 WIRE	50 FEET	EA	BROOKS MILLIKEN 000047 2592020	1 0	8 8	1	06/06/83 10/19/81	5.88	47.04	
0000303 01	PAPER, COPY (FOR CANON) 1BX=10RM	8 1/2 X 14	BX	CAROLINA RIBBON 100009 134504	2 1	16 15	15	05/28/84	42.50	637.50	
0000013 01	PAPER, COMPUTER 4 PART 1/2 GREEN BAR	14 7/8 X 11	BX	GIBBS BUSINESS FORMS CO. 100014 144112GB 4 PART	1 0	3 3	0	02/20/84 / /	46.34	139.02	
0000024 01	PAPER, COMPUTER 3 PART CUSTOM	7 X 11	BX	GIBBS BUSINESS FORMS CO. 100014	2 1	4 3	0	/ /	0.00	0.00	
1100020 01	PAINT, EXTERIOR EXTERIOR	GALLON	GL	PPG INDUSTRIES, INC. 120001	20 0	250 250	1	04/13/81	5.41	1,352.50	
1100140 01	PAINT, PORCH AUTUM BROWN 6-587	GALLON	GL	PPG INDUSTRIES, INC. 120001 AUTUM BROWN LTX	1 -10	6 6	1	12/05/83 03/06/84	20.67	124.02	
1300080 01	HANDLE, ROLLER PAINT ROLLER EXTEN	48"	EA	PPG INDUSTRIES, INC. 120001 749-302	1 0	2 2	1	06/06/83 / /	2.49	4.98	

The third file, Restock Vehicles, allows the user to identify the actual versus the desirable supply levels on each of the agency's vehicles or in warehouses other than the central inventory facility. Exhibit A-16 provides a sample of this report, whose purpose is to help ensure that a vehicle or project-based warehouse does not run out of necessary items. As with maintenance of central inventory, minimum and maximum levels for these peripheral vehicles or warehouses must be prudently predetermined to avoided overstocking or understocking.

EXHIBIT A-16

VEHICLE RESTOCK REPORT

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
VEHICLE RESTOCK REPORT

VEHICLE	STOCK NO	ITEM NAME	ITEM TYPE	ITEM SIZE	VENDOR STOCK NO	ON HND	MINIMUM	NEEDED
JH	6301830	CORD, ELECTRIC	DBL INS. 16-2 7-0366	100 FEET	7-0366 EL. CORD	8	10	2

DATE 6/20/1984
PAGE 2

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
VEHICLE RESTOCK REPORT

VEHICLE	STOCK NO	ITEM NAME	ITEM TYPE	ITEM SIZE	VENDOR STOCK NO	ON HND	MINIMUM	NEEDED
SF	6301830	CORD, ELECTRIC	DBL INS. 16-2 7-0366	100 FEET	7-0366 EL. CORD	8	10	2

Master File Reports

Four Master File Reports, Descriptions by Number, Descriptions by Class, Inventory Quantities, and Vendor Listing, provide summary data on individual stock items. Some of the individual details found in these reports may be found in others as well, but none present the mix of detail available in these reports. Samples are found in Exhibits A-17 through A-20.

Description by Number presents, by consecutive stock item number, each item's name, location, type, size, manufacturer, vendor's stock number, and vendor number. Description by Class and Name presents most of the data on a given stock item contained in all other AMIS records. This includes not only the information presented in the Description by Number file, but additional data on quantity, value, and cost. Description by Class and Name provides the most comprehensive record available in the system on a given stock item. It can be sorted either alphabetically by item name, or by class (plumbing, electrical, refrigerator, for example). Inventory Quantities presents much the same data about quantity as that presented in Description by Class and Name, but outlines it in a more readable form. The final Master File Report is a Vendor Listing by vendor number with address and phone information.

