DOCUMENT RESUME

ED 325 119 IR 053 297

TITLE	Projection of Network Costs for Service Functions. Phase I Report, Volume I.
INSTITUTION	Technology Management Corp., Alexandria, VA.
SPONS AGENCY	Library of Congress, Washington, D.C. National Library Service for the Blind and Physically Handicapped.
PUB DATE	8 Jun 90
CONTRACT	L70086
NOTE	47p.; Appendixes 5-7 use small type font.
PUB TYPE	Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Disabilities; *Library Expenditures; *Library Materials; *Library Networks; *Library Services; Library Statistics; Library Surveys; National Programs; *Operating Expenses; Public Libraries; Regional Libraries, State Programs; Tables (Data); Visual Impairments
IDENTIFIERS	*Cost Projections; *National Library Service for the Blind

ABSTRACT

The National Library Service for the Blind and Physically Handicapped (NLS) commissioned a study to determine the baseline costs of operation for the network of libraries and agencies that provide braille, playback machine, and recorded book services to patrons of the free national program. A 15-year projection of costs was also prepared. The approximate costs of network operations for the federal fiscal year 1989 were $3,154,000 for braille book services, and $7,724,000 for playback machine services, and $30,181,000, for recorded book services, for a total of $41,058,000. These numbers represent expenses incurred by state, local, and private agencies in the network, and exclude costs for materials or equipment, which were covered by the NLS. The NLS also incurred approximatley $805,000 in costs for its multistate centers (MSCs). In fiscal year 1989, the network consisted of 56 regional libraries, 92 subregional libraries, 8 machine lending agencies, and 3 MSCs. The 15-year projection of network costs was based on the cost behavior of 35 sample sites, operational statistics as reported to NLS by network libraries and agencies, and unit occupancy costs compiled by the General Services Administration (GSA). Independent mathematical relationships relating the costs for the sample sites to their associated operational statistics were developed for regional and subregional libraries for the three services under study and for three major cost categories: labor, occupancy, and all other costs. It is projected that costs in the 15th year will have increased to $91,601,419 ($6,134,726, $17,415,106, and $68,051,587 for braille book, playback machine, and recorded book services respectively). Supporting data and cost prediction models are appended. (SD)

PHASE I REPORT
VOLUME I

PROJECTION OF NETWORK COSTS FOR SERVICE FUNCTIONS

to:

National Library Service
for the Blind and
Physically Handicapped
Library of Congress

for:

Data Collection Services

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June 8, 1990

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EXECUTIVE SUMMARY

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The National Library Service for the Blind and Physically Handicapped (NLS), The Library of Congress, commissioned Technology Management Corporation (TMC) to determine the baseline costs of operations for the network of libraries and agencies that provides braille book services, recorded book services, and playback machine loan services to patrons of the national free library program. In addition to the determination of baseline costs for network operations, a 15-year projection of these costs was also required.

TMC found that the approximate costs of network operations for federal fiscal year 1989 (FY89) were $3,154,000 for braille book services, $7,724,000 for playback machine services, $30,181,000 for recorded book services, for a total of $41,058,000 for all three services combined. These figures represent the total expenses incurred by state, local and private libraries and agencies in the network, but exclude both the costs of all books, machines and other materials purchased for the program by NLS, and the costs of all postage-free mailing provided for the program by the United States Postal Service. These costs include all expenses for resources that directly or indirectly support the subject operations, regardless of funding sources, whether directly paid for by the network libraries and agencies, or paid for by parent or administering organizations. In addition to the costs incurred by state, local and private libraries and agencies for network operations in FY89, NLS directly incurred approximately $805,000 in costs for its multistate center (MSC) operations of which $173,000 was for braille book services, $92,000 was for machine services, $387,000 was for recorded book services, and $153,000 was for publication and back-up supply services.

During FY89, the network consisted of 56 regional libraries, 92 subregional libraries, 8 machine lending agencies, and 3 NLS MSCs operating throughout the U.S. and its territories TMC initially compiled a statistical profile of the network and made a pilot site visit to the Washington, D.C., regional library. With the guidance and approval of NLS staff and an advisory committee composed of network administrators and other interested parties, a data collection plan was formulated, and a representative sample of network sites was selected whose cost behavior was used to model the baseline costs of the entire network population The data collection plan was designed to capture all relevant costs of operations, including

costs associated with labor, facility occupancy, capital equipment depreciation, equipment maintenance, services, supplies, miscellaneous activities and administrative overhead. The sample was designed to include sites which spanned the full range of size for readership, circulation, collection and several other operational attributes, as well as full geographic representation. A total of 35 sites was selected for the sample: 17 regional libraries, 15 subregional libraries and all 3 MSCs.

Study teams consisting of one or two individuals made visits to each selected site for a period of approximately one week for the purpose of data collection, which involved the collection of raw financial and operational data, the interviewing of staff to determine time spent on particular activities, the assessment of facility space and capital equipment utilization, and the determination of the uses of all other resources. The data thus collected was then analyzed and compiled by cost category, e.g., labor, and by operation, e.g., braille book services, taking into account all direct and indirect costs incurred by the sites themselves or any parent or administering organizations that support the operations under study. Costs directly incurred for the provision of specific operations were assigned directly to those operations, while indirect costs were allocated to applicable operations by the most appropriate allocation bases. It was readily apparent at the conclusion of these individual site analyses that labor was the most significant cost category, followed by occupancy costs, then capital equipment costs and services, and then all other costs.

