OST-90-1 Ref

U.S. Department
of Transportation

Office of Secretary
of Transportation

U.S. Department of Transportation Optical Disk Needs Assessment Report

DOT-TSC-OST-90-1
August 1990

A. M. Swierzbin

AVIATION SAFETY DIVISION

U.S. Department of Transportation
Research and Special Programs
Administration
Transportation Systems Center
Cambridge, MA 02142

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
U.S. Department of Transportation Optical Disk Needs Assessment Report	August 1990
	6. Performing Organization Code DTS-67
7. Author(s) Anthony M. Swierzbin	8. Performing Organization Report No. DOT-TSC-OST-90-1
9. Performing Organization Name and Address U.S. Department of Transportation Research and Special Programs Administration Transportation Systems Center Cambridge, MA 02142	10. Work Unit No. (TRAIS) OM007/T0501
	11. Contract or Grant No.
	13. Type of Report and Period Covered Other August 1989 - June 1990
12. Sponsoring Agency Name and Address U.S. Department of Transportation Office of the Secretary of Transportation Office of Management Planning Washington, DC 20540	14. Sponsoring Agency Code OST/M-20

15. Supplementary Notes

16. Abstract

Results of a detailed survey and analysis of docket storage and retrieval within the nine Operating Administrations of the U.S. Department of Transportation are presented together with general conclusions and recommendations supporting the application of optical imaging technology to storage and retrieval problems.

17. Key Words	18. Distribution Statement
Docket, Imaging, OST, Optical Disk Assessment, USCG, FAA, MARAD, UMTA, FHWA, NHTSA, FRA, RSPA	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	66	

Form DOT F 1700.7 (8-72)

PREFACE

The Office of Management Planning (M-20) of the Office of the Secretary of Transportation (OST), U.S. Department of Transportation (DOT), has been studying the Department-wide docket function to determine if efficiencies and/or economies of scale could be achieved using automated information management systems. As a part of this study, the Transportation Systems Center (TSC) was tasked to perform a detailed needs assessment at each of the nine docket offices found within the Department. The docket function is dependent on a variety of enterprise-wide processes, from docket creation to historical archiving; however, the assessment was directed to focus on the application of imaging to physical storage, retrieval, and control of docket files within individual offices. This report presents results of findings and contains specific recommendations for the use of this technology.

METRIC / ENGLISH CONVERSION FACTORS

ENGLISH TO METRIC

LENGTH (APPROXIMATE)

1 inch (in) = 2.5 centimeters (cm)
1 foot (ft) = 30 centimeters (cm)
1 yard (yd) = 0.9 meter (m)
1 mile (mi) = 1.6 kilometers (km)

AREA (APPROXIMATE)

1 square inch (sq in, in^2) = 6.5 square centimeters (cm^2)
1 square foot (sq ft, ft^2) = 0.09 square meter (m^2)
1 square yard (sq yd, yd^2) = 0.8 square meter (m^2)
1 square mile (sq mi, mi^2) = 2.6 square kilometers (km^2)
1 acre = 0.4 hectares (he) = 4,000 square meters (m^2)

MASS - WEIGHT (APPROXIMATE)

1 ounce (oz) = 28 grams (gr)
1 pound (lb) = .45 kilogram (kg)
1 short ton = 2,000 pounds (lb) = 0.9 tonne (t)

VOLUME (APPROXIMATE)

1 teaspoon (tsp) = 5 milliliters (ml)
1 tablespoon (tbsp) = 15 milliliters (ml)
1 fluid ounce (fl oz) = 30 milliliters (ml)
1 cup (c) = 0.24 liter (l)
1 pint (pt) = 0.47 liter (l)
1 quart (qt) = 0.96 liter (l)
1 gallon (gal) = 3.8 liters (l)
1 cubic foot (cu ft, ft^3) = 0.03 cubic meter (m^3)
1 cubic yard (cu yd, yd^3) = 0.76 cubic meter (m^3)

TEMPERATURE (EXACT)

[(x - 32) (5/9)] °F = y °C

METRIC TO ENGLISH

LENGTH (APPROXIMATE)

1 millimeter (mm) = 0.04 inch (in)
1 centimeter (cm) = 0.4 inch (in)
1 meter (m) = 3.3 feet (ft)
1 meter (m) = 1.1 yards (yd)
1 kilometer (km) = 0.6 mile (mi)

AREA (APPROXIMATE)

1 square centimeter (cm^2) = 0.16 square inch (sq in, in^2)
1 square meter (m^2) = 1.2 square yards (sq yd, yd^2)
1 square kilometer (km^2) = 0.4 square mile (sq mi, mi^2)
1 hectare (he) = 10,000 square meters (m^2) = 2.5 acres

MASS - WEIGHT (APPROXIMATE)

1 gram (gr) = 0.036 ounce (oz)
1 kilogram (kg) = 2.2 pounds (lb)
1 tonne (t) = 1,000 kilograms (kg) = 1.1 short tons

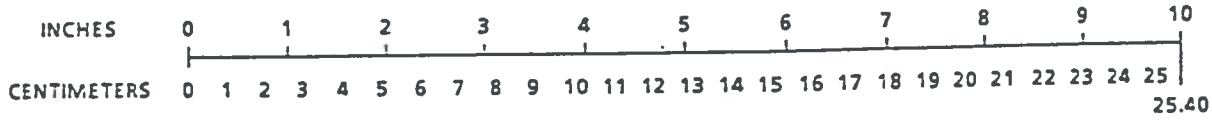
VOLUME (APPROXIMATE)

1 milliliter (ml) = 0.03 fluid ounce (fl oz)
1 liter (l) = 2.1 pints (pt)
1 liter (l) = 1.06 quarts (qt)
1 liter (l) = 0.26 gallon (gal)
1 cubic meter (m^3) = 36 cubic feet (cu ft, ft^3)
1 cubic meter (m^3) = 1.3 cubic yards (cu yd, yd^3)

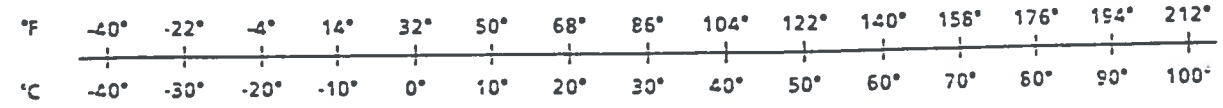
TEMPERATURE (EXACT)

[(9/5) y + 32] °C = x °F

QUICK INCH-CENTIMETER LENGTH CONVERSION



QUICK FAHRENHEIT-CELCIUS TEMPERATURE CONVERSION



For more exact and/or other conversion factors, see NBS Miscellaneous Publication 286, Units of Weights and Measures. Price $2.50. SD Catalog No. C13 10 286.

CONTENTS

CONTENTS (cont.)

LIST OF ILLUSTRATIONS

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ACRONYMS

AC	Alternating Current
ASG	Automated Sciences Group, Inc.
B&W	Black and White
BPI	Bits Per Inch
CCITT	International Telegraph and Telephone Consultative Committee
CPU	Central Processing Unit
DOD	Department of Defense
DOT	Department of Transportation
EIA	Electronic Industries Association
ELAN	Extended Local Area Network
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FAX	Facsimile
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
IEEE	Institute of Electrical and Electronics Engineers
IMS	Information Management System
I/S	Indexing/Search
KBYTES	Kilobytes (Thousands of data bytes)
LAN	Local Area Network
MARAD	Maritime Administration
MBYTES	Megabytes (millions of data bytes)
MIS	Management Information System
MODEM	Modulator/Demodulator
ms	Millisecond
MS-DOS	Microsoft-Disk Operating System
N/A	Not Available
NHTSA	National Highway Traffic Safety Administration
OATS	Office Automation Technology and Services
1K	One Thousand
OST	Office of the Secretary of Transportation
PC	Personal Computer
PCAT	Personal Computer Advanced Technology
RIN	Regulatory Identification Number
RSPA	Research and Special Programs Administration
SCSI	Small Computer System Interface
TCP/IP	Transmission Control Protocol/Internet Protocol
TSC	Transportation Systems Center
2D	Two Dimensional
UMTA	Urban Mass Transportation Administration
USCG	United States Coast Guard

1. INTRODUCTION

BACKGROUND

1.1 OFFICE OF MANAGEMENT PLANNING REQUESTED TO REVIEW THE DOCKET FUNCTION

The activities of the docket function in the Department of Transportation (DOT) have traditionally been carried out by the Operating Administrations (referred to as modalities, modals, or modes) on an individual basis without coordination at the departmental level. In an effort to determine if efficiency enhancement and/or economies of scale were possible in the use of departmental resources, the Office of the General Counsel and the Assistant Secretary for Policy and International Affairs requested that the Office of Management Planning (M-20) conduct a department-wide review of the docket function. In response, a study team was formed focusing on defining of office functions, identifying problem areas, gathering physical plant and fiscal information, and exploring possible improvement scenarios. The team published its findings "A Review of the Docket Function in the Department of Transportation" in February 1989.

1.2 STUDY TEAM RECOMMENDS OPTICAL IMAGING TECHNOLOGY

One of the recommendations resulting from the M-20 study pertained to the use of optical disk technology for records storage and retrieval. The study revealed that, with a paper growth problem, an imaging system would probably be a cost-effective solution to an existing space problem in the larger offices such as the OST, NHTSA, and RSPA; however, in the smaller offices, it was concluded that less cost savings would be realized for the near term, but that the overall benefits of fast and accurate retrieval, enhanced customer service, document security, reduced probability of misfiling, reduced wear and tear on documents, and the potential growth of docket cases far outweighed initial cost considerations in a longer term strategy. The study team concluded that consolidating the nine docket offices, at this time, was not feasible, but would remain an option for future considerations.

1.3 DOT STUDY ACKNOWLEDGES OPTICAL DISK USE IN DOCKET OPERATIONS

The DOT study clearly identified a storage space problem and unsatisfactory methods of handling and storing records. Present processes were labelled as time consuming and labor-intensive with little support in terms of automation. With dwindling resources, staff, and limited space for growth, the DOT study acknowledged that problems existed and that the application of optical disk technology appeared appropriate for use in docket operations.

1.4 NEEDS ASSESSMENT

Having recognized the need to consider imaging technology, the DOT, in August 1989, solicited the RSPA Transportation Systems Center (TSC) to perform a detailed needs assessment for the storage and retrieval function at each of the nine docket offices. The goal was to focus on a fundamental element of docket operations--the physical storage and retrieval of docket information. In order to assist the DOT in its selection of the most suitable and cost effective configuration of hardware and software, RSPA/TSC was tasked to determine the following:

A. The volume of records on hand and projected growth rate.

B. The amount of records which could be considered candidates for backscanning.

C. The number and types of equipment at each site capable of being used in an optical system.

D. The nature and complexity of file contents.

E. The required system storage capacity.

F. The required scanning capability.

G. The required system throughput.

H. Information accessibility and restrictions.

I. Processing requirements.

J. Hardware requirements.

K. Software requirements.

L. Database characteristics.

M. Print volume.

N. Detailed functional requirements for the optical system.

O. Verify M-20 study results and assumptions.

TSC concluded the functional and physical needs assessment task on December 1, 1989. Cost information was gathered following individual site surveys.

This report presents the results of the assessment and contains specific recommendations for applying two optical disk-based, storage and retrieval system configurations to problems of individual docket offices throughout the DOT. This description

forms the basis for the Functional Specification found under separate cover.

This report is submitted as the first deliverable item under Task 2 of Program Plan Agreement OP-991.

Cost analyses are not a part of this document. They are found, under separate cover, in the Conceptual Design Document.

2. THE NEEDS ASSESSMENT PROCESS

As the first step in the assessment process, a RSPA/TSC survey team conducted a detailed functional, physical, and cost survey at each of the nine docket office facilities. These facilities were located at the:

A.) Office of the Secretary of Transportation (OST)
B.) United States Coast Guard (USCG)
C.) Federal Aviation Administration (FAA)
D.) Federal Highway Administration (FHWA)
E.) Federal Railroad Administration (FRA)
F.) National Highway Traffic Safety Administration (NHTSA)
G.) Research and Special Programs Administration (RSPA)
H.) Urban Mass Transportation Administration (UMTA)
I.) Maritime Administration (MARAD)

The intent of the survey was to determine how docket offices functioned within their particular Operating Administration; to gather physical evidence of importance to the determination of optical system characteristics; and to perform various estimates, measurements, and cost surveys at each operation. All offices were surveyed identically. Docket supervisors and/or clerks were first interviewed. A survey instrument was used so that all interviewees were asked the same standard questions about office procedures and their perception of problem areas. The questions covered topics related to usage rates, storage, retrieval, reproduction/duplication, distribution, and tracking; docket office users; the nature of docket information; docket accountability procedures; projected volume; and current use of computers and local area networks.

In addition to the interviews, each docket office was physically inspected by the survey team. This involved: (1) taking measurements of the total docket office space and the amount of space allocated for docket storage; (2) estimating the amount of paper stored in the dockets by sampling and measurement techniques; (3) assessing the amount of microfiche or microfilm (if any) on-hand and converting this to number of pages stored in this fashion; (4) examining samples of the dockets to determine document characteristics including: size, color, condition, age, optical content, weight, texture, and document size; and (5) listing any computer equipment used in the office for current operations. During this phase of the assessment the team also paid close attention to the procedural aspects of docket formation, accountability structures, and indexing information so as to be able to later characterize the complexity of the database that would be necessary in any future optical system. Information on growth rate and printing volume was not readily available; however, some reasonable estimates were gathered and used to form a

judgmental assessment of these areas.

As the final step in the survey, modes were revisited to gather data on fiscal operating expenses. Financial analysts provided the team with an accounting of staff numbers, commensurate staff grade levels, fringe benefit costs, cost of space per square foot, computer costs, supply costs, xerox and mailing costs, and overhead rates.

Note: Docket information is also stored in the Regional Offices of the FAA; however, guidance received from M-20 specifically targeted Headquarters' operations as the only offices of interest.

3. DATA SUMMARY

3.1 GENERAL

The information presented in this section was compiled from data gathered at each operating mode. The results portray actual conditions at each docket office and establish a basis for analyses, determinations, and findings presented in Section 4.0 of this report. While most of the data was obtained by the survey team, information pertaining to the National Highway Traffic Safety Administration's (NHTSA) docket office operation was taken from a study recently completed by Automated Sciences Group, Inc. (ASG) under contract to NHTSA. TSC verified study results, wherever possible, without a duplication of effort.

Data contained in paragraphs 3.2 through 3.7 exclusively reflect paper records. Data for microfiche is contained in paragraph 3.8. Since this study was to focus on the paper problem and the application of optical disk technology, microfiche did not receive detailed attention. Information is presented only to form a clearer picture of the overall state of the docket offices.

3.2 FLOOR SPACE ALLOCATION

The following floor space allocation table contains a breakdown of how each mode has apportioned its allocated space among the various functions performed within each office.