EXHIBIT A-17

DESCRIPTION BY NUMBER

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
INVENTORY MASTER FILE LISTING

STOCK #	WH	L	SC	SH	NAME	PRJ	TYPE	SIZE	UM	MANUFACTURER	VENDOR STOCK NO.	VENDOR NO.
0000010	01	Y	9B	6	PAPER, COMPUTER		1 PART 1/2 GREEN BAR	14 7/8 X 11	BX		14112GB 1 PART	100014
0000012	01	Y	9C	6	PAPER, COMPUTER		3 PART 1/2 GREEN BAR	14 7/8 X 11	BX		14112GB 3 PART	100014
0000013	01	Y	9C	6	PAPER, COMPUTER		4 PART 1/2 GREEN BAR	14 7/8 X 11	BX		144112GB 4 PART	100014
0000020	01	Y	10	A	PAPER, COMPUTER		1 PART BLANK PERF	9 1/2 X 11	BX		9401 (SS 1S#)	100014
0000021	01	Y	10	A	PAPER, COMPUTER		2 PART BLANK PERF	9 1/2 X 11	BX		9402 TYPE SS	100014
0000022	01	Y	10	A	PAPER, COMPUTER		3 PART BLANK PERF	9 1/2 X 11	BX		9403 (TYPE SS)	100014
0000023	01	Y	5M	4	PAPER, COMPUTER		2 PART CUSTOM	7 X 11	BX			100014
0000024	01	Y	5M	5	PAPER, COMPUTER		3 PART CUSTOM	7 X 11	BX			100014
0000050	01	Y	5K	2	FORMS, RENT STA'MNTS		2 PART CUSTOM	6 3/4 X 11	BX	GIBBS BOS FORMS	1100 IN EA BOX	100014
0000051	01	Y	5L	3	FORMS, RENT STA'MNTS		2 PART CARBON SNAP	7 X 8 1/2	BX		2750 IN EA BOX	100011
0000052	01	Y	5L	6	FORMS, DELINQ/TERM		2 PART SELF MAILER	1250 IN EA BOX	BX	GIBBS BUS FORMS		100014
0000053	01	Y	AD	3	FORMS, WORK ORDER		CUSTOM FORM	11 X 7	BX	GIBBS BUS FORMS	750 IN EA BOX	100014
0000102	01	N	AD	MN	LABELS, DP		2 UP	4 X 15/16	M			100014
0000200	01	Y	9B	4	RIBBONS, CARTRIDGE		DATA GEN LP2 BLACK	1/2 N	EA		PART NO. 120	100009
0000201	01	Y	9B	4	RIBBONS, CARTRIDGE		DATA PROD B300 BLACK	1 X 50 X 4	EA			100009
0000202	01	Y			RIBBON,CARTRIDGE		#493 IBM PRINTERS	NYLON BLACK	EA		1443 & 2203	100009
0000300	01	Y			PAPER, COPY		(FOR SAVIN) 1BX=10RM	8 1/2 X 11	BX	NASHUA	130501	100009
0000301	01	Y			PAPER, COPY		(FOR SAVIN) 1BX=10RM	8 1/2 X 14	BX	NASHUA	130514	100009
0000302	01	Y			PAPER, COPY		(FOR CANON) 1BX=10RM	8 1/2 X 11	BX	NASHUA	134500	100009
0000303	01	Y			PAPER, COPY		(FOR CANON) 1BX=10RM	8 1/2 X 14	BX	NASHUA	134504	100009
0000400	01	Y			ENVELOPE, WINDOW		#10 W/RETURN ADDRESS	500 IN EA BOX	BX	CAROLINA ENVEL	#10 WINDOW W/RT	100035

EXHIBIT A-18

DESCRIPTION BY CLASS AND NAME

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
MASTER FILE LISTING (SORTED BY CLASS & NAME)