The projection of baseline network costs was then performed, based upon the cost behavior of the sample sites, operational statistics as reported to NLS by network libraries and agencies, and unit occupancy costs compiled by the General Services Administration (GSA). Independent mathematical relationships relating the costs for the sample sites to their associated operational statistics were developed for regional and subregional libraries for each of the three operations under study, and for three major cost categories; labor, occupancy and all other costs. These cost prediction models assumed the form of both regression equations and step-functions of stratified means, which were then used to predict the costs of sites not visited based upon their reported operational statistics. In the case of occupancy costs, the cost prediction models first determined predicted facility space area (in square feet) and then applied the GSA RENT system unit occupancy costs to determine the full occupancy costs for

each operation. For the MSCs, no cost predictions of the population from a sample was necessary because all sites had been visited and analyzed.

A 15-year projection of network costs for the three NLS sponsored operations was then performed based upon the baseline costs for the network as determined by the various cost prediction models, NLS estimates of future national readership growth rates, and cost inflation estimates as derived from economic literature. A 2% average annual net growth rate in number of patrons was assumed for recorded books and machines, a 1% average annual net growth rate was assumed for braille books, and a 3.5% average annual cost inflation rate was assumed for all three major categories of costs that were modeled. This 15 year projection is shown below for all network libraries and agencies (exclusive of MSCs) for all three operations under review. Exhibits 2, 3, and 4 in the text contain 15-year projections for each operation stratified by major cost category, as well as projections for Multistate Centers, and combined totals.

Libraries & Agencies
15-Year Cost Projection

Year	Braille Books	Playback Machines	Recorded Books	Total Cost
Current	$3,154,055	$7,723,574	$30,180,778	$41,058,408
1	3,297,092	8,153,777	31,861,848	43,312,716
2	3,446,615	8,607,942	33,636,553	45,691,110
3	3,602,919	9,087,405	35,510,109	48,200,432
4	3,766,311	9,593,573	37,488,022	50,847,906
5	3,937,113	10,127,935	39,576,105	53,641,153
6	4,115,662	10,692,061	41,780,494	56,588,216
7	4,302,307	11,287,609	44,107,667	59,697,583
8	4,497,416	11,916,329	46,564,464	62,978,209
9	4,701,374	12,580,068	49,158,105	66,439,547
10	4,914,582	13,280,778	51,896,211	70,091,571
11	5,137,458	14,020,517	54,786,830	73,944,805
12	5,370,442	14,801,460	57,838,457	78,010,358
13	5,613,991	15,625,901	61,060,059	82,299,951
14	5,868,586	16,496,264	64,461,104	86,825,954
15	6,134,726	17,415,106	68,051,587	91,601,419
Total Cost	$71,860,648	$191,410,299	$747,958,392	$1,011,229,339

PROJECTION OF NETWORK COSTS

FOR

SERVICE FUNCTIONS

PROJECTION OF NETWORK COSTS FOR SERVICE FUNCTIONS

1. BACKGROUND

The National Library Service for the Blind and Physically Handicapped (NLS), Library of Congress, administers a free national library program for persons who are unable to read standard printed materials due to physical or visual impairments. In cooperation both with authors and publishers of books and magazines, who grant NLS permission to mass produce copyrighted works. NLS works with a network of state, local and private libraries and agencies, which provide the necessary resources for the storage and distribution of the NLS materials. The books and magazines in braille, recorded disc and recorded cassette format, as well as specially designed playback machines and accessories, are delivered to eligible patrons by postage-free mail, and returned to network libraries and agencies in the same manner.

The free national library program consists of three major components, each with its associated responsibilities, costs and revenue sources. NLS, funded by Congress, secures copyright permission from authors and publishers, contracts with firms for the mass production of braille and recorded books and magazines, machines, accessories, and repair parts, and administers the program. The United States Postal Service (USPS), funded by Congress for this program, provides transport of program materials between and among network facilities, patrons, NLS, and points of book and machine manufacture and repair. The network, consisting of state, local and private libraries and agencies, funded by various combinations of federal, state, local and private sources, provides the personnel, facilities and other resources necessary to provide NLS materials to patrons.

There were four basic types of facilities in the network during federal fiscal year 1989. Regional libraries (RL), of which there were 56, provide a comprehensive range of services, including services in addition to distributing NLS sponsored materials. Subregional libraries (SRL), of which there were 92, provide service to a specified part of a regional library's territory. Machine lending agencies (MLA), of which there were 8, control and distribute NLS

machines and accessories to patrons in a specified service area. Multistate centers (MSCs), of which there are 3, are NLS agencies that distribute program materials and backup supplies to network libraries and agencies, as well as braille and recorded books from special collections directly to patrons.

2. PHASE I STUDY OBJECTIVES

The primary objective of Phase I of the study was to determine the baseline costs of network operations for NLS sponsored functions, namely braille book operations, recorded book operations, and playback machine and accessories operations. With network-wide baseline cost data determined, a fifteen-year future projection of network level costs for these operations was required.