Table 3-1. Space utilization (in sq.ft.) by mode devoted to docket functions:

Mode	Docket Storage(%)	Office(%)	Public(%)	Other(%)	Total(%)
OST	570 (34)	469 (28)	448 (26)	208 (12)	1695 (23)
FAA	230 (34)	90 (13)	208 (31)	152 (22)	680 (9)
NHTSA	226 (16)	388 (28)	36 (3)	738 (53)	1388 (19)
RSPA	239 (19)	394 (32)	154 (12)	461 (37)	1248 (17)
FHWA	95 (8)	82 (7)	152 (13)	841 (72)	1170 (16)
USCG	100 (18)	382 (68)	0 (0)	78 (32)	560 (7)
FRA	48 (18)	0 (0)	60 (22)	164 (60)	272 (4)
MARAD	51 (27)	30 (16)	38 (2)	72 (55)	191 (3)
UMTA	20 (14)	0 (0)	15 (1)	105 (75)	140 (2)
TOTAL	1579 (21)	1835 (25)	1111 (15)	2819 (39)	7344 (100)

3.3 REQUEST FOR SERVICE ACTIVITY

The following table contains the results of a survey of docket office visitor activity for peak periods. OST "Request for Service" records were examined and a count of service requests was performed using data from a recent six month period of operation. In all other modes, personnel interviews were the main source of information. The figures, therefore, are real for OST and empirical estimates for all other modes.

Table 3-2. Peak service request activity by mode:

Mode	Visitors/Week	Phone Inquiries/Week	Mail Inquiries/Week
OST	100-150	Insignificant	Insignificant
FAA	25-75	Some	Some
NHTSA	30-40	50	Insignificant
RSPA	5-10	10	Insignificant
FHWA	0-50	Insignificant	Insignificant
USCG	0-5	None	None
FRA	0-3	Insignificant	Insignificant
MARAD	16-20	Some	Insignificant
UMTA	0-3	Insignificant	Insignificant

3.4 DOCKET VOLUME/PROJECTED GROWTH RATES

The following table lists the current record volume and growth rate by mode, wherever these values could be obtained. In most offices, no physical records are maintained to indicate the relative size of dockets nor are service requests receipts available. The pages/sample figures were assembled as a verification check on the statistical variation in physical paper volume. The mean value for the pages/sample figures was 188 with a standard deviation of 16. Statistical sampling was, therefore, considered valid for use in all docket offices.

Table 3-3. Volume of records and projected growth rate by mode:

Mode	Pages/Sample	Record Volume (pages)[1]	Growth Rate (pgs./yr.)[2]
OST	193	1,329,469	332,367
FAA	208	499,616	N/A [3]
NHTSA	N/A	484,310 [4]	26,132 [4]
RSPA	186	494,888	N/A
FHWA	177	181,204	N/A
USCG	215	136,757	15,000
FRA	187	150,722	N/A
MARAD	170	218,705	N/A
UMTA	169	18,623	N/A

[1] Table derived by sampling and linear measurement. Technique samples dockets until a reasonable representation of material is obtained. A 1" sample is counted and the resultant total used to calculate the volume of stored records.

[2] Projected growth rate was determined by examining available record logbooks and by empirical survey.

[3] N/A - Information Not Available

[4] Per ASG Survey

3.5 COPYING SERVICES

The following table was compiled to indicated the level of activity for printer services. In most modes, detailed records were not available. The OST figure is based on usage records while the FAA value is empirical.

Table 3-4. Copying service activity by mode:

Mode	Copies/Day
OST	300
FAA	300
NHTSA	N/A*
RSPA	N/A
FHWA	N/A
USCG	N/A
FRA	N/A
MARAD	N/A
UMTA	N/A

* N/A - Information Not Available

3.6 DOCKET STORAGE EQUIPMENT

The following table contains an inventory of the filing equipment being used in the modes for docket storage.

Table 3-5. Inventory listing of the number and types of storage equipment that are currently in use exclusively for dockets by mode:

Mode	File Cabinets	Shelves	Boxes	Other
OST	0	194 [1]	0	0
FAA	2 [7], 19 [2]	0	14	0
	4 [3]	0	0	0
NHTSA	17 [1]	0	0	0
RSPA	30 [2]	0	38	0
FHWA	8 [9], 3 [4]	0	0	0
USCG	3 [2]	0	16	2 [6]
FRA	0	12 [1]	3	
		10 [4]		
MARAD	3 [1], 1 [8]		0	0
UMTA	0	1 [1]	4	0

[1] Lateral Metal 35"
[2] Lateral Metal 34"
[3] Lateral Metal 32"
[4] Lateral Metal 39"
[5] Standard Roller Draw Files
[6] Wooden Credenza (6 shelves)
[7] Motorized 5' Lektriever
[8] Motorized 8' Lektriever
[9] Standard 5 Drawer File

3.7 DOCKET CHARACTERISTICS

A physical examination of a representative cross section of dockets stored at each mode produced the next series of tables.

Table 3-6. Docket document type by mode (sampled):

Document types	OST	FAA	NHTSA	RSPA	FHWA	USCG	FRA	MARAD	UMTA
Rules	X	X	X	X	X	X	X	X	X
Hearings	X	X		X		X	X	X	
Exemptions		X		X			X		X
Waivers									X
Enforcements				X					
Exhibits	X			X					
Correspondence	X	X	X	X	X	X	X	X	X
Transcripts	X								
Briefs	X								
Glossies	X			X	X	X			
Charts	X					X			
Maps	X						X		
Standards			X						
Handwritten		X		X					
Computer (15")							X		
B/W Photo.				X		X	X		
Color Photo.				X		X			
Pict. Reprints					X	X			
Mailgrams		X							
Newsprint							X		
Mimeograph							X		
Blueprints				X					
Postcards		X			X				
Carbon Copies						X	X		

Table 3-7. Docket physical characteristics by mode

	OST	FAA	NHTSA	RSPA	FHWA	USCG	FRA	MARAD	UMTA
Size									
8.5" x 11"	90%	98%	98%	85%	98%	93%	98%	100%	100%
Legal	5%	1%	1%	5%	<2%	5%	1%		
Other	5%	1%	1%	10%	<1%	2%	1%		
Material									
Std. Bond	X	X	X	X	X	X	X	X	X
Texturized	X								
Cardboard	X								
Postcard		X			X				
Sepia									
Onion Skin		X		X		X	X		
Blueprint				X					

The following table lists optical characteristics which are important in determining sizing requirements for the optical database.

Table 3-8. Docket optical characteristics by mode:

Mode	Color*	Characteristic: Rotated	Clean	Faded	Speckled	Bi-modal	Grey-scaled
OST	B/T,Bl/W O/W,R/W B/Bl,		98%		2%	>99%	<1%
FAA	B/Bl,B/P B/O,B/Be		99%	<1%		>99%	
NHTSA	B/T,Bl/W		>98%	<1%	<1%	>99%	<1%
RSPA	B/Y,B/Bl B/A,B/P Bl/W		>98%	1%	<1%	98%	2%
FHWA	B/T		98%		2%	100%	
USCG	B/A,B/M B/T,B/G B/Y,Bl/W	<1%	99%	1%		99%	1%
FRA	B/G,Bl/W		96%	2%	2%	99%	1%
MARAD	B/T,B/Gr		100%			100%	
UMTA			100%			100%	

* First Letter - Foreground or print color
Second Letter - Background or paper color
Majority of documents are Black/White

Colors:

A - aqua
B - black
Be - beige
Bl - blue
G - green
Gr - grey
M - melon green
O - orange
P - pink
R - red
T - tan
Y - yellow

3.8 MICROFILM/MICROFICHE/FILM/OTHER

The information presented in this summary concerns microfiche and microfilm media. It has been included for completeness and will not be analyzed as a part of the assessment.

Mode	Summary
OST	Some dockets microfiched in 1979. Discontinued due to cost of operations.
FAA	1,058,400 pages on standard 35mm microfiche. One 3 drawer file cabinet. One viewer/reproduction unit.
NHTSA	144,840 pages of original docket material on 18, 16mm microfilm rolls. 10,260 master 16 mm jacketed microfiche. 44,270 duplicate 16 mm jacketed microfiche. 40,470 master/duplicate 16mm jacketed microfiche awaiting review. Video film - 2,806 canisters. Videotape - 33 cassettes. 175 35mm slides Two 3M, 500 Reader/Printers; Minolta RP 407 microfilm reader.
RSPA	516 16mm microfilm cassettes (4000 pgs./cassette). 2,064,000 pages on microfilm. Produce microfilm using: 3M 900 Page Search 3M Micraprint 3M EF 5000 Document Camera
FHWA	None. A few 35 mm slides.
USCG	None.
FRA	Stopped microfiche operations in 1982. 2-3 drawers of microfiche.
MARAD	None.
UMTA	None.

3.9 DATA PROCESSING AND LOCAL AREA NETWORK SUPPORT

The following information is a summary of data processing and processing related equipment at each mode.

Mode	Summary
OST	One Apple/Macintosh PC. 4th Dimension Database used to track status and compile brief summaries of active dockets. Plan to link into Burroughs C3 system. Unisys contracted for support. One Laserjet II printer.
FAA	Four Wang VS 300 minicomputers with 4 standard disk drives. Wangnet used for document file transfers and electronic mail. Word processing is primary function. Two terminals in docket area.
NHTSA	Wang VS 100 with 300 Mbytes of disk capacity. Used sparingly for word processing and electronic mail. Two AST and one IBM PC. Function as docket index and number generators. Wangnet and Novell Lans available. Wangnet operates on floors 5 and 6 networking 5 Wang VS Minis (2 VS 100, 1 VS 65, 1 VS 75E, 1 VS 5000).
RSPA	One PC-Limited 2000, IBM compatible PC.
FHWA	One AST PC and one Lexis computer.
USCG	Two Proteus IBM compatibles.
FRA	One Lexis computer. Two 3COM stations, four 3COM 3 servers. Ethernet links only internal FRA stations.
MARAD	ITT XTRA PC with Kyocera Laser Printer.
UMTA	One Leading Edge IBM compatible.

4. DETERMINATIONS AND FINDINGS

4.1 GENERAL

Docket Offices at the nine Operating Administrations demonstrate wide variation in physical size, facility configuration, and volume of docket activity. The information obtained from staff interviews clearly portrays a model docket storage/retrieval facility as one which possesses the following characteristics:

- o Adequate storage space and docket organizing aids.
- o Precise indexing and locator information systems.
- o Efficient logging, dating, and posting facilities.
- o Controlled access to dockets and copy distribution.
- o Efficient copying facilities available to the staff and the public.
- o Easy location and retrieval of information.
- o Accessible by the public with minimal personnel assistance.

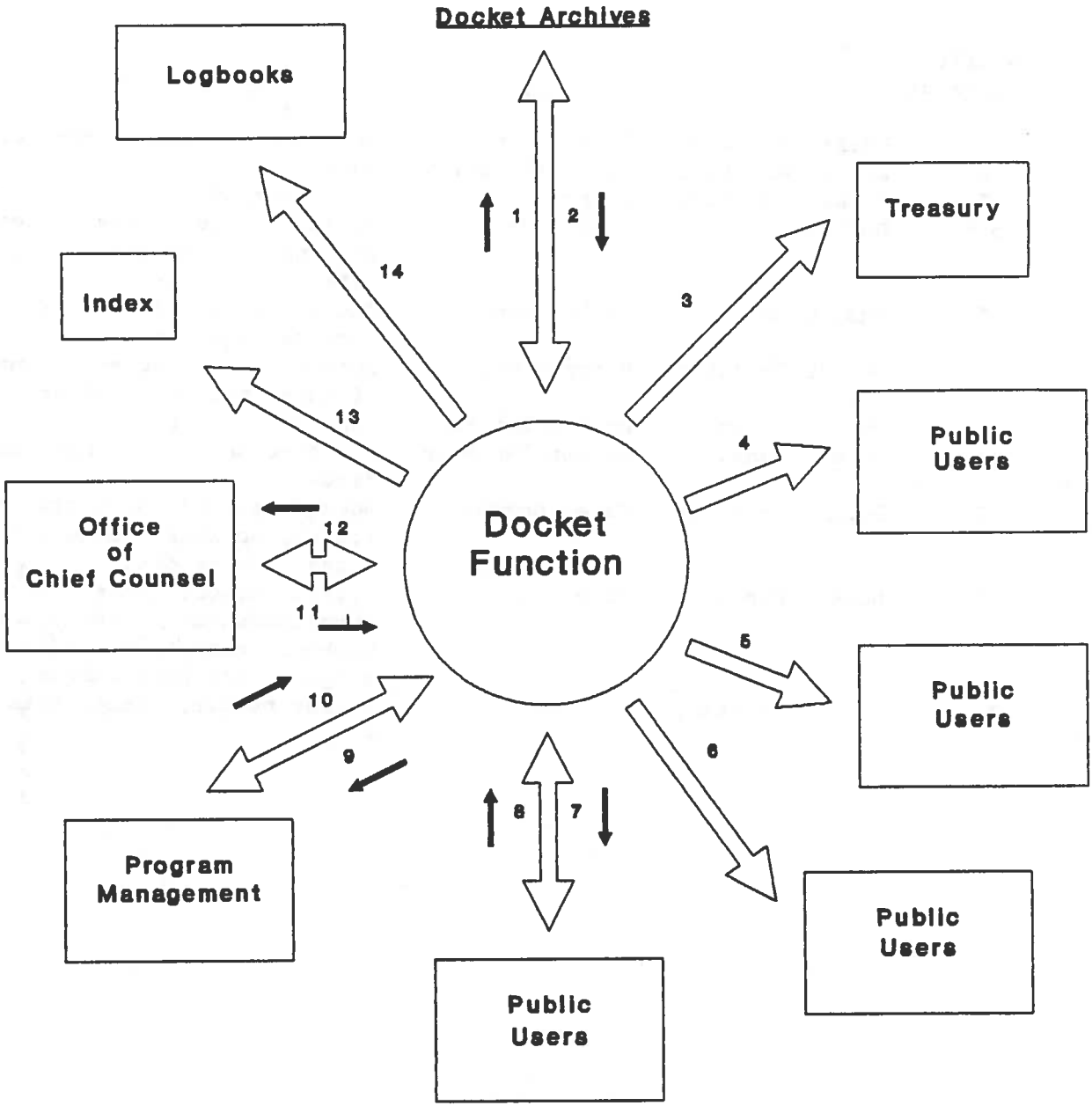
No single docket office is capable of demonstrating all of these characteristics nor can assure absolutely consistent efficiency because of increasing workload, shrinking resources, and a lack of uniform standards in docket operations; however, most docket storage/retrieval facilities exhibit a high degree of commonality in services rendered and the manner in which they are typically provided. Except for individual implementation nuances, each office performs functions similar to those shown in Figure 4-1 and Table 4-1 with only minor variances. It was determined that the following basic functions were common to each office:

A.) Receiving and examining all applications, complaints, rulemakings,petitions, motions, pleadings, exhibits, hearings, etc.

B.) Docket number assignment and logging of all pertinent information.

C.) Maintenance of complete docket files including their indexing, filing, listing, posting, retrieving, and storage.

D.) Maintenance of suspense ledgers for response tracking (public notices, etc.).



DATAFLOW DIAGRAM

Figure 4-1

Table 4-1. **DATAFLOW ANALYSIS**

Dataflow Reference	From	To	Data Content
1	Docket Function	Docket Archives	Original documents, dockets
2	Docket Archives	Docket Function	Dockets
3	Docket Function	Treasury	Copy receipts
4,5,6,7	Docket Function	Public Users	Dockets, file copies, digest, postings, docket summaries, index data
8	Public Users	Docket Function	Docket related documents, service requests
9	Docket Function	Program Mgmt.	Dockets, file copies, summaries, digests, postings, index data
10	Program Mgmt.	Docket Function	Service requests
11	Chief Counsel	Docket Function	Approved docket filings, service requests
12	Docket Function	Chief Counsel	Docket related documents, file copies, dockets, summaries, digest, index data
13	Docket Function	Index	Docket number, title, dates, submitters name, company name, RII number, initiating office, subject, FAR part number
14	Docket Function	Logbook	Docket number, title, data/time

E.) Collection of filing and copying fees, where necessary.