STOCK # PRJ / SC SF L	PART NAME..... / TYPE..... / SIZE.....	UM	VENDOR..... / VENDER ITEM #.. / MANUFACTURER...	VEN NO	LST USED / USED YTD / USED PYR	LST BGHT / BGHT YTD / LST PO #	MAXIMUM. / ON HAND. / MINIMUM.	NEEDED.. / QTY DISC / DEL TIME	UNIT CST / VALUE... / EST. ORD	RE ON
4400130	ADAPTER	EA	SOUTHSIDE HARDWARE CENTER			05/19/83	5		0.49	
	3 PRONG TO 2 PRONG			300040			0	1	0.00	
4C 4 N						830325		1 WEEKS		
6303180	ADAPTER	EA	MAC-MOTOR ELECTRONIC		05/26/83	05/25/83	1		7.35	
	HEADSET-HS-2		HS-2	400009	1	830324	0	1	0.00	
5A 2 N								1 WEEKS		
9400380	ADAPTER	EA	NOLAND COMPANY		04/01/84	05/06/83	100		0.77	
	3/4" C X MIP 90 DEG			900011	12		5	25	3.85	
3A 3 N	3/4"		NOLAND SUPPLY		6	830129	4	1 WEEKS		
9401250	ADAPTER	EA	TERRY SUPPLY CO.		05/30/84	05/03/84	100		0.82	
	3/4" C X FIP		105-3370	900012	12	100	73	25	59.86	
3A 5 N	3/4 INCH		NOLAND SUPPLY		17	840503	3	1 WEEKS		
9401330	ADAPTER	EA	TERRY SUPPLY CO.		05/14/84	05/03/84	100		0.52	
	3/4" C X MIP		3/4" C X MIP	900012	12	50	57	25	29.64	
3A 6 N	3/4 INCH				8	840503	6	1 WEEKS		

EXHIBIT A-19

INVENTORY QUANTITIES REPORT

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
REPORT ON INVENTORY STOCK QUANTITIES

STOCK #	WH	NAME.....	TYPE.....	SIZE.....	PRICE	UM	ON HND	MAX	MIN	$BRK	#WKS	YR BEG USED	Y
0000010	01	PAPER, COMPUTER	1 PART 1/2 GREEN BAR	14 7/8 X 11	38.84	BX	2	6	2	0	2	4	10
0000012	01	PAPER, COMPUTER	3 PART 1/2 GREEN BAR	14 7/8 X 11	51.73	BX	4	6	2	0	2	2	7
0000013	01	PAPER, COMPUTER	4 PART 1/2 GREEN BAR	14 7/8 X 11	46.34	BX	0	3	1	0	2	0	2
0000020	01	PAPER, COMPUTER	1 PART BLANK PERF	9 1/2 X 11	28.22	BX	2	6	2	0	2	5	7
0000021	01	PAPER, COMPUTER	2 PART BLANK PERF	9 1/2 X 11	33.55	BX	5	6	2	0	2	6	1
0000022	01	PAPER, COMPUTER	3 PART BLANK PERF	9 1/2 X 11	38.61	BX	3	10	3	0	2	3	5
0000023	01	PAPER, COMPUTER	2 PART CUSTOM	7 X 11	55.55	BX	3	6	2	0	2	0	2
0000024	01	PAPER, COMPUTER	3 PART CUSTOM	7 X 11	0.00	BX	1	4	2	0	2	0	0
0000050	01	FORMS, RENT STA'MNTS	2 PART CUSTOM	6 3/4 X 11	42.26	BX	18	20	4	0	3	5	5
0000051	01	FORMS, RENT STA'MNTS	2 PART CARBON SNAP	7 X 8 1/2	0.00	BX	3	3	1	0	3	3	0
0000052	01	FORMS, DELINQ/TERM	2 PART SELF MAILER	1250 IN EA BOX	88.33	BX	13	16	5	15	4	0	3
0000053	01	FORMS, WORK ORDER	CUSTOM FORM	11 X 7	44.65	BX	17	25	5	0	3	25	8
0000102	01	LABELS, DP	2 UP	4 X 15/16	5.34	M	0	0	0	0	0	0	0
0000200	01	RIBBONS, CARTRIDGE	DATA GEN LP2 BLACK	1/2 M	9.87	EA	66	36	12	0	2	18	12
0000201	01	RIBBONS, CARTRIDGE	DATA PROD B300 BLACK	1 X 50 X 4	8.94	EA	72	36	12	0	2	12	12
0000202	01	RIBBON,CARTRIDGE	#493 IBM PRINTERS	NYLON BLACK	3.58	EA	12	12	0	12	1	0	0
0000300	01	PAPER, COPY	(FOR SAVIN) 1BX=10RM	8 1/2 X 11	30.20	BX	13	16	2	10	2	0	1
0000301	01	PAPER, COPY	(FOR SAVIN) 1BX=10RM	8 1/2 X 14	42.50	BX	4	8	2	15	2	0	0
0000302	01	PAPER, COPY	(FOR CANON) 1BX=10RM	8 1/2 X 11	30.20	BX	22	30	5	15	2	0	7
0000303	01	PAPER, COPY	(FOR CANON) 1BX=10RM	8 1/2 X 14	42.50	BX	1	16	2	15	2	0	3
0000400	01	ENVELOPE, WINDOW	#10 W/RETURN ADDRESS	500 IN EA BOX	7.38	BX	91	100	10	100	2	0	10