Rather than conduct a complete cost census of the entire network of libraries and agencies, NLS determined that a sample of network facilities should be visited, and the cost behavior of the sample then be used to project the baseline costs for the entire network. TMC was to identify the data to be collected and the sites to be included in the sample. Following the review, modification and approval of the data collection plan and the sample of sites by NLS staff and a study advisory committee of network administrators and other interested parties, TMC was to collect and compile the cost data, project baseline network costs for NLS functions, and produce a fifteen-year projection of these costs.

It was considered very important that all costs of operations for NLS sponsored functions at the network level be captured, regardless of the funding source, be it federal, state, local or private. Of particular concern was that the full costs of facility occupancy (rent/depreciation, utilities, security, and building maintenance and repairs) be captured, because in many instances this major expense is not included in a network library's or agency's budget. It was mandated that in those instances where a network facility's occupancy costs could not be directly ascertained, that a commercially comparable cost should be assigned.

It was also determined during the earliest post-award planning stages of the study that the costs of operations for non-NLS sponsored functions, i.e., locally provided materials and

services, should also be captured and compiled for sample sites. However, network-wide costs for these non-NLS sponsored operations were not to be projected to a national level.

3. DATA COLLECTION PLAN

The development of the data collection plan began with discussions between NLS staff and TMC to identify the categories of costs that are relevant to braille, machine and recorded book operations, and for NLS staff to explain the functioning of the network in detail. The study team was provided with the Library Resources for the Blind and Physically Handicapped, A Directory with FY88 Statistics on Readership, Circulation, Budget, Staff, and Collections, independent statistics for subregional libraries, machine inventory and repair statistics, and certain other data in order to compile a profile of the network, and to determine what information is common to all sites and would be available from NLS for use in projections of national costs.

A pilot site visit was made to the Washington D.C. regional library, in order to both observe operations, and to formulate a data collection approach for the study. The manner in which staff was deployed, the various activities that are required to perform each operation, the types and allocations of facility space, the types and allocations of equipment, and the other resources necessary for the provision of services were noted. Additionally, the availability and format of the various financial and operational data maintained by the library were ascertained.

With the understanding that there are differences with regards to operating and reporting procedures among the libraries and agencies in the network, a tentative data collection plan was formulated after the pilot visit. This plan was further refined at a meeting held with the study advisory committee. The salient aspects of the plan are:

- A study team consisting of one or two members, depending upon the size of the library to be visited, would visit each site selected for a period of approximately one week.

- Costs at each site were to be captured by operation category, e.g., braille book services, and by cost category, e.g., labor.

- The sources of labor cost and usage information were to be derived from interviews with personnel, personnel records, work flow charts, organization charts, wage/salary and benefit information, and position descriptions. The labor costs associated with personnel engaged in direct activities would be assigned to those activities, whereas the labor costs associated with indirect time spent by supervisors or support staff would be allocated by the way in which the time of the staff supervised or supported was spent, respectively. Actual wage/salary and benefit expenses by individual would be used wherever possible, and where not available, federal government equivalent salary costs or state supplied wage rates by skill category would be used as surrogates. The quantity and usage of volunteer labor were also to be captured at each site visited for use in subsequent analysis.

- The sources of occupancy cost information were to be derived from actual lease costs (for rented space) or actual depreciation cost (for owned space), and actual costs for electricity, fuels, municipal services, repairs and maintenance to real property, and security. If any of these occupancy costs were paid for by an external agency, and if the costs were known, costs were to be prorated to specific operations based upon facility area utilized. If occupancy costs could not be ascertained, comparable commercial fully serviced occupancy rates were to be applied, preferably from the GSA RENT system database. The usage of facility space was to be ascertained by direct observation of operations, in tandem with the use of any existing layout drawings.

- The source of equipment cost information was to be equipment or property records, hopefully detailing the acquisition date, acquisition price and description of the personal property. Equipment was defined as all personal property that supports network library operations, exclusive of the books, playback machines, accessories and repair parts provided by NLS. The total annual depreciation of all equipment would then be calculated, and this would be used as a measurement of average annual capital expenditures.

- Costs for services including telephone or other telecommunications, central Automatic Data Processing (ADP) support, support contracts, courier services, paid postage or shipping, printing services or other services were to be captured from actual expenditure information, if possible, otherwise from budget data, or lastly, from managerial estimates. Expenses were to be assigned directly to specific operations wherever possible, and otherwise prorated by the most representative basis.

- Costs for the repair and maintenance of equipment, materials and supplies, travel and other miscellaneous costs were to be captured from actual or budgeted expenditure data, or estimated as a last resort. Direct costs were to be assigned to appropriate operations, while indirect costs were to be allocated.

- The cost of administrative overhead was also to be captured, either from actual or budgeted data. Where actual or budgeted data for this expense was unavailable, a uniform percentage of total loaded labor cost was to be applied to determine a representative cost associated with this indirect, usually off-budget and essential activity.

- Other non-financial data was also to be collected, which included statistics on book collections, machine inventories, book circulation and readership, machine repairs, and book duplication.