F.) Assisting the general public in locating, retrieving, reviewing, and obtaining copies of docket information.

G.) Assisting legal counsel, administrative law justices, and any agency personnel with the preparation and distribution of docket information including location, retrieval, review, and copying docket materials.

This functional commonality assures that:

A.) Standards can be adopted and compatible operations are possible across all modes.

B.) The potential for consolidating offices exists should the DOT decide that a single docket facility is necessary in the future.

C.) Dockets can be managed uniformly and consistently across all docket functions.

D.) A single, integrated approach to any form of automated system support is possible.

The following sections categorize determinations and findings in five functional areas. Docket office facilities and operations are broken down by storage, retrieval, reproduction/duplication, distribution, and docket control functions. Problems are identified and amplified, wherever possible, by observations and quantitative analysis in order to place them in a proper perspective for supporting final conclusions.

4.2 DOCKET STORAGE

The amount of storage space for docket material (paper) varies from office to office. The largest docket offices (>1000 sq.ft.) are found in OST, NHTSA, FHWA, and RSPA; moderate-sized offices (>500 sq.ft.) are found in the FAA and USCG; and the smallest offices (<500 sq.ft.) are in FRA, UMTA, and MARAD. The amount of collective space is deceptively large (>7000 sq.ft.) and does not present an accurate picture of the amount of floor space devoted solely to docket storage. Physical floor plans; that is, the layout of space required for public use, office personnel, library and support facilities, microfiche/microfilm, and access/clearance-way requirements, necessarily account for just under 80% of the total available space. Docket storage comprises 21% of the total floor space, but is not uniformly distributed across all modes. No two facilities are physically identical. The lowest amount of

floor space dedicated to paper storage is found at the FHWA (8%) while the greatest amount has been dedicated to this function at OST and the FAA; both at 34%. Table 3-1 contains a breakdown of floor space allocation for all modes.

Dockets are, generally, stored as hard copy on either lateral shelving or in enclosed lateral filing cabinets and powered filing systems. The FAA and MARAD are the only two modes with some form of automation (power file). In addition, NHTSA, RSPA, and the FAA have some of their older dockets on microfiche or microfilm media. In most modes, dockets are stored in chronological order. In some, dockets are further grouped by type. Only OST binds its dockets in booklike fashion while all other modes file dockets in folders, jackets, or leave them as free standing material.
Some modes maintain two or more sets of dockets - one file for originals, one for duplicate copies (for preservation of originals), and sometimes a copy for files containing inter-office notations, commentary, etc., related to the docket but not available for public viewing. At least two sets of dockets are, currently, being maintained at MARAD, FRA, UMTA, and NHTSA. Other modes maintained this practice until space became a problem (OST, FHWA, RSPA, and FAA). USCG uses two sets of dockets but discards the original and duplicate when the docket is closed; all that is kept is a copy of the Federal Register publication in which a ruling was published.

Docket facilities were observed and closely inspected. The team confirmed that storage space problems exist and that the larger offices are facing a serious shortage. It was also apparent that all offices are heading in this direction and that some modes, lacking space and/or modern storage devices, are being forced to use unorthodox, or off-site, storage methods to cope with the expanding paper problem. The volume of paper seen at each office was within a range of values (Table 3-3), generally less than a million pages. OST was the only exception with just under 1.5 million pages in its active files. All modes were judged as low volume candidates for optical storage (medium to high volume applications range in the vicinity of 5 million pages and up) and it would be several years before any mode would reach a relatively high volume level.

The initial impression that the team formed when viewing these facilities was that they were neglected, somewhat antiquated, overburdened, and inefficient. The lack of modern and spacious facilities, manpower and equipment shortages, and a perception of disarray at some of the modes, did little to instill confidence that the overall docket function was providing creditable service; let alone sustaining a superb public image. Upon closer inspection, however, the team determined that extraordinary personnel efforts have made them work.

To fully quantify storage, it was necessary to measure facilities, calculate the available storage volume, ascertain the number of docket pages being stored, and estimate the potential growth rate. These results are tabulated in Tables 3-1 and 3-3. In addition, a complete inventory of storage equipment was taken in order to articulate the level of physical resources that are being provided for this function. The inventory is contained in Table 3-5.

Normally, to quantify storage space would require structuring a suitable model which reflected the ideal storage facility and then comparing this model against the physical state of each mode. A figure of merit "Docket Storage Density" would be used as the basic quantifying measure. In an effort to present a more realistic result for this aspect of the assessment, however, it was decided to use the OST facility as the basis of comparison. The OST system of docket storage presents a suitable baseline and a docket storage density that is considered good for its size and the volume of records stored on premises. In selecting OST as the model, the results presented below can be viewed from a perspective that is physically real and tangible.

While not completely ideal, the OST model is viewed as containing a reasonably efficient library with a docket quantity which is manageable with the current level of resources. It has an organized storage facility which classifies docket information in chronological order with hard-covered bookbinders displaying docket control numbers in large, readable letters/numbers on each bookend to facilitate retrieval. The binders are stored vertically on standard, lateral metal shelving as would be found in most library facilities. Measurements indicate that OST is maintaining its dockets at a density level of 2332 pages/sq.ft., estimated to be 5% below maximum saturation limits for the available space and type of filing equipment. As records are added to storage, they are retained for at least 1 year following closure and then sent to permanent storage at the Federal Records Center in Suitland, Maryland. OST's system is working well, however; it places a burden on personnel who must provide ready and controlled access to historical material. Indexing lacks some flexibility and will be discussed in paragraph 4.3.

OST uses floor to ceiling, metal shelving units which could accept a larger number of dockets, however; this would increase the risk of degrading the ease at which dockets can now be retrieved and would accelerate handling degradation of docket material by requiring higher shelf packing density.

The following analysis uses the docket storage density figure as a measure of the degree of paper saturation at each site. In selecting this approach, the assessment needed a "critical situation yardstick" to determine a realistic phasing of possible solutions (in the case of this study, an optical disk-based document management system). The density figure was also adjudged

an accurate indicator of the relative necessity for immediate/delayed remedial action. If a mode's density figure was less than the normalized standard (1.00), then it would be possible to state that the particular facility had not reached a volume which compromised efficiency and any optical equipment purchases could be deferred to a later date. If mode figures were equal to, or greater than, the norm, then the logical conclusion would be that modes did not have the resources to sustain an efficient level of operation and were in need of immediate, or at least near term, attention. The higher the figure, the greater the need. The results were as follows:

Table 4-2. Page density by mode:

Mode	Density (pgs./sq.ft.)	Normalized Density
OST	2332	1.00
FAA	2172	.93
NHTSA	2143	.92
RSPA	2071	.89
FHWA	1907	.82
USCG	1368	.59
*FRA	3141	1.14
*MARAD	4246	.96
UMTA	1220	.52

* FRA has 5-shelf and MARAD has 7-shelf storage units. The Density figures reflect actual density calculations, but skew Normalized Density results. Therefore, in order to compare these modes accurately against the OST model, Normalized Density was recalculated with data factored to reflect comparable shelf space.

The figures indicate that most of the modes are approaching storage density limits. The figure for FRA indicates that this mode is close to an oversaturated condition at this time. FRA stores almost half of its dockets in an office occupied by the docket clerk and has some space still available in its docket room. A low number of service requests helps it to manage its problem. MARAD is approaching limits and has some room still available. It also maintains duplicate dockets in a power file system. These could be destroyed, if necessary, freeing duplicate filing space for original docket storage.

NHTSA, RSPA, and FHWA are all approaching their saturation limits.

USCG and UMTA are both over the 50% mark. UMTA, the smallest of all docket offices, uses only 2/3 of 1 shelf for storing active dockets and just recently moved 4 boxes of docket material into an empty office space (24 hour retrieval). UMTA is almost too small to consider optical storage and retrieval at this time, but should be revisited if a DOT-wide system concept is implemented.

USCG destroys original copy final rulings and documentation required under Section 553 of Title 5, United States Code, replacing them with Federal Register publications. The small print and compact size of these documents saves the USCG approximately 40% in the amount of paper that must be retained. Unfortunately, the original paperwork is lost to anyone requiring historical background information or a need for originals and, furthermore, any additional information that may have appeared with this documentation. Without this procedure USCG would be facing a .82 density figure at this time, placing it even closer to its critical saturation limit. Lacking floor space and high density filing systems, USCG is forced to use paper box storage for excess docket material. It should be mentioned that USCG uses 1/2-height cabinets and, except for two wooden credenzas (narrow, 6-shelf), has no floor to ceiling system.

Overall results indicate that the current docket volume is still manageable. In fact, docket personnel performance should be commended for it is surprising that those docket offices at, or close to the saturation limit, are still able to sustain a level of performance which has not been admonished by users. Attorneys at both OST and FRA indicated that these modes were doing a fine job. In examining this paradox it was found that the smaller sized operations have not experience significant usage and are, therefore, less prone to some of the problems plaguing docket clerks at the larger modes. The larger modes have more people to deal with problems which has helped their situations.

OST has been forced to adopt extraordinary measures to cope with problems and mitigate their effects. As previously mentioned, OST stores all open dockets until one year after closure. Dockets are then sent to the Federal Records Center for permanent storage and

are retrieved on an as needed basis. While this seems appropriate and has worked in the past, it has not been without problems for it creates an environment where: 1) a segmented storage situation exists which requires personnel to commute to an off-site facility to store and retrieve documents; 2) forces a need for redundant filing operations; 3) has a higher probability of lost documentation; 4) results in lost work time and productivity; 5) extends retrieval delays; and, 6) increases the potential for excessive handling and docket abuse. In addition, the Federal Records Center only allows the withdrawal of 2 dockets per request and personnel must make multiple trips if more than two dockets are required. Several of the modes indicated that use of the Records Center facility is avoided because of these problems.

OST has had reasonable success with managing its off-site operation because of particular care in the transportation and control of these dockets by personnel. In addition, OST has had a level of staffing which could be devoted to this function; however, manpower resources are being slowly eroded and it is not believed that OST will be able to sustain the quality of service it has been providing. With an estimated yearly growth rate of 25%, OST is now facing a substantial challenge to maintain its status quo given its current resource limitations. It is highly unlikely that OST will be able to continue a quality operation without some supplemental automation or a greater infusion of manpower and storage space/equipment resources.

NHTSA suffers from a lack of manpower and, to a lesser extent storage. As Exhibit 4-1* shows, there is a potential for acquiring additional floor space which would more than double what is now available; however, because of manpower constraints, NHTSA finds itself backlogged with a large of amount of microfiche waiting for review and filing. Fiche are boxed in original shipping cartons occupying much useable space. It was estimated that there were over 3,900,000 pages of information on fiche awaiting review and no real solution in sight. NHTSA's policy is to destroy original documentation and duplicates after the microfiche has been reviewed and filed; but, as of this time, many originals and duplicates are still being retained. The storage area, as a result, suffers from the fiche backlog, is riddled with paper boxes, does not appear as secured, or as well organized, as the OST model. Even with new space made available, it is doubted that NHTSA will commit sufficient manpower to alleviate the storage situation and perhaps, may even aggravate it with the desire to move all loose material and box stores to this area as quickly as possible.

* All exhibits portray general areas. Items, such as storage cabinets, machines, and office furniture, are not shown. The Exhibits only illustrate relative space orientation/proportion and are not drawn to scale.

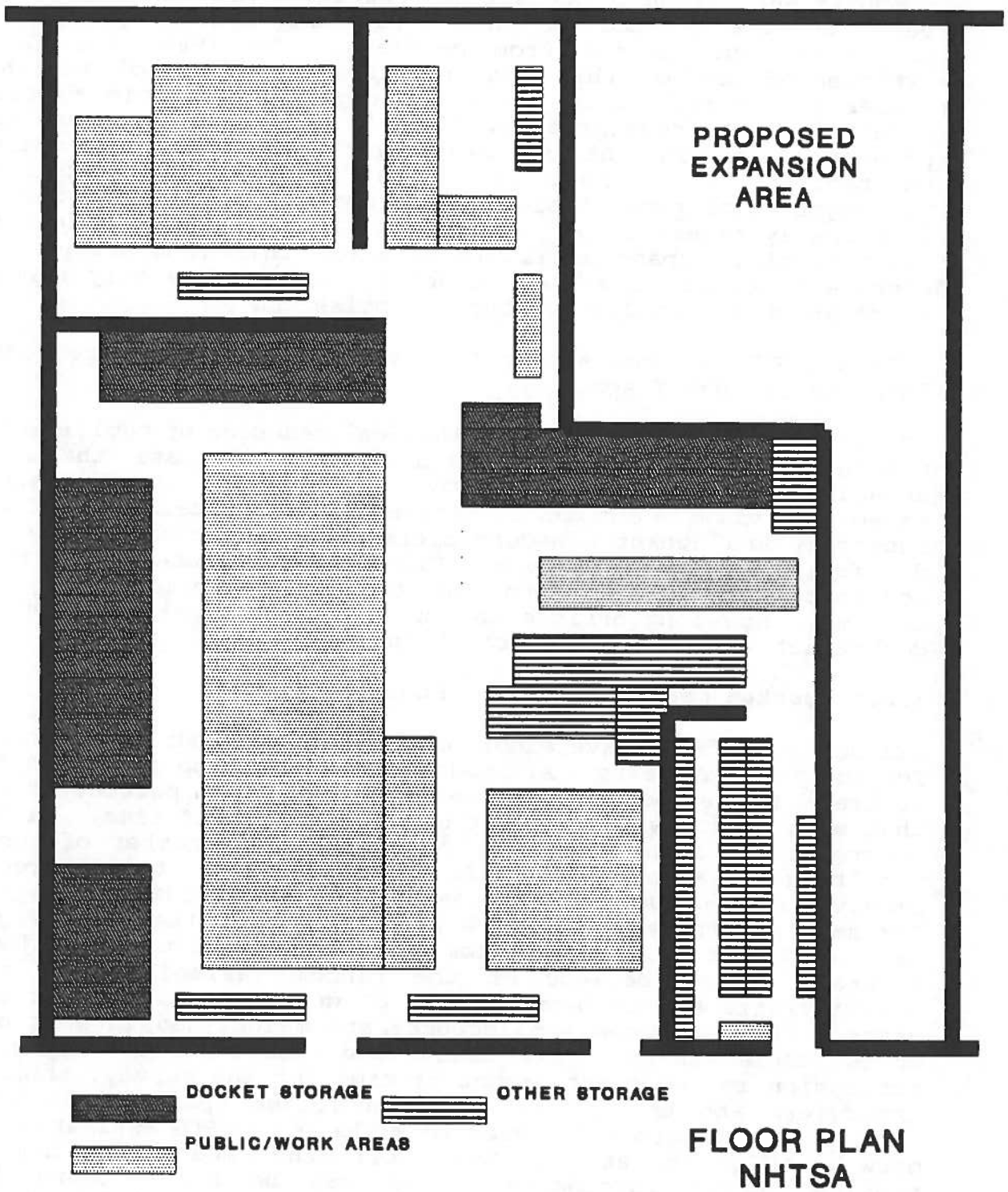

PROPOSED
EXPANSION
AREA
DOCKET STORAGE
OTHER STORAGE
PUBLIC/WORK AREAS
FLOOR PLAN
NHTSA

Exhibit 4-1

The FAA is clearly approaching the limit of its available storage space. It possesses a Lektriever power file, but does not have computer automation to augment the retrieval process. An index has been recently created on one of the Wang systems using a word processor, but is far from complete. In 1989, the FAA had experienced one of the uncontrollable anomalies of the docket process; a particularly sensitive regulation. This regulation resulted in the receipt of over 60,000 individual comments to the proposed rule. This has severely strained the person in charge of the facility, the facility itself, and the process. At this time, the majority of paper resides in cardboard boxes in an area which is normally reserved for public use. There does not appear to be adequate shelf space available to store this commentary. Since storage space is at 93% of capacity, the FAA has only enough to store about 1/2 to 2/3 of these submissions.