EXHIBIT A-20
VENDOR LISTING

DATE 6/20/1984
PAGE 1

HOUSING AUTHORITY OF THE CITY OF HIGH POINT
MATERIAL INVENTORY VENDOR LISTING

NUMBER	VENDOR NAME	VENDOR'S ADDRESS		CITY	ST	ZIP	PHONE
100000	SERVICE CRAFT PHOTO FIN.	1311 JOHNSON ST.		HIGH POINT	NC	27260	
100001	DILLARD PAPER CO.	P. O. BOX 21767		GREENSBORO	NC	27420	
100002	SNIDER PRINTING CO.,INC.	508 N. WRENN ST.		HIGH POINT	NC	27262	
100003	THE DRAWING BOARD, INC.	P.O. BOX 38520		LOUISVILLE	KY	40233	
100004	HIGH POINT OFFICE MACHINE	P. O. BOX 1455		HIGH POINT	NC	27261	
100005	PIEDMONT WHOLESALE CO.	P.O. BOX 868		HIGH POINT	NC	27261	(919) 885-504
100006	PAUL B. WILLIAMS, INC.	P.O. BOX 6745		GREENSBORO	NC	27405	(919) 275-044
100008	RAM GRAPHICS,INC.	P.O. BOX 9434		GREENSBORO	NC	27408	(919) 379-016
100009	CAROLINA RIBBON	OFFICE PRODUCTS	P.O. BOX 8809	GREENSBORO	NC	27419	(919) 852-412
100010	DENNIS OFFICE SUPPLY,INC	P.O. BOX 1010		HIGH POINT	NC	27261	(919) 883-721
100011	GEORGIA FORMCRAFT	P.O. BOX 790		FAYETTEVILLE	GA	30214	(404) 461-110
100012	CALDWELL STAMP & PRINTING	P.O. BOX 1048		HIGH POINT	NC	27261	
100013	SOUTHERN PHOTO PRINT &	SUPPLY COMPANY	P.O. BOX 420	GREENSBORO	NC	27402	(919) 274-154
100014	GIBBS BUSINESS FORMS CO.	P. O. BOX 1750		HIGH POINT	NC	27261	
100015	GRIFFITH OFFICE EQUIP.CO.	P. O. BOX 567		HIGH POINT	NC	27261	(919) 885-504
100016	SNYDER PAPER CORPORATION	P.O. BOX 758		HICKORY	NC	28603	(919) 882-012
100017	JARRETT STATIONERY CO.	P. O. BOX 267		HIGH POINT	NC	2726	1
100019	TAB PRODUCTS, INC.	P.O. BOX 10270		PALO ALTO	CA	94303	
100020	MUNICIPAL FORMS & SYSTEMS	P.O. BOX 60077		CHARLOTTE	NC	28260	(919) 286-777
100022	PRO-FORMS & SYSTEMS	P.O. BOX 1515		BURLINGTON	NC	27215	
100023	ACROPRINT TIME RECORDER	3001 SPRING FORREST ROAD		RALEIGH	NC	27604	(919) 872-580

Other Reports

This sub-menu of the Reporting Menu offers three options. The first, Physical Count, permits the user to generate a form for taking inventory of items in stock. This form includes a list of stock items by warehouse and shelf location within that warehouse; descriptive information on each item; the on-hand quantity of the item; and a blank space for writing in the actual inventory count.

The second, Shortages and Overages, permits the user to calculate the difference, if any, between on-hand quantities of each stock item as recorded in the AMIS files and the actual inventory count. Once this report is completed, the file allows the user to update all inventory records to reflect the latest inventory count.