- Costs and operating statistics were to apply to a one-year time period, preferably federal fiscal year 1989, otherwise the most recently completed fiscal year of a given site.

A summary data collection listing was then designed which included all of the items enumerated above. This listing, shown in Appendix 1, was mailed to all selected sample sites prior to the actual site visit.

It was also determined that detailed labor profiles would be necessary for the analysis of braille and machine operations in Phase II of the study, so a personnel interview instrument was designed, which is shown in Appendix 2. Although recorded book and large-print book operations are not to be examined in Phase II of the study, it was nevertheless determined that labor profiles for these two operations were to be collected at this same level of detail. For all other local operations, only the aggregate labor usage was to be collected, not a detailed labor profile. The detailed labor profile was stratified into the following activities:

(1) "Set-up; maintain patron files" - this activity includes the initial registration of patrons with the service, including enrollment in the CMLS direct circulation magazine program, and patron record updates or changes of any kind.

(2) "Check-in; shelve" - this activity includes the receipt, sorting, checking-in and putting away of new or returned books or machines.

(3) "Inspect books" - this activity includes the effort associated with book inspection performed upon the issuance and/or the return of books.

(4) "Duplication of books" - this activity includes the reproduction of NLS books.

(5) "Build and maintain collection" - this activity includes weeding and shifting of book collections, the copy allotment process, the ordering of new items, and the cataloging of book collections.

(6) "Repair books and machines" - this activity includes any repair of braille and recorded books that are performed, and any diagnostics, clean-up, record keeping, transport, and electro-mechanical work associated with playback machine repairs.

(7) "Receive requests, make selections" - this activity includes the receipt of all patron telephone, mail-in and walk-in requests for books, machines or publications, the generation of orders to fulfill these requests, and any reader advisory services or reference work for patrons.

(8) "Check-out; delivery" - this activity includes the retrieval of materials from storage locations, packaging, mailing and, in some cases, home delivery.

(9) "Retrieve overdue items" - this activity includes the writing and mailing of letters, phone calls and home visits to retrieve overdue books and machines from patrons.

(10) "Manage and support operations" - this activity includes any effort that is managerial or supervisory in nature, clerical and secretarial support, conferences and travel, and the time of any in-house programmer-analysts that could not be directly attributed to other specific activities.

4. SAMPLE SITE SELECTION

In order to derive an accurate profile of the network's baseline costs for braille, machine and recorded book operations, an appropriately sized and representative sample of sites had to be selected for the data collection effort. The steps applied in this site selection process are enumerated below.

(1) The network population of regional libraries, subregional libraries and multistate centers were evaluated independently, because the differences among these facility types are significant enough to warrant independent consideration.

(2) Independent machine lending agencies would not be visited; rather, their costs would be modeled based upon the cost of machine operations within regional libraries, where identical functions are performed.

(3) The important attributes that drive the types and levels of the three NLS sponsored operations under study, such as collection size, circulation and

readership, were chosen as the criteria for sample selection, not the reported resources used to perform the services, such as staff size, facility area and budget. However, because there exists a strong correlation between the resources deployed to perform a service and the level of service itself, excellent representation across all ranges of resource utilization resulted.

(4) For braille book operations in regional libraries, braille readership, braille collection, braille circulation (exclusive of direct circulation magazines) and geographic region were considered.

(5) For machine operations in regional libraries, machine inventories, machine repairs and geographic region were considered, as well as the readership and circulation of recorded media.

(6) For recorded book operations, recorded book readership, recorded book collection, recorded book circulation (exclusive of direct circulation magazines) and geographic region were considered.

(7) For subregional libraries, recorded book readership, recorded book collection, recorded book circulation (exclusive of direct circulation magazines), number of machine repairs and geographic region were considered. For the three SRLs that conduct significant braille operations, braille readership, braille circulation (exclusive of direct circulation magazines) and braille collection were also considered.

(8) It was determined that all three multistate centers should be visited, both because all sites could be visited at reasonable expense, and because knowledge of all three operations would be necessary for analysis in Phase II of the study.

(9) Of the network regional library population of 56 libraries, 54 conduct either braille operations, machines operations or both; all conduct recorded book operations. The two libraries that conduct neither braille nor machine operations were removed from further consideration.

(10) Populations from which samples were to be selected were sorted and stratified into five ranges according to size for each attribute under consideration.

(11) Although the determination of optimal sample size cannot be objectively specified when attempting to ensure that the sample span a full size range for multiple attributes, we used the same logic as that employed for determining sample size when estimating the mean of a population for an application wherein the population is finite. We chose as criteria a 95% confidence level with $\pm$ 10% tolerable error assuming a $\pm$ 10% variance in costs of operations after all factors have been considered.

(12) Through an iterative random selection process, 17 regional and 15 subregional library sites were selected for the sample. There were four instances whereby

a selection was "forced" to achieve: (i) the selection of one regional library that did not conduct braille operations (ii) the selection of one regional library that did not conduct machine operations (iii) the selection of one regional library that is a geographic outlier, i.e., outside the continental United States, and (iv) the selection of one of the three subregional libraries that conduct significant braille operations.