RSPA and FHWA do not appear to have critical space problems but lack overall shelf space.

Standard operating procedures, physical redesign of facilities, and modern filing systems would immediately increase the storage capacity of all modes; however, as long as the dockets are reasonably visible and easily retrievable, physical upheaval is not necessary and docket managers/clerks should not experience great difficulty in the short term. This is part of the reason for the apparent satisfaction with the current performance of docket offices. How long offices can sustain this level will depend on docket activity and paper growth in the future.

4.2.1 Docket Growth Impact on Storage Space

All docket offices have experienced steady growth in paper volume for the past few years. All modes will experience increases in the future, but the amount of increase will depend on particular issues that each agency will confront over the course of time. Major, controversial issues, generally cause a large number of comments resulting in large dockets. As was noted above, the FAA recently received over 60,000 on an issue of altitude encoding transponders for smaller aircraft. In attempting to assess the rate of growth of the docket storage problem, it is difficult to project an accurate number because of the random variability in docket activity/size and an overall lack of docket statistics from past years. While indices and logbooks are maintained in most of the modes, there was no way to assess the actual number of pages per submission in the short amount of time for the survey, therefore interviews and the ASG report were relied upon as the primary sources for the growth figures in Table 3-3. USCG estimated an 11% growth, NHTSA 5%, and OST 25%. All other modes were unable to provide useful information. As can be seen, there is no consistency in the projected figures; however, the information can be used to calculate the effect of growth on these particular modes and the amount of time before storage problems become critical.

A simple calculation using the storage density figure to determine lead time to saturation showed USCG as having 6 years (with an upgrade of its filing system). NHTSA would have 2 years before reaching this point. Using the highest estimated growth rate (25%), calculations indicate that the majority of docket offices would not reach saturation for at least 2-3 years.

There is no immediate requirement for extraordinary action to alleviate space shortages and there is still time to do adequate planning; however, it should be noted that OST takes advantage of floor space by using floor-to-ceiling shelving and that most modes would not be as close to saturation as what is being implied if similar storage systems were being used.

4.2.2 Alternate Space Considerations

Pressure to expand storage space at each mode by using the space allocated for other functions should be discouraged. Indiscriminate use of available office or public space, as shortfalls occur, will adversely impact the efficiency and morale of docket personnel, create additional control problems, and damage public perception of the docket function. Individual office infrastructures should be carefully reexamined and redesigned to be more considerate of the human element so as to present to the public, as well as in-house users, the best possible functionality and professional image.

The minimum office space standard for the type of functions performed at each office should be in the 80 to 120 sq. ft./person range. This includes clerical and staff positions. Docket offices currently reflect the following office space allocations on a per person basis:

- OST - 78 sq.ft.
- NHTSA - 78 sq.ft.
- FAA - 90 sq.ft.
- RSPA - 197 sq.ft.
- FHWA - 41 sq.ft.
- USCG - 127 sq.ft.
- FRA - 0 sq.ft. (docket clerk not located in area)
- MARAD - 15 sq.ft.
- UMTA - 0 sq.ft. (docket clerk not located in area)

With the exception of FAA, USCG, RSPA, FRA, and UMTA, the four remaining modes are below the adjudged minimum standard for comfort and efficiency and should reapportion office space. RSPA has 152 sq.ft. of office space that is realistically available for additional storage. The USCG, because of its floor plan (Appendix A, Exhibit 4-2), does not allow the taking of any additional office space for alternative purposes.

Users from both the government and public sectors need access to docket facilities and should be provided with comfortable seating and table space for reading and study. A reasonable amount of space is considered to be equivalent to a 5 x 4 (20 sq.ft.) area for work and seating. In comparison, the modes appear as follows (based on peak period requirements):

- o OST - 29 sq.ft.
- o FAA - 30 sq.ft.
- o NHTSA - 18 sq.ft.
- o RSPA - 154 sq.ft.
- o FHWA - 152 sq.ft.
- o UMTA - 15 sq.ft.
- o USCG - 0 sq.ft.
- o FRA - 60 sq.ft.
- o MARAD - 28 sq.ft.

With the exception of USCG, all modes have designated an ample amount of space for the public. In terms of the requirements for additional storage space, these modes could be modernized with the goal of better use of public and "other" (Table 3-1) discretionary floor space (Appendix A, Exhibits 4-3 to 4-9 present individual office floor space layouts). An effort to replan and reorganize space in each mode would take an appreciable amount of time and short term upheaval of docket functions. In any such program modes should be provided with modern storage equipment better suited to the needs of individual users and the docket storage function.

4.3 DOCKET RETRIEVAL

All docket offices use "docket number" as the primary locator and are heavily dependent on this simplistic system of document indexing. Some offices assign lengthy numbers (e.g., NHTSA's docket numbering system includes: type of docket, year, comment number, and notice number). Smaller offices use even more simplistic systems; usually year plus a sequential number. In addition, most docket offices list contents at the beginning of each docket folder as a secondary index into the specific information contained in the file.

All docket offices maintain a formal index or log containing, at minimum, the docket number and title. Additional information that is, sometimes, included is subject matter, date/time document was received, initiator, and FAR Part number. Most indices are manual some offices have computerized databases or are beginning to place index listings on various word processors (NHTSA, FAA, OST, and UMTA). OST and NHTSA have customized software systems which provide supplemental services, such as content listings and summaries, in addition to indexing information. OST is using an Apple Macintosh PC; NHTSA is on a standard IBM PCAT compatible. The word processors are either a part of Wang's Office environment standalone Wordperfect, or non-standard packages. Several docket offices keep additional indices to enable docket clerks to retrieve dockets if the number is not known by a user. For example, FHWA and FAA keep logs or catalogs of FAR Part numbers and correspondin

dockets; USCG can retrieve dockets by RIN (Regulatory ID Number from the Regulatory Semiannual Agenda); NHTSA maintains a listing of dockets by "standard number" (corresponding to different subjects covered by the agency).

Ease of docket retrieval should be the primary goal of the docket storage function and, in general, all of the surveyed offices can locate open docket information. Once a docket is found, the user can browse through it at will or may find a convenient summary at the beginning of each folder, binder, or packet which may aid in locating a particular piece of information. This is, usually, the extent of indexing. No cross-referencing system exists in any of the modes which would allow a user to search by subtitles, articles, exhibits, etc., and in some cases title. The last element was most disturbing since it is perceived to be most natural form of search criteria. In discussions with docket personnel, the survey team found that if a user could not produce a docket number, there was a high probability that the docket could not be located by description alone. Docket personnel must directly intervene in such instances and call upon the extent of their knowledge of docket topics to affect a fruitful search. This results in protracted search time, a potential distraction from normal routines, and wasted time. NHTSA and OST have cross-referencing systems based on certain keywords; however, all docket offices should adopt some form of descriptive cross-indexing scheme as a further aid in the retrieval process. Older, closed dockets may, or may not, be found on premises at the time of search. If a need arises to retrieve a retired docket, a docket clerk must first search the active files and, if not found, resort to a search of any inactive files that are readily available on-site. Should the docket reside at the Federal Records Center, then personnel time, transportation cost, etc., must be incurred for its retrieval. Compounding this problem is the issue of descriptive searches, in which case there is little likelihood that a docket can be retrieved; the possibility of excessive docket manipulation and mishandling; and potential of loss in transit. With a heavy dependence on docket number, the benefits of descriptive search criteria cannot be realized. The simple act of browsing for a topic is impossible. Any browsing must be done by physically removing and reviewing individual pieces of a completed docket. Searches by category are non-existent. Users are not able to recover all dockets that may contain a particular topic. Docket storage/retrieval functions in all modes do not realize significant benefits from the use of this simplistic cataloging system. Docket offices may never achieve the potential of being recognized as modern and efficient legal document repositories, or research, facilities if this continues in its present form.

OST provides quick visual location of dockets by imprinting the docket number on the side of each docket binder. It is the only mode using this method of docket recovery. All other modes rely on manila folders, looseleaf binders, or straight filing of

material. In those modes, with a high density factor, locating information is tedious, retrieving files is cumbersome, damage is innevitable, and the possibility of misfiling is high. Several of the offices indicated that, with an open file system, misfiling is a common occurrence.

4.4 DOCKET REPRODUCTION/DUPLICATION

Most docket offices have one, on-site copying machine; exceptions are FRA and UMTA, which send users to nearby large volume, print rooms. All offices, with the exception of UMTA, charge for copies (generally 10 cents/copy). OST and FHWA have coin operated units while other offices empirically determine the number of copies made and charge appropriately. Some offices do not charge unless a significant number of copies are required.

Some docket offices make multiple copies of docket contents and keep these with the originals; this is particularly true for dockets covering controversial or major issues. When users desire copies of these items, they are removed from the docket rather than having to take apart originals. This saves wear and tear on the original material in the docket.

In addition to allowing copies to be made on site, FAA, NHTSA MARAD, and RSPA also respond to requests by phone and send copies to the requestor by mail. Other offices require user presence, or will respond only to phone requests when the user exercises his/her right to dockets under the Freedom of Information Act.

Problems in the reproduction/duplication function arise when simultaneous access to a docket is required, or if a large number of users are, concurrently, using the facility. If no spare copier are available, users will experience proportional delays. The machines that are available are, generally, the least expensive on a copier family and do not possess high output rate. This has profound impact on machine availability to the user. Compounding this problem are the individual needs of office personnel who retain priority over the public in the use of these machines. It is not uncommon to interrupt an external user with an internal higher priority, office item. In those cases where the user must go to another copying location, or if the on-site copier is not functioning (observed first hand at OST and USCG), the user will take the docket back to his/her office and may not return it to the files. Many of the offices confirmed that this happens with regularity and is a significant problem.

4.5 DOCKET DISTRIBUTION

All docket offices have a system of distributing docket information (filings, applications, comments, rules, etc.) to internal program and legal offices associated with particular dockets. This was done for the purpose of reducing the number of internal users who

would, otherwise, be actively using docket storage/retrieval facilities. Docket personnel did not voice any particular concern over the functioning of this process.

4.6 DOCKET CONTROL

Docket offices must maintain absolute control over file contents and track docket circulation at all times. All offices are open to the public, most allow internal users to remove dockets from storage areas, and, when duplicate copies are not available, allow open access to original files. On the surface, this operation is, in a simplistic sense, a public library function; however, it differs significantly in its overall importance when consideration is given to its use in supporting rulemaking activities and legal proceedings. Dockets must be kept totally accurate and up to date. They must be safeguarded against theft, destruction, alteration, misplacement, and prolonged removal from their storage locations.

At the present time, there does not appear to be serious problems with the tracking of docket contents although, in several instances, dockets were found without a listing of content. This would impair any attempt to verify that the dockets were complete.

As for monitoring docket circulation, some offices have instituted sign-out procedures for docket removal whereby users must fill out a checkout form, or request slip, which can then be used to track docket custody. Because of limited manpower and space shortages, most of the docket offices have no front desk control/service counter, do not police stores, nor monitor access and document removal. What is happening, then, is that some of the modes (e.g., FAA) have instituted an "honor system" and rely upon the integrity of the user in order to maintain surveillance over the location of dockets. This can create serious problems. While the FAA indicated that sign-out sheets were readily available within each docket, upon closer inspection it was found that this was not the case, making this procedure totally unreliable. Once a docket is removed from this facility, there is no guarantee it will ever be returned or can be found. Most offices reported that they have had dockets misplaced, misfiled, lost, stolen, modified, or abused. In the case of missing documents, there is no way of retrieving lost information without duplicates. With no positive means of insuring accuracy in content, docket offices cannot assure the integrity of the material they have in custody. Without safeguarding access to storage facilities, loss through theft and pilferage, whether intentional or benign, will continue. As proof that this is the case, Table 3-2, for the most part, was constructed by interviewing personnel, since no records were available to do an accurate count. OST was the only exception.

4.7 DOCKET CHARACTERISTICS

Sampled dockets from each area were examined to assess the physical and optical character of the documents contained therein. The purpose of this exercise was to determine the amount of optical storage that would be required for docket images. Other parameters can be estimated from this information and used to determine required scanners, system throughput figures, and the need for any special handling of dockets with greyscaled, color, rotated, faded, or speckled (dirty) documents. The results are shown in Table 3-8 in Section 3.7. The documents maintained in each docket office are fairly standard. Most dockets contain one or more of the following types: Rules, comments, exemptions, hearings, and transcripts. The majority of documents are on 8.5" x 11" standard bond paper in some combination of single- and/or double-spaced copy. Most offices have documents on legal-size (11" x 14") paper but not a significant amount (1-5%). Docket offices which maintain rules dockets occasionally receive handwritten comments on various size and colored papers.

Many dockets contain xerographic copies of documents some of which have high black content areas. Others are faded, or smudged, and some have high speckle content. All of these characteristics will impact file size, but, fortunately do not comprise a high percentage of docket content (1-2%). Offices also contained colored papers and colored inks. Most offices have glossy documents (color brochures, etc.) but, again, in low numbers (<2%). Colors have significant impact on scanner response and system performance can be adversely impacted by spectral blindness.

Few documents were considered unusual. This category comprises blueprints, postcards, maps, etc. of various sizes, shapes, and content. Most of the offices have a small number of photographs in black/white and color.

The age of dockets varies by office. With the exception of OST and NHTSA, docket offices do not retire old dockets to the Federal Records Center. Older dockets are usually kept on microfiche or microfilm at NHTSA, RSPA, and the FAA. RSPA maintains hard copies as well. RSPA, USCG, FHWA, FRA, and UMTA all reported that old dockets create problems with fading, yellowing, and fraying edges. Older dockets also tend to contain more onion skin and blue carbon copies which may give scanners additional spectral problems

5. CONCLUSIONS

5.1 STORAGE/RETRIEVAL FACILITIES

DOT Operating Administration Docket Offices currently store approximately 3.5 million pages of docket information. Most of this information is contained in active dockets which must be readily available to both government and private sectors. A low percentage of the total docket office space is dedicated to paper storage (21%).

While accurate statistics on growth rate are unavailable, information obtained from personnel interviews would quantify growth in the range of 5-25%. Docket growth rate is difficult to predict with certainty because of the variability in the substantive nature of regulatory issues. There is general agreement in the modes that the more controversial the issue, the greater the response and, thus, the size of the docket. Docket activity may also depend on such factors as domestic and international economy, political climate, social and environmental conditions which cannot be readily predicted, or quantified, and are beyond the scope this assessment. However, in order to be able to form some conclusion about docket growth, a judgmental assessment was made conservatively estimating a 15% yearly increase in paper volume for those offices which could not provide accurate data. This placed the paper expansion problem at .6 million pages per year.

Most docket offices will face storage problems as long as no attempt is made at improving physical facilities. As the analysis of paragraph 4.2.1 indicated, many of these offices would not be experiencing shortages today if modern storage systems were immediately available and optimal floor space planning had been an integral activity as a part of the function. As dockets grow, more and more offices will be forced to use unorthodox storage methods and the storage and retrieval process will become increasingly cumbersome; user satisfaction will wane as personnel struggle with controlling the process.

It is inevitable that currently used space will be reallocated as docket volume increases. Decreasing personnel office space or public working areas will only lead to a demoralization of personnel and a further erosion of public perception and confidence. As the analysis in paragraph 4.2.2 indicates there is space that could be used if offices were rearranged and a small amount of public space was taken; however, this cannot be done in all facilities and represents only a meager amount of relief.