The final option allows the user to generate labels for each stock item. These labels contain the stock number of the item, shelf location, size, name, type, unit of measure, and year of purchase. Sample stock labels are found in Exhibit A-21.

EXHIBIT A-21
SAMPLE LABELS

3300720 885 15 7/8 X 4
GLASS, WINDOW EA
DS8 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

3300690 885 16 X 44
GLASS, WINDOW EA
DS8 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
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2400500 A01 30 5/8 X 3
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
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2400610 A01 28 7/8 X 2
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SCREEN, DOOR EA
5/16 CHANNEL 83

2400610 A01 28 7/8 X 2
SCREEN, DOOR EA
5/16 CHANNEL 83

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Announcement

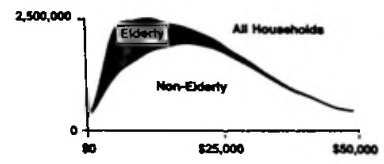
The American Housing Survey:
A Comprehensive One-Stop Look at the Nation's Homes and People

The AHS is useful to city managers, banks, marketing departments, builders, fuel companies, developers, manufacturers, brokers, and strategic planners. Information is gathered through 50,000–150,000 interviews per year.

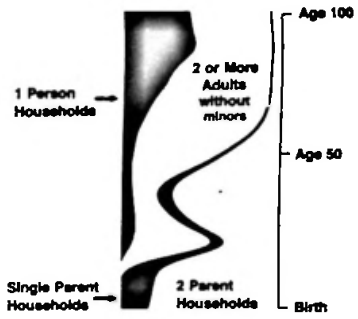
Subject Areas Include:

- Age, race, sex, disabilities.
- Number of rooms, bedrooms, baths.
- Neighborhood quality.
- Commuting, reasons for moving, details about former home.
- Plumbing, kitchens, heating, air conditioning, insulation.
- Condition of homes, repairs made, date built, why houses were no longer used.
- Mobile homes, housing value, rent, mortgage, utility costs.
- Income from wages, pensions, investments, welfare.

Here are just two uses of AHS data:



U.S. Households, by the Average Income Each Had in Last 1–5 Years



Four Kinds of Households, and the Ages When People Live in Them

How to Order:

AHS **books** are available for a small handling charge from HUD USER, P.O. Box 280, Germantown, MD 20874, tel. (800) 245–2691 or (301) 251–5154.

Three volumes contain overviews:

Book A compares cities, suburbs, and nonmetro areas.
Book C compares various incomes and housing costs.
Book E compares urban, rural, metro, and nonmetro areas.

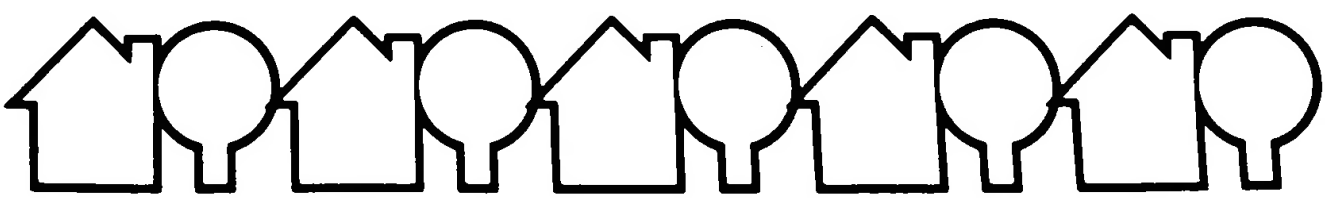
Three other volumes focus on special topics:

Book B looks at housing and neighborhood quality.
Book D focuses on people who moved that year.
Book F highlights energy: utilities and commuting.

In addition, a separate book is published on each large metropolitan area.

Computer tapes and microfiche: Data User Services Division, Census Bureau, Washington, DC 20233, tel. (301) 763–4100.

Free advice, special tabulations, and special tapes: AHS Data Project, Abt Associates, 55 Wheeler Street, Cambridge, MA 02138, tel. (617) 497–7182.



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