(13) The selected sample sites were presented for review to the study advisory committee. Of the original sample selected, no regional library sites were changed, but four subregional sites were changed due to various reasons known to the advisory committee, but not apparent from statistical evaluations.

(14) Subsequent to the beginning of actual site visits and data collection, two subregional library sites were additionally changed for specific reasons.

The listing of the final 35 sites actually visited during the course of Phase I data collection is shown in Appendix 3. The final sample was of adequate size and representativeness for the purpose of projecting network costs, covered all size ranges of important attributes for relevant operations, and provided diverse geographic representation.

5. SITE VISIT PROCEDURES

Following the finalization of the data collection plan and selection of the sample sites, NLS staff contacted all facilities to be visited, the administering agencies of all facilities, and in the case of subregional libraries, the associated regional libraries. Letters detailing the general nature of the study were mailed first, and then telephone calls were made as follow-up contact for any further clarification necessary.

Subsequent to NLS contacting the sample sites, TMC sent letters to all the sites and administering agencies outlining the purpose of the site visits and detailing the data to be collected during the course of the site visits. The cover letter sent by TMC to the sample sites and associated agencies is included in Appendix 4, and the data collection checklist attached to this cover letter is shown in Appendix 1. Several weeks prior to the actual visit, each site was contacted by telephone to coordinate the logistics of the visit, and to clarify any data collection requirements that required further explanation or embellishment.

Each site visit began with a briefing of the manager of each facility, both to explain the objectives of the study, and to discuss the overall data collection requirements. During this briefing, it was stressed to each manager that TMC was neither performing an audit of the site nor performing an efficiency review of any kind, but was rather seeking to determine the actual total cost of providing various services to patrons.

Following the briefing, all financial and operational data that had been collected by the site, whether actual, budgeted or estimated, was reviewed with the manager or other relevant staff, and any necessary data that was still lacking was identified so that efforts could be made to obtain it. A general walk-through of operations was then conducted, complete with an explanation of the services provided and the operating procedures employed, and an introduction to the site's staff.

The most important step in the data collection plan was to interview staff to determine the time spent on various operations and activities. Prior to the conduct of actual interviews, however, was the review of staff activities with management, and the review of any organization charts and position descriptions that were available. In most instances, every individual on the staff was personally interviewed, the exception to this rule being individuals in large regional libraries whose work was so specialized that the individuals' supervisors knew exactly how their time was spent. The form shown in Appendix 2 was used for these interviews to record the percentage of total working time spent by operation and by activity.

The next step in the data collection plan, and the most important step after the capture of labor utilization, was the capture of facility space utilization. This was done by carefully mapping out the facility, segmenting the entire facility into logical, component functional areas, and measuring each functional area (in square feet). Wherever available, existing layout drawings were used in this step, but in every such instance these drawings were verified, and modified if necessary, to reflect actual current usage.

After facility space utilization profiles were completed, capital equipment utilization was then captured. A complete inventory of capital equipment was performed, noting the types of equipment in the facility, where they were located, and their uses. In most instances, a

property listing was available and this was annotated with the location and use of the equipment. However, in a few instances, property reports were non-existent, so the site visit team would draw one up from scratch. Included in this calculation were various types of computer hardware, software and peripherals provided to the network libraries by NLS, which is more or less on permanent loan.

Finally, the actual, budgeted and/or estimated costs for supplies, equipment maintenance, services, travel and miscellaneous costs, and administrative overhead were collected from various sources, along with all other non-financial statistics required for the study. These costs were reviewed with the site manager or designated staff, both to identify costs that could be directly assigned to specific operations, and to determine, for those costs that could not be directly assigned, the most appropriate allocation bases to use for prorating shared costs to specific operations.

It should be noted that the management and staff of all the sites visited during the course of the data collection effort were very cooperative and helpful. Although in certain instances not all of the information desired could be located and collected, this was in no way the fault of the site's staff, but simply a limitation imposed by existing reporting and accounting procedures.

6. COST ANALYSIS OF INDIVIDUAL SITES

Enumerated below are some basic tenets regarding the cost analysis of individual sites.

(1) The analysis developed fully allocated costs for each operation and cost category, that is, all indirect costs which generally benefit multiple services but directly benefit no specific service were allocated to applicable operations using the most appropriate basis available.

(2) The acquisition cost of NLS provided braille books, recorded books, playback machines, machine accessories, machine repair parts, publications and supplies were outside the scope of the study, and are hence not included in the analysis.

(3) The costs of transporting NLS provided materials within the network, performed by the United States Postal Service, were outside the scope of the study, and are hence not included in the analysis.

The initial step in the cost analysis of individual sites involved the assignment and allocation of labor costs to specific operations, both because this category of cost is generally the greatest single contributor to total cost, and because labor time profiles were subsequently used to assign and allocate certain components of occupancy, equipment and other costs. Labor time profiles were first arrayed by individual to the activity level, for the three NLS sponsored functions and for large print, and to the operation level, for all other locally sponsored functions. Direct time was assigned to specific operations/activities, while indirect time was allocated based upon the time profile of staff supervised or supported, whichever was appropriate. With time profiles for all individuals on the staff completed, fully loaded salaries or wages were then multiplied by the time profiles to yield labor costs for each operation, and in the case of NLS sponsored functions and large print operations, for each activity. Because volunteer labor is by its very definition a no-cost resource, no effort was made to calculate and add an "equivalent" volunteer labor cost for specific operations and/or activities. However, any other actual costs incurred for the mobilization and deployment of volunteer labor were included in the analysis, such as time spent by staff coordinating volunteers, transportation of volunteers, or related costs.