All docket offices are in danger of saturation. OST will begin to feel the adverse effects of saturation within the next year and other modes are expected to reach their saturation point shortly thereafter. The effects can be lessened with manual methods if the DOT is willing to commit to a complete modernization program including redesign of floor space and the purchasing of modern, high density, filing equipment. However, this is considered to be only a stop-gap measure if significant expansion of floor space cannot be provided within the next 2 years. All indications are negative as to this happening without the acquisition of new facilities. Floor space, in general, is a premium commodity in the FAA and NASSIF buildings and at USCG Headquarters. The possibility of docket offices acquiring adjacent space appears remote.

5.2 INDEXING/LOCATOR SYSTEMS

The storage space problem is only the tip of the iceberg when considering the ideal characteristics of a docket storage facility as outlined in Section 4.1. All docket offices suffer from indexing/locator systems which are overly simplistic. Modern library science principles are not evident in any of the offices other than FHWA. Detailed indexing and locator information is not readily available in the modes making searches completely dependent upon knowledge of docket number or office personnel familiarity with individual filings. In the case of the former, docket information can always be located; the latter poses significant problems and is best described as a "hit or miss" proposition. Many of the docket clerks interviewed could not locate dockets by verbal description alone.

A modern legal repository should have locator guides or, at least, a card-based cross-referencing system which allows users to quickly locate dockets or any documents contained within them. Furthermore, the system should minimally allow searches on titles, dates, and related dockets.

5.3 LOGGING, DATING, AND POSTING

Logging, dating, and posting functions are manual operations in each docket office. Date and time stamps are affixed to documents as they are received and filed. Only one office, OST, is public posting new filings. OST is also the only facility that is providing comprehensive summaries of docket activity. Some modes have digests of docket contents published under the auspices of the Federal Register. All other facilities provide only login, dating and some content listing functions. In some cases, listings can only be found in the docket itself and are not available in collective summary or statistical form. Few docket offices are able to easily provide a capsular summary of current docket activity, complete historical statistics, or any kind of digest of docket content.

5.4 DOCKET CONTROL AND SECURITY

Most of the docket facilities are open areas and can be used by the general public as well as internal government personnel. Circulation of dockets is allowed with complete access provided to docket storage facilities. Users may perceive a freedom to use original docket material in any way including removal from the office area. The ramifications of this openness on security and control should be reviewed at each mode. The legal implications of the documents contained in a docket demand absolute correctness, close monitoring of use, and careful control of circulation. Current operations, in many instances, allow users access to original documentation with minimal control to prevent pilferage, theft, abuse, or modification. Few of the docket facilities maintain any kind of counter operation whereby personnel must be involved in the storage and retrieval process from the request stage through to the return of the docket to its previous storage location. Sign in/out procedures are evident in some of the facilities, but not closely policed. Internal users are allowed full access to dockets and, in some instances, may return dockets to storage, bypassing any personnel screening. This should not be allowed. Since dockets can be easily taken apart and tampered with, personnel must assure that contents are inventoried before placed into circulation and after return by a user. Some offices maintain secured files which must be accounted for, but not made available for public viewing.

5.5 COPYING FACILITIES

Copying facilities in most of the docket offices are substandard for the amount of use they get while other offices have no copiers, but rely on general use facilities within walking distance of docket storage. The copiers observed in high usage areas were low speed equipment designed for low to moderate office use. There are no high capacity machines in any of the offices. Multiple requests for copy services are handled sequentially. In all docket offices personnel take precedence and will interrupt a user whenever they need copier time. Perception of this operation could not be measured in the short time spent at each office; however, some aggravation with an overused machine and coin box operation was noted during the evaluation at OST and the machine at the USCG was not functioning. In areas which have no on-premise, copier facility, users are allowed to remove files from the immediate vicinity and copy wherever convenient.

5.6 PHYSICALLY LOCATING AND RETRIEVING DOCKETS

Most storage facilities contain dockets in some form of folder or binder arrangement. Many use standard shelving with binders/ folders placed perpendicular to the view of the user. Moveable shelving which improves access and browsing, in order to locate documents, are not used in all facilities and, except for OST,

docket reference numbers are either typed or written in long-hand on individual folder tabs or on the documents themselves. Users cannot see these numbers in a direct viewing of the storage space and are prevented from conducting any kind of general scanning of the dockets on hand. This makes the retrieval process tedious and time consuming. In some of the docket offices showing a high storage density, location and removal/return of documents/dockets were difficult and confusing because of tightly packed materials.

5.7 PUBLIC ACCESS AND PERSONAL ASSISTANCE

All docket office personnel are very cooperative and provide the users complete assistance and full access to docket facilities. Because of the problems cited above, docket personnel are now devoting an inordinate amount of time to search and copying activities. In some cases, office responsibilities are set aside to service user requests with full time staff reassigned to daily docket retrieval and copying service tasks.

During peak periods of docket activity it is highly likely that multiple requests for the same docket will be made. This causes a queuing problem for docket offices when duplicate dockets are not available. Whenever this situation arises, docket personnel will service requests on a "first come/first service" basis. If dockets are in internal circulation, personnel will immediately recall them. The public has the highest priority of all external docket users. Most docket offices allow the user unlimited time with a docket during an 8 hour day and will reserve the docket for as long a time as the user deems necessary. This policy is considered intolerable when multiple requests are submitted for the same docket. Some offices will have copies of "high interest" dockets available.

5.8 DOCKET CHARACTERISTICS

Ninety five percent of all docket contents are either single-spaced or double-spaced, 8.5" x 11" (A-size) pages. Approximately 2% are legal-size documents (11" x 14") leaving the remaining sizes in the 2-3% range. An immediate conclusion that can be drawn from these statistics is that there is little requirement to store documents sizes greater than the legal size dimension. These can be maintained off-line with references to their location stored in databases or notated on a scanned regular A-sized sheet of paper and electronically placed in the correct location in a docket file.

Document cleanliness was excellent. One to two percent were either faded or contained high speckle content. Less than 1% contained continuous greyscaled images (B&W photographs) or color (photographs, papers, inks, etc.). Ninety-nine percent were white with black typeface containing printed text characters. A very small percentage of xeroxed copies contained areas of toner smear

Less than 1% were rotated. With these statistics as a basis, it is estimated that 98% of all stored image files will occupy a range of between 50 to 70K bytes (compressed). Less than 2% will occupy a range of 100 to 300K bytes (compressed).

Continuous greyscaled or color images should be included in system storage on a case-by-case basis depending on the quality of scanner and its ability to 1) provide quality halftone conversion; and 2) provide accurate spectral response. The number of documents is low enough to maintain separate manual files in those cases where sufficient contrast ratio cannot be obtained.

5.9 RESIDENT PROCESSING EQUIPMENT

The equipment listed in Section 3.9 may, or may not, be able to be used in an integrated imaging system depending on the eventual equipment provider. It does not appear feasible to integrate the varied computers that are available into a single system concept because of the high cost of system integration. A separate study should be conducted to determine overall costs. While some offices have INTEL 8088-based, or 80286-based, PCs, some have WANG equipment and others have processors from LEXIS or APPLE which are all incompatible with one another both in equipment design and software operating systems.

Local Area Networks (LANs) pose a significant challenge to imaging system integration. Imaging places intense transactional demands on network capacity and can dramatically reduce performance with just a few workstations on line.

A typical network (E.g., Ethernet* as used in many government agencies) will exhibit a system throughput in the several kilobytes/second range with little traffic on the network. Even with heavy usage, the network may not experience significant delays and users will be, generally, satisfied. The reason for this is that, in a typical user session, less than 1500** bytes of data are normally transferred, at any given time, between a user and the host processor. Imaging, however, is not bound by this low amount of data transfer and a typical transaction may see several hundred kilobytes (thousands of bytes often referred to as "Kbytes") transferred with a single keystroke. Even if a network exhibited a 30 Kbyte instantaneous transfer rate, a 300 Kbyte transfer would

* While Ethernet is cited, as an example, identical rationale can be applied to many LANs currently being sold.

** Value quoted from a Digital Equipment Corporation Network Reseller Training Seminar for Phase V development of DECNET. Statistics compiled for 95% of all worldwide users.

take 10 seconds and no other terminal would likely be allowed access to the network until this transfer were completed. Studies have shown that most networks, using the OSI, 7-layer model architecture for network software, exhibit significantly less throughput rate than the above. Imaging applications, generally, avoid using full 7-layer LAN implementations opting, instead, to use Transport Layer Protocols, such as TCP/IP or custom LANs, which provide orders of magnitude improvement in throughput usually achieving 90 -100 Kbyte transfer rates. What this means to the docket function is that without a change in protocol, networks may exhibit markedly reduced performance with the introduction of image processing and increase the level of frustration of now satisfied users. Each LAN interface must, therefore, be carefully examined to determine the impact of adding an imaging application on it. Tradeoff studies must first determine the anticipated usage, the resident LAN's ability to sustain a significant increase in data activity, and the cost of implementing alternative LAN systems, if required. While such studies are beyond the scope of this assessment, integration in the DOT environment should be considered for the future overall docket process concept. Integration is further considered in subsequent recommendations.

6. RECOMMENDATIONS

6.1 PREFACE

The assessment determined that all modes should be considered low volume operations (<5 million pages) in terms of docket storage capacity. The application of optical imaging technology to document management of such operations should not be undertaken without a clear understanding that immediate cost savings may not be possible. The real cost savings and benefits that are to be derived from a dense archival storage medium and image processing, are not easily justified in traditional automation terms--near term cost savings, computational/processing power, and management information system (MIS) characteristics. Instead, terms such as labor productivity, document image retrieval, document risk minimization, document management, information management systems (IMS), enterprise processing, simultaneous access, print-on-demand, space reduction and conservation, image processing, optical character recognition, improved personal and organizational dynamics form the newer terminology that is now used to describe the benefits of optical disk-based systems. In addition, while imaging is a highly attractive solution to most paper-intensive operations, applying the technology for "technology's sake" should be avoided, because the concept of document management introduces a dramatic change to the working environment requiring user commitment and a willingness to adapt to a different way of doing business.

Traditional terms will, generally, apply to the entire docket function across offices where dockets are used and automation already exists. This is evident in FAA Regional Offices where information has been previously automated.

6.2 GENERAL RECOMMENDATIONS

DOT docket offices are candidates for document management technology; however, the most important issue confronting its application will be the impact on people who are responsible for day-to-day operations. Most of the offices have been in existence for some time. The OST facility, for example, has been operating since 1968 and its procedures are well defined and understood by office personnel. Resistance to change should be evaluated in the course of making a final buy decision since some of the modes indicated apprehension at the thought of deviating from today's norms. Most personnel are now beginning to use PC technology and are beginning to see its advantages, although on a limited scale, and appear to be interested in the newer imaging technology; however, they must, first, be thoroughly educated in its use, understand how it will affect their work environment and work routines, and be clearly shown the benefits to be derived from its

use before it can be applied on a full scale basis in all docket offices. Until personnel confidence is won, management will have to assume a pivotal role in orchestrating this change and ensure that the transition to this new operating environment is done in a logical and people-oriented manner, or else it will fail.

From the conclusions drawn in Section 5.0, all DOT docket offices will be facing saturation limits within the next 2-3 years unless some modernization, or expansion, of facilities is undertaken. While it is possible to prolong current operations with better use of space, or acquiring more, and using high density manual/semi-automatic filing systems, it is recommended that a document management system be incorporated in any future improvement plan since manual approaches offer only temporary solutions and cannot completely address the other problematic issues that have surfaced during this assessment.

An automated document management system offers the DOT docket function a way to begin standardizing the entire operation and a system-based approach to solving security, user, printing, storage space, indexing, and retrieval shortcomings. A common system approach can also provide the means to insure interoffice compatibility and unity of purpose. Resource sharing, savings in consolidation, increased labor productivity, a bolstering in public goodwill, and high personnel morale are some of the more mundane benefits that are possible in the future by using this technology.

It is recommended that a phased system approach be taken in automating the nine docket offices. There is no immediate requirement to implement a complete, "across-the-board" system since sufficient alternatives currently exist, within offices, to cope with the paper problem for the next two years. It would be advisable to test optical disk-based management systems in higher and lower volume docket offices before implementation on a DOT-wide scale. Both OST and NHTSA operations would be suitable candidates for a networked system. Each office is experiencing problems with limited space, a large number of closed docket files, has room to add equipment, has strong management incentive, and personnel who are interested in using imaging technology.

It is recommended that a clustered system approach be used. A clustered system is defined as a self-contained, networked, workstation environment where communications to any external system are performed through a single "gateway/bridging/telecommunications" subsystem. Clustering implies multiple, independent processors sharing networked resources and various server configurations.

This approach will provide a working testbed independent of other applications being used in the host office. This will allow the user complete freedom to experiment with the system and provide operational feedback to system designers while tailoring the

application to the user's specific needs. The objective of this program should be to prove that optical disk-based docket management can be a long term, cost effective solution to docket handling problems when encountered at the lowest level of system operation--use by the staff and the general public. It should, also, prove that the systems can be designed, co-operatively, with users who will be operating them on a daily basis. While future applications and system integration are worthwhile considerations during the pilot phase, they are of little consequence if basic storage and retrieval functionality cannot be demonstrated. Individual docket offices will be more interested in basic functionality during the pilot phase and less interested in the need to factor in all possible external operational needs. The clustered system design philosophy recognizes that without a good working optical disk system, retrieval is impossible; and, if retrieval is impossible, then indexing/search (I/S) processes are useless. If I/S processes are useless, then docket access is non-existent; and, if docket access is non-existent, then external interfacing is meaningless. Therefore, it is fundamental that basic functionality be achieved first, to the user's satisfaction, before a great deal of attention is brought to external system integration and future requirements issues.

The clustered system approach will allow the users to interactively support the application design without the need to be thoroughly familiar with the details of system architecture; nor encumbered by having to deal with the operational nuances of multi-system integration. Gateway and bridging technologies, which may be used to, ultimately, link the clustered systems into DOT networks, have evolved to a state of maturity which makes system integration, at the hardware level, a straightforward task. System interoperability, on the other hand, can be a formidable enterprise. Making Wang/Banyan, Novell, ELAN, Appletalk, etc. networks and imaging work together implies a thorough understanding of how operating systems, network parameters, and clustered imaging servers/components will interoperate in "out-of-office" applications. It also implies that protocols can be made compatible, either internally in the various operating systems or through the provisions of "store and forward" buffering. In either case, if it is required to consider the integration issue in the pilot, then the cost of implementation could be prohibitively high and could deny docket offices the fundamental S&R capabilities they now need. A clustered system approach will pose no unique problems to the integration effort nor will it deny an ability to transfer image information external to the system. The technology is relatively stable and is applied in a top-down fashion. That is, that unlike traditional MIS design (definition of need/ functional requirements/concept design/preliminary system design/detailed system design/etc.), an IMS design is fashioned by applying the hardware configuration first, and then building the application in standard systems engineering manner. The building blocks of imaging are specifically design to accomodate this design

methodology because their sole purpose is to capture, store, retrieve, disseminate, display, and print images as fixed functions which never change. The application, however, is the user's window into the system, is variable, and needs the full system development approach for maximum user satisfaction. It is recommended that each DOT interface be assessed on a case-by-case basis as overall docket office application requirements are defined. This will ensure that imaging is being applied with full consideration of its impact on already existing LAN systems.