The next step in the cost analysis was the determination of occupancy costs for each operation. Actual unit occupancy costs, i.e., the cost per square foot per year, were first determined by dividing the total facility area, in square feet, into the total of all costs associated with occupancy, namely rent/depreciation, electricity, fuels, municipal services, maintenance and repair of real property, and security. In several instances where some or all occupancy costs were unknown, GSA RENT system data was used as a surrogate for actual unit occupancy cost (discussed in more detail in Section 7). Costs for each of the segmented functional areas of the facility were then derived by multiplying the area associated with each segment by the unit occupancy cost for the facility. Finally, the occupancy cost for each functional area segment was then either assigned or allocated to specific operations for directly and indirectly utilized space, respectively. For example, 100% of the occupancy cost for

braille book storage was assigned to braille operations, while if 6% of a library's total staff time was spent on braille operations, then 6% of the cost of any common areas was allocated to braille operations.

The third step in the analysis was to assign and allocate the costs associated with capital equipment. The first part of this step involved compiling a table that associated each piece of capital equipment in a facility with a designated functional area. Then, for each type of equipment, an average, annual depreciation cost was calculated (straight-line, zero salvage value depreciation) using the actual acquisition date, acquisition cost and representative useful life, or, if this data was unavailable, by estimating the annual depreciation based upon known data for similar equipment at other sites. Next, the total equipment cost for each functional area was compiled by summing the products of all pieces of equipment in that area multiplied by their respective annual depreciation costs. Finally, the equipment cost for each functional area segment was then either assigned or allocated to specific operations for directly and indirectly utilized equipment, respectively.

The last steps involved in the cost analysis of individual sites was the assignment or allocation of all other costs associated with equipment maintenance, services, supplies, travel and miscellaneous activities, and administrative overhead to specific operations. Identifiable direct costs were assigned to the operations that they benefited, whereas shared indirect costs had to be allocated by the most appropriate basis. For those sites where actual administrative overhead costs could not be obtained, it was assumed that this cost was equal to 10% of the loaded labor cost for each operation.

With all cost categories determined for all operations performed at all sample sites, summary cost profiles for all sites were compiled. This summary cost information for the three NLS sponsored operations formed the baseline cost data from which total network-wide costs were projected.

7. PROJECTION OF BASELINE NETWORK COSTS

The projection of baseline, i.e., current network costs for NLS sponsored operations is based both upon the cost behavior of the sample sites, and upon operational statistics reported to NLS by all sites. The determination of mathematical relationships between actual operational costs of the sample sites and operational statistics reported to NLS by the sample sites provides a statistically valid method to project costs for those sites not visited.

The development of mathematical relationships between actual costs and reported operational statistics for the sample sites involved a three-way stratification of data:

(1) Regional and subregional libraries were considered separately,

(2) Braille book operations, playback machine operations and recorded book operations were considered separately, and

(3) Independent relationships were developed for three major categories of cost: labor, occupancy, and all other costs.

Regional and subregional libraries were analyzed separately because the nature of the operations is different enough to warrant separate consideration. The three NLS sponsored operations were analyzed separately because baseline costs had to be projected separately for each operation. Specific relationships for labor and occupancy costs were developed because these two cost categories were by far the largest contributors to total cost, and because of the consistency among the sample sites with regards to what cost elements were reported in each of these categories. "Other Costs" include equipment depreciation, equipment maintenance, office services, supplies, travel/miscellaneous, and administrative overhead. These six cost categories were combined in order to minimize variances in the cost data due to differences in the operations of the sample libraries. For example, sites that own and operate their own ADP system have those costs reported under equipment depreciation and equipment maintenance, whereas libraries being supported by another organization's ADP system have those same costs reported under office services (per NLS request).

Initial analysis of readership, circulation and collection statistics of the sample sites suggested that more reliable cost relationships could be developed if regional and subregional libraries were analyzed separately. Performing a combined analysis of regional and subregional libraries could result in inappropriate relationships which fail to take into account the operational differences in the two types of libraries. The exception to this approach was in developing relationships for braille costs. The characteristics of the few subregional libraries with substantial braille collections and circulation made it possible to examine the entire set of braille sites visited as a single population.

In order to project baseline costs for the entire network, it was necessary to determine mathematical relationships between each of the three major cost categories and identifiable reported statistics for each of the three NLS sponsored operations, for each facility type. For example, a relationship between recorded book readership and recorded book labor costs was developed based upon the sample sites. Using reported recorded book readership statistics, the recorded book labor costs for libraries not visited can be projected. In this manner, the total costs associated with NLS service functions by major cost category were projected.

In developing the various relationships for costs, the choice of statistics used in the relationships to predict costs was limited to data reported to NLS. In order to project costs for the entire network, it was necessary to confine the possible list of predictor variables to data reported for *all* libraries, and not include information collected at the sample sites that is not reported to NLS, such as machine circulation and volunteer hours spent on particular activities. In fact, because specific quantities of volunteer labor time and how it is used are not reported to NLS, the assumption had to be made that the quantity and usage of volunteer labor in the sample was representative of the network as a whole.

The source of all predictor variable data was information as reported to NLS by the network libraries and agencies for federal fiscal year 1989. The variables examined included readership, circulation (excluding direct circulation magazines) and collection size for braille and recorded books, machine repairs, machine inventories (as of the end of September 1989), full-time equivalent (FTE) staff, budget and facility area. The only data verification performed by TMC was for braille circulation and collection statistics for sites not visited, because of

inconsistencies in the units that were reported (both should be in volumes, not titles or copies). Telephone calls were made to all regional libraries with braille not visited, to verify the units used in reporting to NLS. Not all of these variables proved useful in the determination of cost prediction relationships.

The first stage of the development of cost prediction relationships was to isolate those factors which significantly contribute to the cost of each operation by major cost category Two separate techniques were employed.

The first technique involved modelling cost as a step-function relationship. An example would be the case of subregional library machine labor costs. Machine labor cost is highly dependent upon recorded media readership (machine inventory and repair statistics are not maintained for subregional libraries), however, analysis of the data yielded the fact that the average cost is the best estimate of the actual cost, i.e., the attempt to develop more sophisticated relationships was unsuccessful due to unexplainable variations in costs. But the average cost in this case is not constant over the total range of readership. For libraries with readership below 2,000 readers, the average cost, $9,524, provides the best estimate of all subregional libraries with less than 2,000 readers. Likewise, the machine labor cost of subregional libraries with a readership greater than or equal to 2,000 also was best described by the average cost, which was $31,523. Obviously, the cost of labor for machine operations in a given subregional library does not "jump" from $9,524 to $31,523 when the readership increases from 1,999 to 2,000, but this relationship provides the best estimate of the *total* machine labor cost for *all* sites, which is the objective of the projection.

The second analysis technique employed in developing cost prediction relationships involved the use of regression analysis. Regression analysis is an integral part of any statistical data analysis, and is used to determine the best mathematical relationship between a dependent variable and one or more independent variables. The dependent variable is the factor to be predicted, and the independent variables, or predictors, are factors which influence the dependent variable. The predicted value, cost, is estimated as a function of one or more independent variables, e.g., readership.

A regression model's "goodness" of fit is expressed by several statistics which show how well the dependent variable is predicted by the independent variable(s). As such, regression analysis is ideal for predicting the relationship between the cost of operations and statistics such as readership that may affect cost. The most commonly used statistics that quantify goodness of fit include:

- o Coefficient of Determination (R^2). This statistic explains the degree of variation in the dependent variable that is explained by a regression relationship.
- o t-statistic. This is used to determine whether the independent variable is statistically significant.

Several criteria were used to determine which predictor variables should be included in the various models. The factors had to be statistically significant. In addition, each factor had to pass a logic test, i.e., each model was examined in order to determine whether it was appropriate for the type of library or agency, the operation and the cost category.

The preceding techniques were used to directly develop the cost relationships for all three NLS sponsored operations for labor, and for other costs. For occupancy costs, a slightly different approach was used. It was possible to accurately estimate the total square footage devoted to each of the three NLS operations by developing a regression model predicting square footage. As part of the analysis of individual sites visited, the actual facility area devoted to each operation was measured in order to calculate occupancy costs. By developing relationships of this type, it was possible to predict the facility area for each operation for all non-visited sites in the network. The resulting square footage for each site was then multiplied by an average occupancy cost per square foot per year supplied by the General Services Administration, Federal Buildings Fund and RENT System database, for each site in the network. These rates are determined by private, professional real estate appraisers working under contract for GSA.

This approach was vastly superior to directly estimating the occupancy cost from workload statistics such as collection or circulation, because it applies a consistent source of occupancy costs. Occupancy costs at the sample sites, while accurately collected, in some

instances failed to capture the true "opportunity" costs involved. Some libraries own their own buildings or occupy their space rather rent free, or at a subsidized rate. Occupancy costs for libraries that own their own building were based upon an estimate of annual depreciation (even if constructed 20 years, 30 years or even longer ago) plus utilities, security, etc. For libraries occupying subsidized space, the subsidized rental rate was utilized. However, neither of these approaches capture the true opportunity cost of the space. Furthermore, the unit occupancy cost of facility space within the sample varied considerably (almost by a factor of 10 between the minimum and maximum unit costs), so by removing this element of variation, excellent correlations between facility space requirements and predictor variables were achieved. Therefore, in order to treat all libraries and agencies on a consistent basis, the decision was made to utilize the GSA RENT data in projecting occupancy costs for the entire network. The GSA RENT unit occupancy cost rates used are equal to 75% of the cost of "office space" for each geographic area, which was determined by responsible GSA personnel to be the appropriate rate for library space. These rates are shown in Appendix 5 for all network sites.