It is possible to demonstrate external communications and the ability to transfer images between systems. As an interim measure, to demonstrate this capability, it is recommended that a standard FAX (Group 3) telecommunications interface be included in each pilot system. This would be in keeping with the philosophy of a phased, clustered, cost controlled, development approach and provide both an intersystem communications capability and an ability to service users with standard FAX machines. Alternatively, a modem-based approach could be substituted for FAX, however, this would only allow transfer of images between DOT pilot systems and preclude transfers to external users.

Smaller docket offices, such as USCG, do not experience sufficient volume or activity to warrant clustered systems. Imaging, however, can be of significant benefit if applied on a standalone basis with the ability to communicate externally, as recommended above. A standalone system is a self-contained, single processor environment containing all major workstation elements for the storage, scanning, printing, and display functions of an information management system.

It is recommended that a concurrent pilot effort be initiated to evaluate a low cost, standalone, optical storage system for such an office. A standard FAX, or modem, capability should also be a requirement. Vendor commonality, and/or a singular software development, is strongly recommended for all pilot programs.

It is recommended that, initially, docket offices refrain from entering data and scanning currently stored files (aged backlog), concentrating efforts on capturing only new docket information as it is received. Until such time that personnel productivity levels are able to adjust to the new system, it is unlikely that the additional scanning workload can be accommodated within current staffing levels. Service demands should decrease over time allowing personnel to redirect workload activities and address the aged backlog. This should result in freeing space and allowing removal of dockets from on-site storage to more permanent facilities. It may even be possible to destroy dockets as they are electronically stored. Optical disk media is considered tamperproof (by design) and has been under legal scrutiny since its inception as a storage device. As far as is known, information recreated from the data on these disks is legally admissable in

court. It is recommended, however, that a formal opinion be obtained from the Office of General Counsel on this matter before dockets are actually destroyed.

It is recommended that, at the conclusion of the pilot program, FAA, MARAD, OST, FHWA, RSPA, FRA, USCG, and NHTSA be fully automated with systems custom tailored to their particular size and demand for services. Specific recommendations for pilot system configurations are presented in the following paragraphs. Design considerations for all docket offices are provided in the Conceptual Design Document.

6.3 PILOT SYSTEM-SPECIFIC RECOMMENDATIONS

System recommendations for each pilot system are based on observations and data collected at each site, factoring in concerns expressed in paragraphs 6.1 and 6.2. The following paragraphs contain pilot system recommendations and the reasons for them. Functional descriptions of equipment and requirements are stated only where required for a general understanding of the recommendation. The information presented below is specific for the two categories of system configuration recommended in paragraph 6.2--Clustered and Standalone.

6.3.1 Clustered System

System performance characteristics, such as throughput, workstation response, scan/print rates, and system sizing requirements were derived using the OST docket facility operation as the baseline. A block diagram of the recommended system is shown in Figure 6-1.

The hardware and software items in the following paragraphs should be viewed as potential purchase items under the FAA's Office Automation Technology and Services (OATS) contract (DTFA01-90-D-00009). Certain items may not appear in the approved catalog of OATS items and waivers will need to be considered. It is also important to note that equipment integration, even with the clustered approach methodology, may be adversely impacted by the specificity of OATS component requirements. If such cases appear, applicable waivers will need to be obtained if OATS compliance is formally issued for all DOT systems of this nature. It may be possible to consider a blanket waiver, on the grounds that the OATS procurement is an office automation application and does not adequately provide for archival imaging and is, therefore, not applicable.

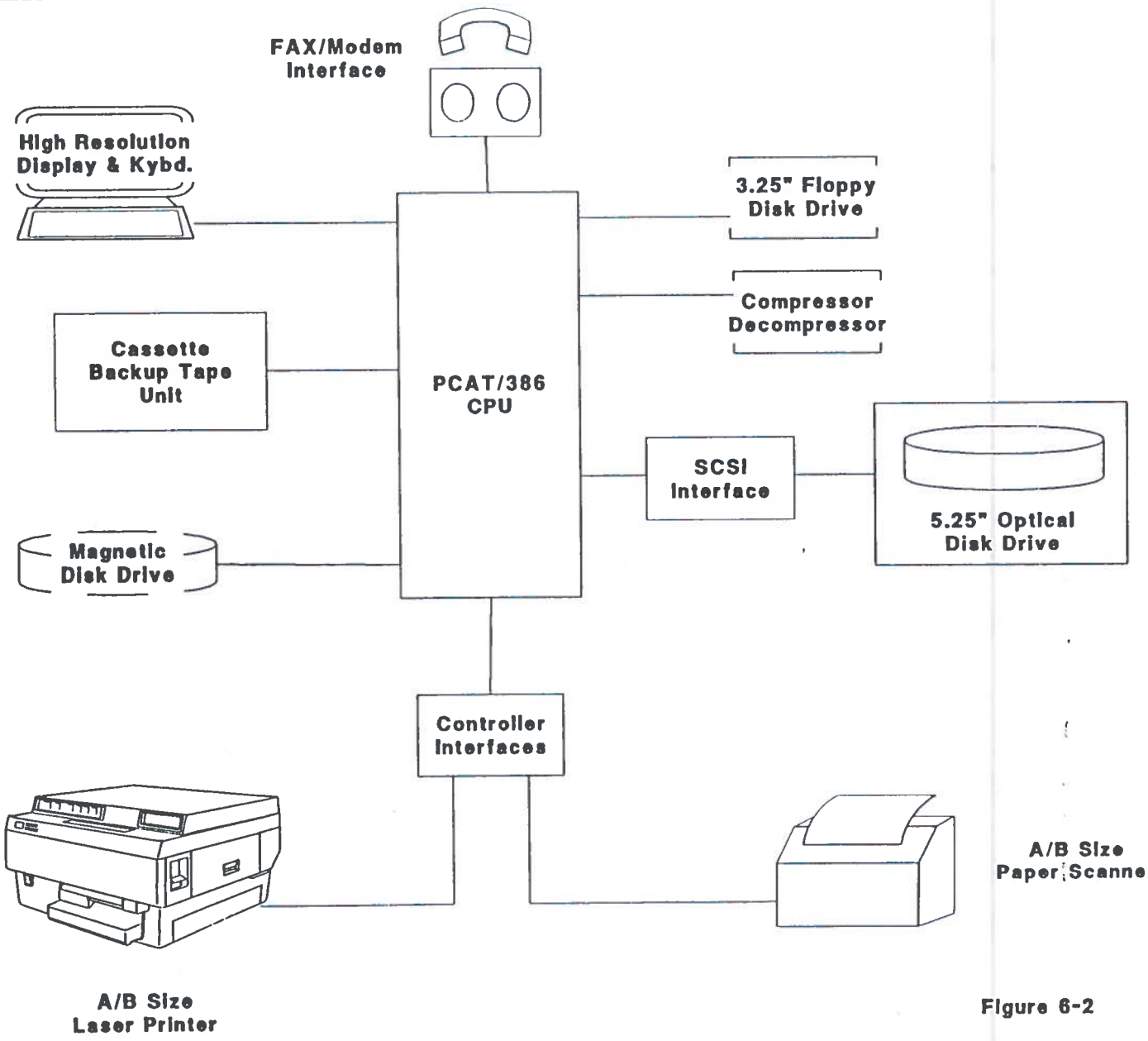


Figure 6-2

Standalone System Block Diagram

6.3.1.1 Image Server

With a projected rate of growth of approximately 332,000 pages per year the system should be sized to store a minimum of 350,000 pages of information and be expandable to accommodate the current inventory and growth rate for a minimum 10 year period; 4.8 million pages. The image server should contain:

A. A Minicomputer-based Central Processing Unit (CPU) with:

   1. Up to 16 Mbytes of internal storage capacity.

   2. Facilities for LAN connectivity (see paragraph 6.3.1.5) and FAX (CCITT Group 3 [1 and 2 dimensional]) communications.

   3. EIA Standard RS-232/422, 2400 baud, serial interface.

   4. A Small Computer System Interface (SCSI) for jukebox control.

   5. Sufficient capacity for adding physical and logical links to other networks or mainframes.

   6. 120 volt, AC operation with power conditioning (Surge protection should be provided as minimum).

B. An Optical Disk Jukebox Unit sized to the first year requirement and expandable to the 10 year volume projection. The jukebox should use a standard SCSI interface. Jukebox configurations not totally capable of providing the full storage capacity must be multi-unit cascadable (daisy-chained operation).

C. Fast document file compression/decompression (<300 ms.) in CCITT group IV, 2D-Huffmann encoded format with bi-directional conversion facilities to/from Group 3, FAX formats.

G. 600 Mbyte (min.) magnetic disk system. Must be capable of being expanded to full 10 year volume indexing requirements.

H. A standard operator's console/printer.

I. A 1600 bits per inch (bpi), 9 track, random access, streaming tape subsystem (for database backup/image and information distribution functions).

J. Real-time, Unix-based, Multiuser/Multitasking Operating System.

K. Application/Database Management/Communications/ Optical Jukebox Interface System Software.

The CPU recommendation is based upon the current non-availability of suitable 386- or 486-based PC platforms and software. This should not preclude a vendor from offering such an alternative, if it can be shown that the alternative is a viable substitute and will perform as well as a comparable minicomputer.

6.3.1.2 Scan/Data Entry Station

All scanning and data entry should be provided by docket office personnel. The page growth rate of 332,000 pages/year does not reflect potential peak period activity but an even distribution over time. It is recommended, therefore, that a 30,000 page per month rate be assumed as a conservative baseline rate for scanner throughput in considering potential peaks in daily docket activities cited in this report. It should also be assumed that the docket clerk will devote 25% of work time solely to this task. These requirements equate to a single unit scanner workstation with a net throughput rate of 4 pages per minute (minimum). The scan station should provide:

A. An 80386-based Central Processing Unit with expansion facilities for LAN connectivity.

B. A medium performance document scanner capable of capturing page sizes up to 11 x 17 inches. The scanner should be a flat bed device providing single page scanning with 50 page (min.) automatic paper feeder features. Scan resolution should be 300 dpi. The scanner should provide multiple threshold settings for contrast adjustment and possess the ability to scan greyscaled images. The scanner should exhibit wide spectral response.

C. Scanner Controller Interface.

D. EIA Standard RS-232/422 serial interface.

E. Fast document file compression/decompression (<300ms) in CCITT Group IV, 2D-Huffmann encoded format.

F. 40 Mbyte magnetic disk system.

G. High Resolution, 19" Monochrome Display Monitor with a 1024 x 1024 pixel display resolution and controller interface (required).

H. 101-key, enhanced keyboard.

I. 1.4 Mbyte, 3.5" floppy disk drive.

J. MS-DOS, Version 3.3, Operating System with a windows-based, multitasking environment.

K. Application/Image processing/Scanner Interface/ Terminal Emulation System Software.

6.3.1.3 Document Viewing Workstations

During peak activity periods, the system can expect between 20 and 25 daily visitor accesses. It is possible that as many as 10-12 people will require immediate service at any given time. This equates to having to provide a minimum of ten document viewstations for public use. The viewing workstations should provide the user:

A. An 80386-based Central Processing Unit with expansion facilities for LAN connectivity.

B. Fast document file decompression (<300 ms.) in CCITT Group IV, 2D-Huffmann encoded format.

C. 40 Mbyte magnetic disk system.

D. High Resolution, 19" Monochrome Display Monitor (1K x 1K) and controller interface. As an alternative, a desired capability should be an ultra-high resolution monitor with a 2048 x 1650 pixel display resolution (for viewing two full image pages or documents up to the full 11" x 17" dimensions).

E. 101-key, enhanced keyboard.

F. 1.4 Mbyte, 3.5" floppy disk drive.

G. MS-DOS Operating System with a windows-based, multitasking environment.

H. Application/Image processing/Terminal Emulation System Software.

6.3.1.4 Print Workstations

The system will need to produce 300 pages of xerox copy per day. Assuming that the average number of copies required by a single user at any given time is 40 pages, an average of 20 to 25

users/day, and that a user should not exceed a 3 minute time limit for copier use (empirical goal), then a single, 300 dots per inch (dpi), single-sided, laser print workstation with a throughput rate of 15 images, or better, per minute is recommended. The print workstation should provide:

A. An 80386-based Central Processing Unit with facilities for LAN communications.

B. Fast document file decompression (<300 ms.) in CCITT Group IV, 2D-Huffmann encoded format.

C. 40 Mbyte magnetic disk system.

D. 1.4 Mbyte, 3.5" floppy disk drive.

E. Laser printer with control interface. Print resolution of 300 dpi with dry monotone toner.

F. 2000 sheet, high capacity paper deck for 21 lb. A-size paper and a 250 sheet B-size cassette.

G. Coin box operation. It is recommended that an alternative billing system be considered as an alternative system.

H. MS-DOS Operating System with a windows-based, multitasking environment.

I. Application/Print Spooler/Printer Interface/System Software.

6.3.1.5 Local Area Network (LAN)

A Local Area Network will form a single-thread communications link between all workstations in the cluster. It is recommended that a proven standard LAN configuration be selected. An Ethernet-based system, in accordance with the IEEE 802.3 standard, can be used as long as the highest workstation throughput rate can be sustained; however, it is also recommended that custom LAN options be considered only where a sustained image file transfer rate in the vicinity of 100 Kbytes/sec. can be demonstrated and gateway software is available for communicating to standard LANs.

A Transport Layer Protocol, such as TCP/IP, is recommended for network transfers. This protocol is widely used throughout the DOD, industry, DOT, and in most imaging applications currently installed. A high sustained throughput rate and internetwork protocol facilities will not only accomodate imaging applications, but also provide a convenient mechanism for interfacing to other

external systems and a variety of central processors. The DOT ELAN uses this protocol in its CS-200 Communications Servers.

6.3.2 Standalone Pilot System

The USCG office survey was used to derive the following system requirements. A block diagram of the system is presented in Figure 6-2.

With a projected rate of growth of approximately 15,000 pages per year the system should be sized to store a minimum of 20,000 pages of information and be expandable to accommodate the current inventory and growth rate for a minimum 10 year period; 300,000 pages.

All scanning and data entry should be provided by personnel within the docket office. The 15,000 page growth rate does not reflect potential peak period activity but an even distribution over time. It is recommended, therefore, that a 2,000 page per month rate be assumed as a conservative baseline rate for scanner throughput calculations considering peaks in daily docket activities as cited in this report. It should also be assumed that the docket clerk will devote 25% of work time solely to this task. These requirements equate to a single unit scanner with a 2 page per minute (minimum) scan rate for A-size pages.

Information on the number of xerox copies required per day is not available, but the system should see very low user activity per week and should only need the lowest of performance print capability.

The standalone system should contain:

A. An 80386-based Central Processing Unit with expansion facilities for LAN connectivity and FAX (CCITT Group 3 [1 and 2 dimensional]) communications.

B. A 5.25" Optical Disk Unit

C. A Small Computer System Interface (SCSI) for the Optical Disk Unit.

D. Sufficient capacity for adding physical and logical links to other networks or mainframes.

E. Fast document file compression/decompression (300 ms.) in CCITT Group IV, 2D-Huffmann encoded format and bidirectional conversion facilities to/from FAX formats.

F. EIA Standard RS-232/422, 2400 baud, serial interface.

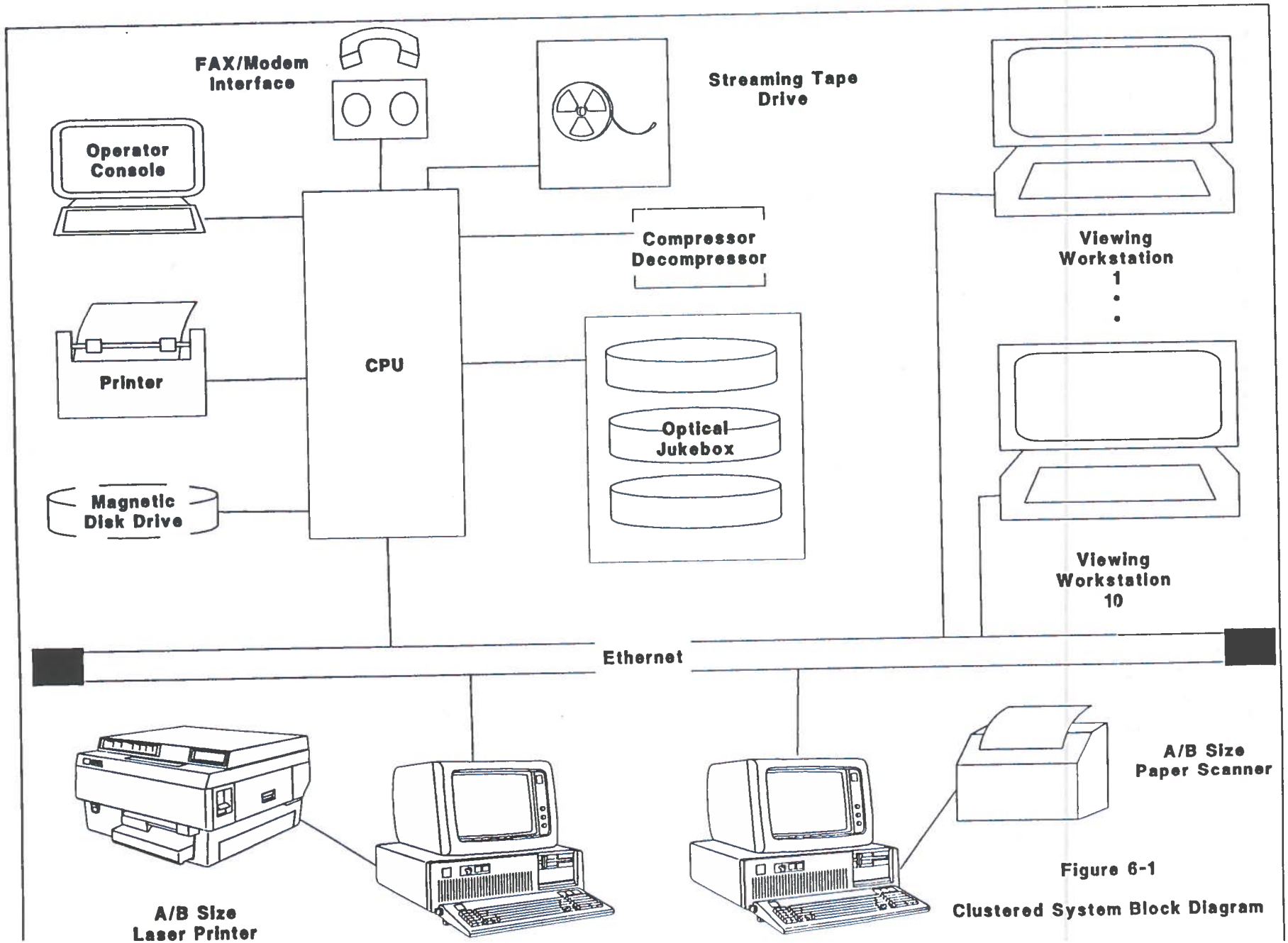


Figure 6-1

Clustered System Block Diagram

G. 400 Mbyte(min.), high density, magnetic disk system with cassette tape unit backup.

H. High Resolution, 19" Monochrome Display Monitor (1K x 1K) and controller interface. As an alternative, a desired capability should be an ultra-high resolution monitor with a 2048 x 1650 pixel display resolution (for viewing two full image pages or documents up to the full 11" x 17" dimensions).

I. 101-key enhanced keyboard.

J. 1.4 Mbyte, 3.5" floppy disk drive.

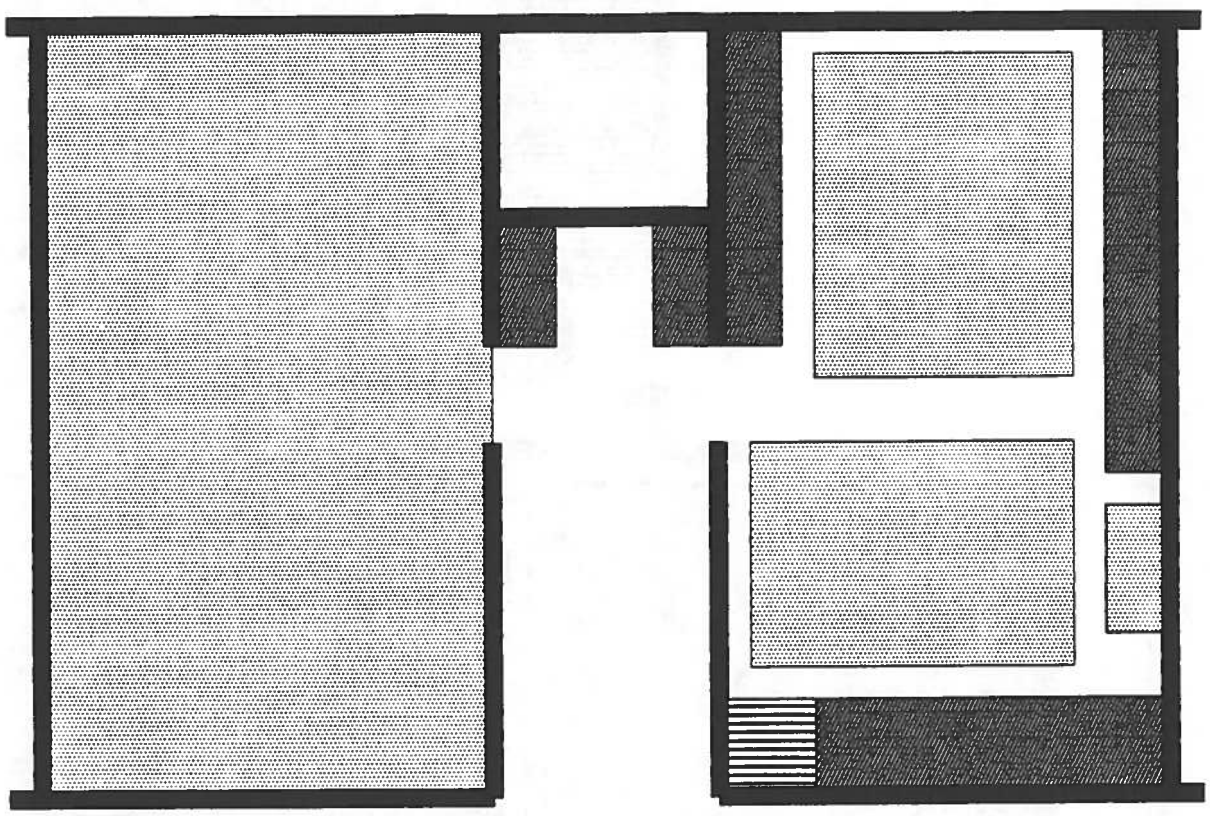
K. A low performance, desktop, document scanner capable of capturing page sizes up to 11 x 17 inches, respectively. The scanner may be a flatbed or roll feeder device providing single page scanning. Scan resolution should be 300 dpi. The scanner should provide multiple threshold settings for contrast adjustment and the ability to scan greyscaled images. The scanner should exhibit as wide a spectral response as possible.

L. Scanner Controller Interface.

M. MS-DOS Operating System with a windows-based, multitasking environment.

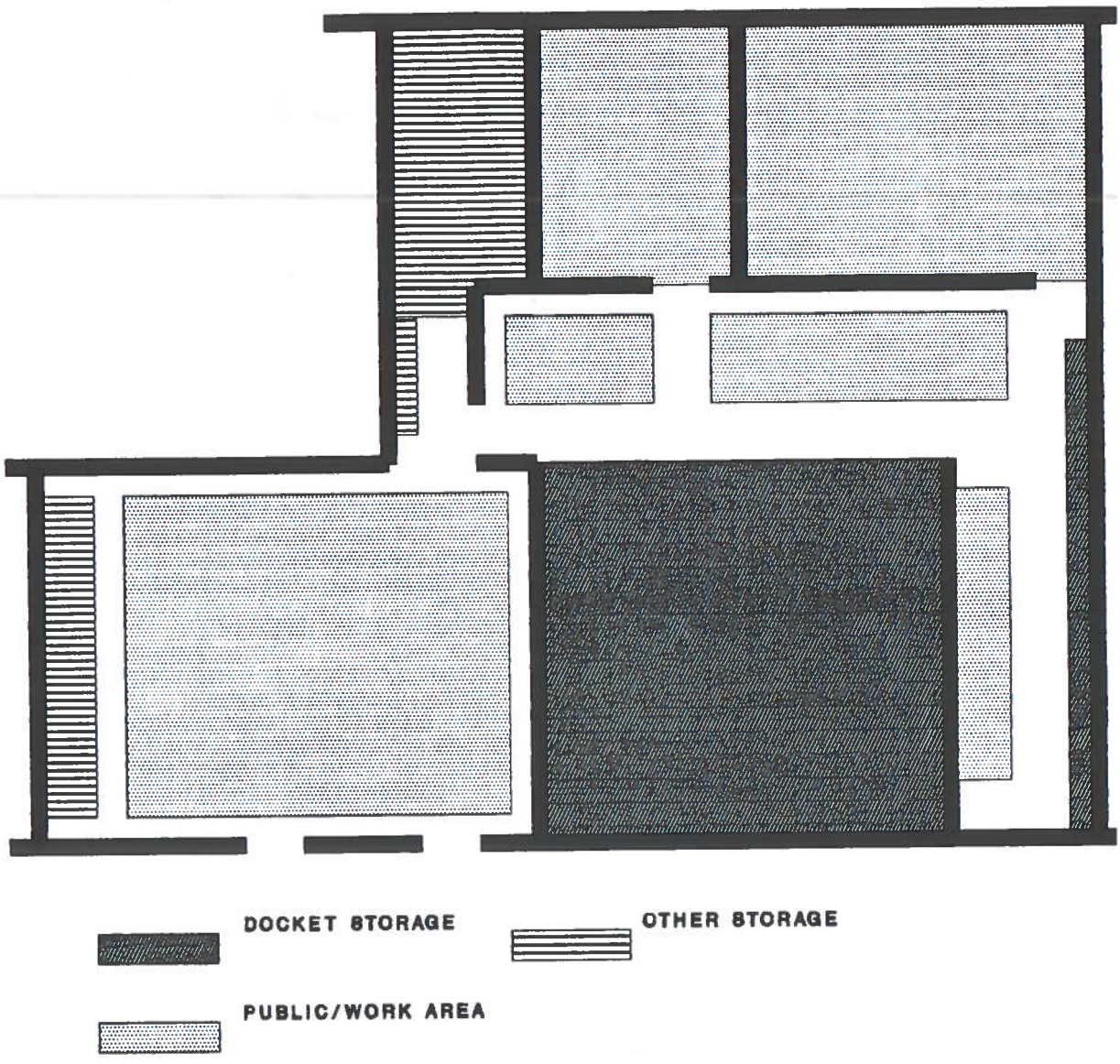
N. Application/Database Management/Communications/ Optical Disk Interface/Scanner Interface/Printer Interface/Image Processing/Terminal Emulation System Software.

O. 2 images/minute laser printing at a resolution of 300 dpi using a dry monotone toner. Dual cassette paper deck with up to 250 sheets each for 21 lb. paper. A and B size sheets.



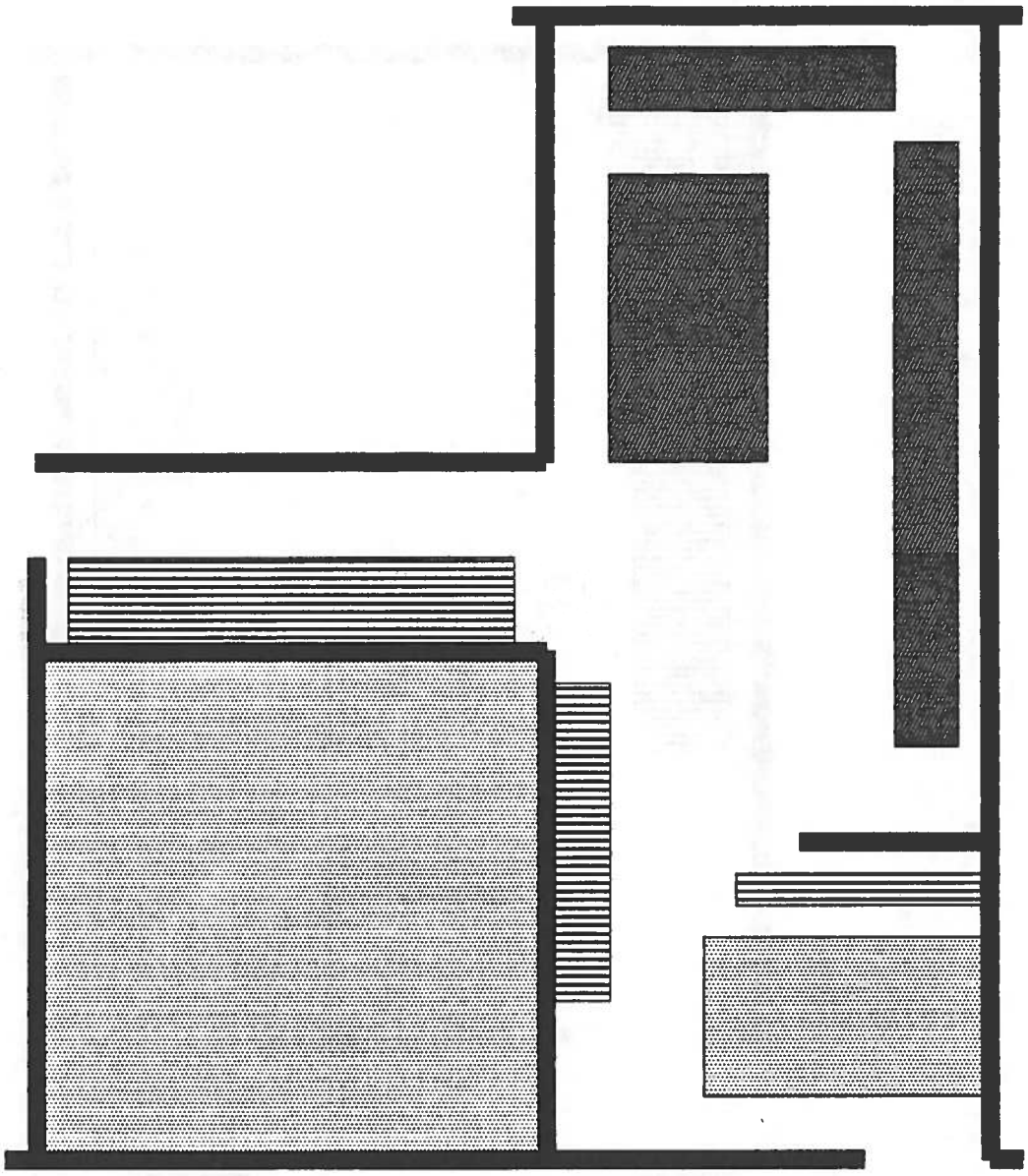
FLOOR PLAN
USCG

Exhibit 4-2



FLOOR PLAN
OST

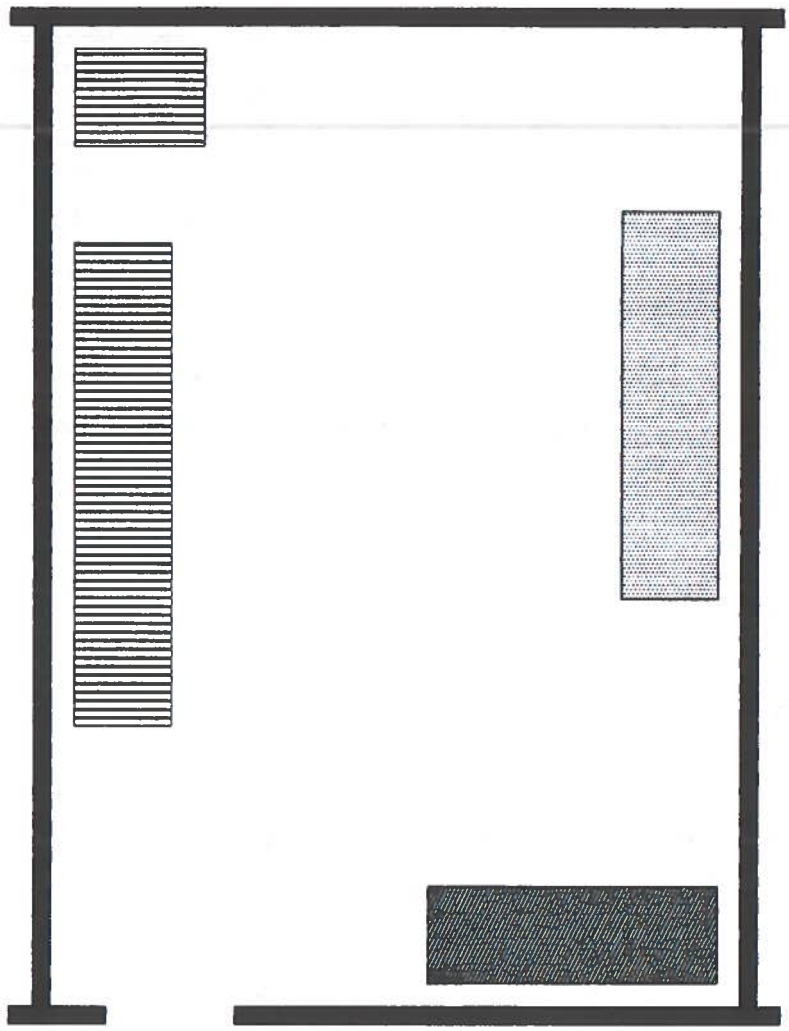
Exhibit 4-3



FLOOR PLAN

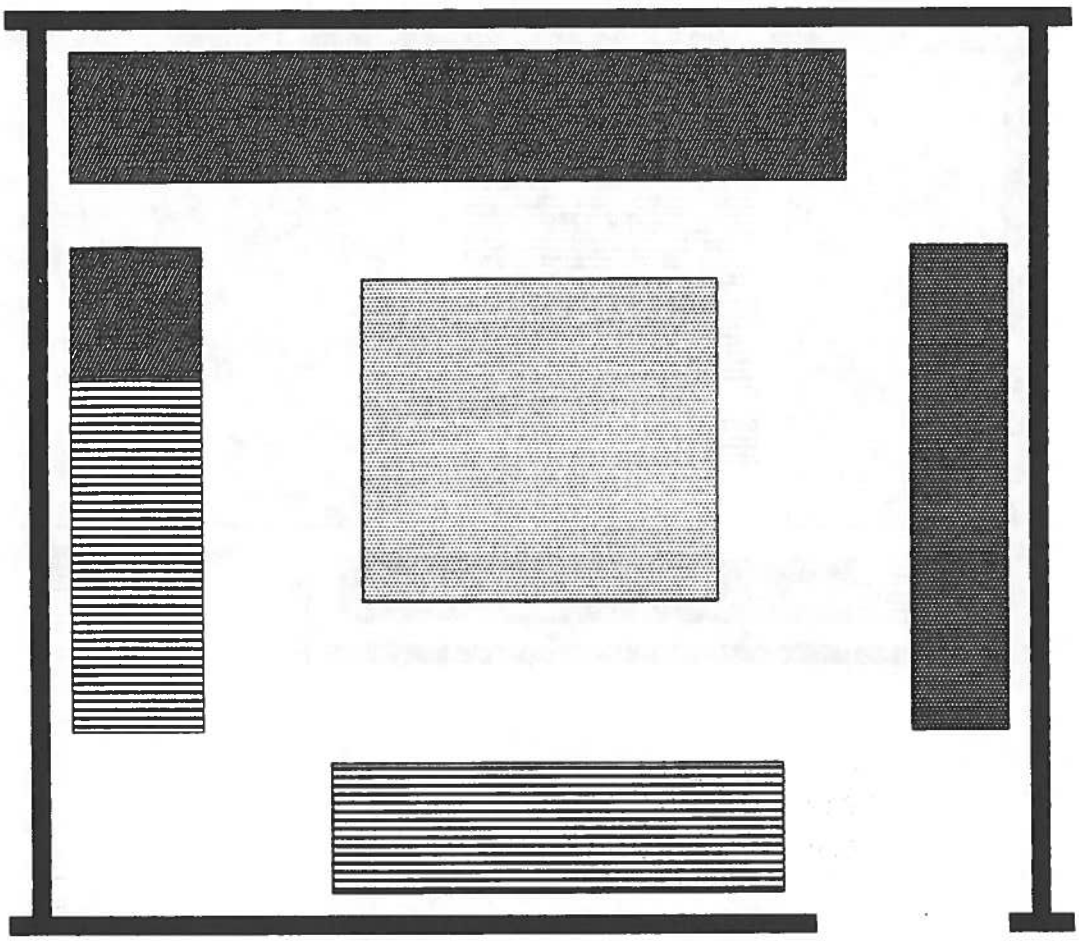
FAA

Exhibit 4-4



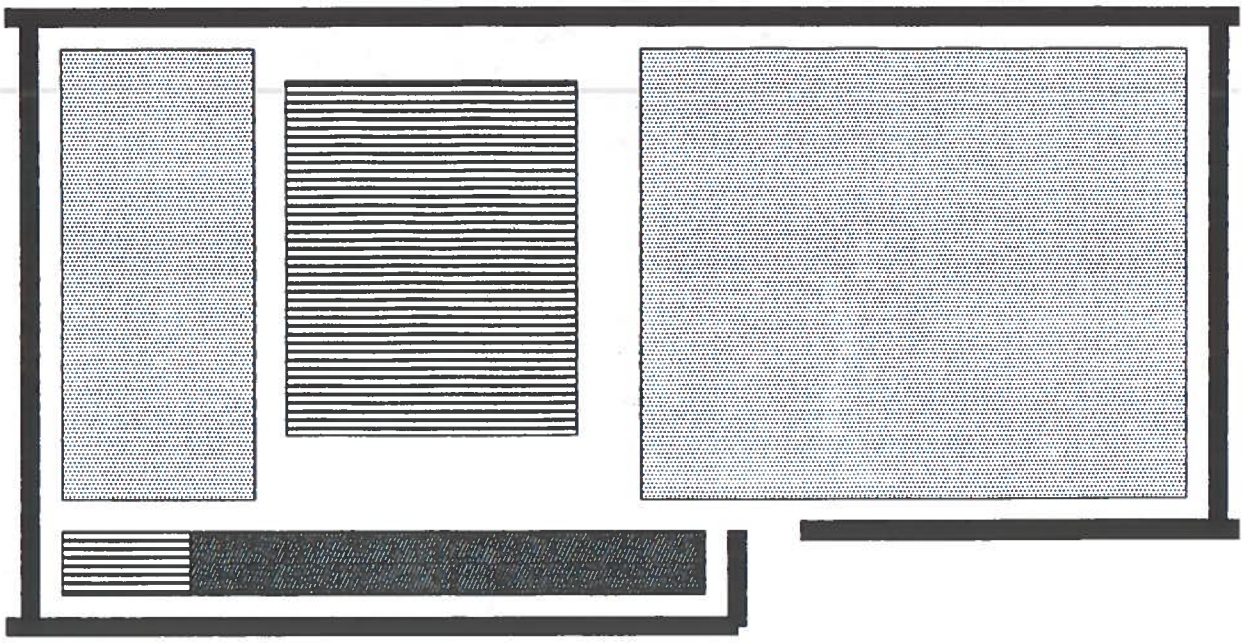
FLOOR PLAN
UMTA

Exhibit 4-5



FLOOR PLAN
FRA

Exhibit 4-6



DOCKET STORAGE

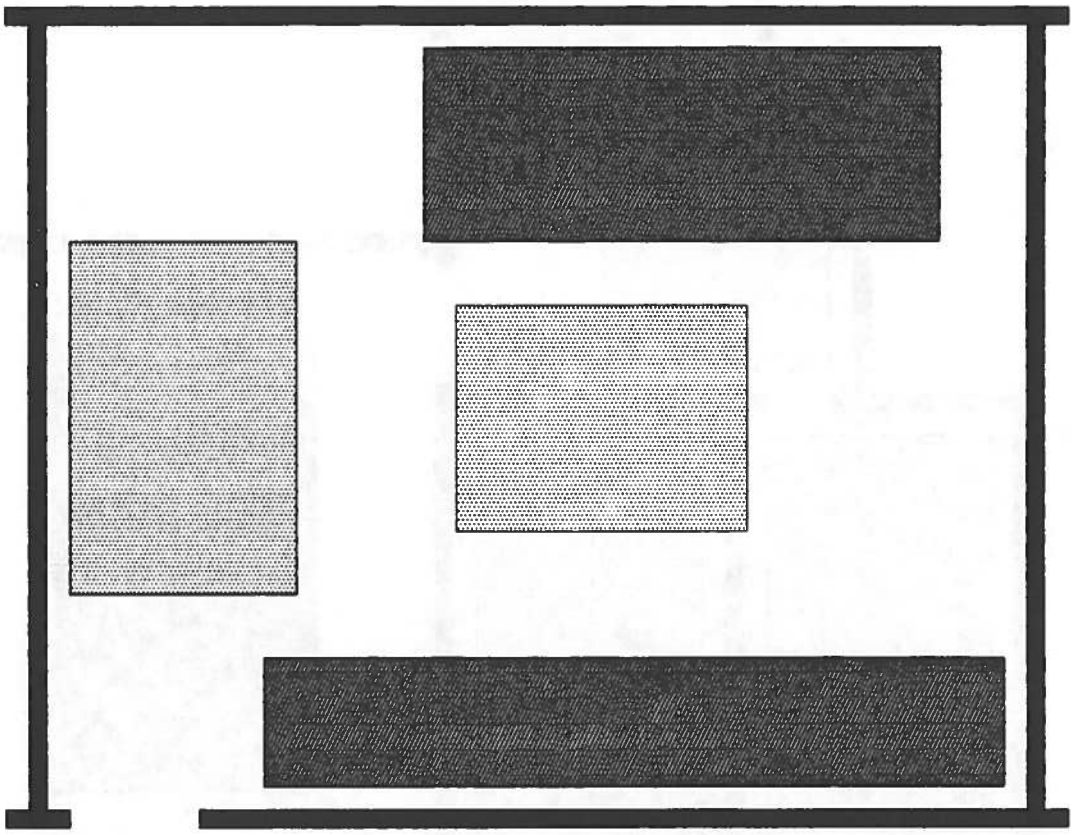
OTHER STORAGE

PUBLIC/WORK AREA

FLOOR PLAN

FHWA

Exhibit 4-7

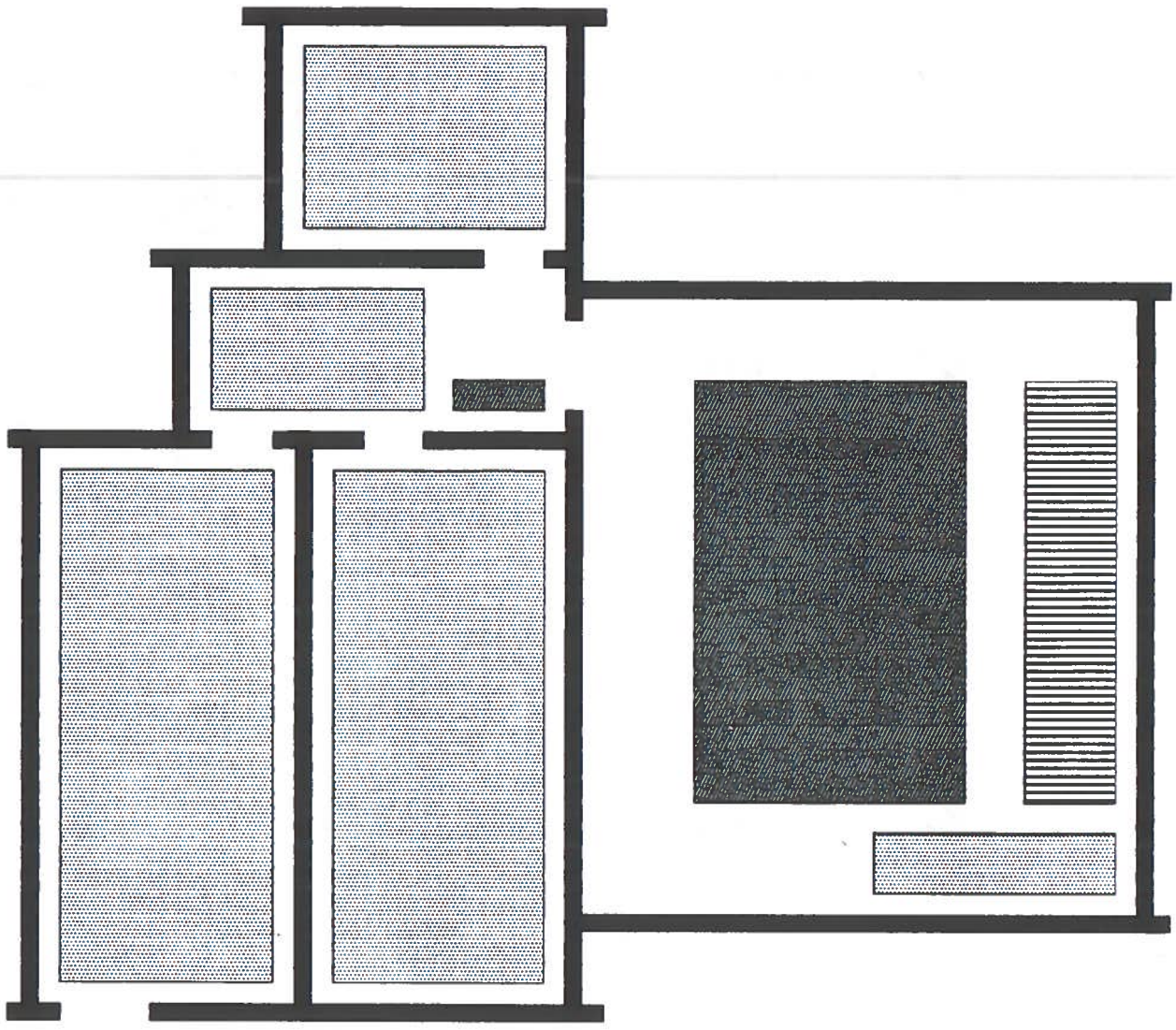


DOCKET STORAGE

PUBLIC/WORK AREA

FLOOR PLAN
MARAD

Exhibit 4-8



FLOOR PLAN
RSPA

Exhibit 4-9