Appendices 6 and 7 contain the best models developed, among many tried, to predict network costs for regional libraries and machine lending agencies, and subregional libraries, respectively, for each of the three NLS sponsored operations and for each of the three major cost categories modeled. The costs for individual libraries and machine lending agencies not visited were estimated based upon these relationships. For labor and other costs, the individual predictions were summed for the non-visited sites and added to the sum of the actual costs for the sample sites. For occupancy costs, the actual costs of visited sites were not included in the network cost projection. The occupancy cost is based entirely upon the product of facility square footage (actual square footage for visited sites, and predicted square footage for non-visited sites) and GSA RENT data.

Exhibit 1 summarizes the baseline costs of the entire NLS network by operation, by major cost category and in total; first, for all network libraries and agencies, secondly for all multistate centers, and thirdly for a combined total. There was, of course, no prediction necessary for baseline multistate center costs since all three were visited and analyzed.

Exhibit 1

BASELINE NETWORK COSTS

Libraries and Agencies

Cost Category	Braille Books	Playback Machines	Recorded Books	Supplies	Total Cost
Labor	$1,372,149	$5,014,594	$16,080,128	----	$22,466,871
Occupancy	1,384,705	1,350,764	8,588,514	----	11,323,983
All Other	397,201	1,358,216	5,512,136	----	7,267,553
Total Cost	$3,154,055	$7,723,574	$30,180,778	----	$41,058,408

Multistate Centers

Labor	$89,043	$45,067	$234,153	$81,397	$449,660
Occupancy	63,021	38,654	95,980	57,424	255,079
All Other	20,662	8,564	56,835	14,493	100,554
Total Cost	$172,725	$92,285	$386,969	$153,314	$805,29

Total: Libraries, Agencies & MSCs

Labor	$1,461,191	$5,059,661	$16,314,281	$81,397	$2[illegible]016,531
Occupancy	1,447,726	1,389,418	8,684,494	57,424	11,579,062
All Other	417,863	1,366,780	5,568,972	14,493	7,368,108
Total Cost	$3,326,781	$7,815,859	$30,567,747	$153,314	$41,863,701

8. FIFTEEN-YEAR PROJECTION OF NETWORK COSTS

A fifteen-year projection of network costs was performed for all three NLS sponsored operations based upon three considerations:

(1) The baseline costs for the network, as determined from the cost behavior of the sample sites and reported operational statistics for all network libraries and agencies,

(2) NLS estimates of readership growth for the network as a whole, and

(3) Assumed rates of cost inflation for the next fifteen years.

Based upon NLS estimates of readership growth for the entire network, a 2% annual net growth rate in recorded book readership was assumed to remain constant for the next 15 years. NLS estimates that braille readership will grow at a slower rate than recorded book readership. Using the NLS estimate of the total number of braille readers, a 1% annual net growth rate in braille readership was assumed.

An annual cost inflation rate of 3.5% was assumed to remain constant for the next 15 years and would be applicable to all three major categories of cost, namely labor, occupancy and all other costs. The matter of the appropriate inflation rate for each cost category could be debated endlessly...the opinion of experts varies considerably with regards to forecasts of future inflation rates for the next decade and beyond.

Given the above assumptions about readership growth rates and inflation rates, the methodology for forecasting network costs for the next 15 years is relatively straightforward. For each operation and major cost category, the average baseline cost per reader was calculated based upon total projected network cost and the associated network readership. Recorded media readership was used for machine cost calculations, and total network readership was used for multistate center supply operations. From these baseline cost-per-reader figures, the average cost per reader was projected for the next 15 years by applying the assumed inflation rate. The total readership figures were also forecasted for 15 years by allowing for the assumed annual growth rate for each operation's readership. Therefore, the

yearly forecasts for network costs are simply the products of the forecasted readerships and the average costs per reader for those years. The fifteen-year projected network costs for each major cost category and in total, are shown in Exhibits 2, 3, and 4 for braille book services, playback machine services and recorded book services, respectively. In each exhibit, costs are shown separately for network libraries and agencies, for multistate centers, and for a combined total.

Exhibit 2

15-YEAR COST PROJECTION
BRAILLE

Libraries and Agencies

Year	Labor	Occupancy	All Other	Total Cost
Current	$1,372,149	$1,384,705	$397,201	$3,154,055
1	1,434,376	1,447,502	415,215	3,297,092
2	1,499,425	1,513,146	434,045	3,446,615
3	1,567,423	1,581,767	453,728	3,602,919
4	1,638,506	1,653,500	474,305	3,766,311
5	1,712,812	1,728,486	495,815	3,937,113
6	1,790,488	1,806,873	518,300	4,115,662
7	1,871,687	1,888,815	541,805	4,302,307
8	1,956,568	1,974,473	566,376	4,497,416
9	2,045,298	2,064,015	592,061	4,701,374
10	2,138,053	2,157,618	618,911	4,914,582
11	2,235,013	2,255,466	646,978	5,137,458
12	2,336,371	2,357,751	676,319	5,370,442
13	2,442,326	2,464,675	706,990	5,613,991
14	2,553,085	2,576,448	739,052	5,868,586
15	2,668,868	2,693,290	772,568	6,134,726
Total Cost	$31,262,449	$31,548,531	$9,049,668	$71,860,648

Multistate Centers

Current	$89,043	$63,021	$20,662	$172,725
1	93,081	65,879	21,599	180,558
2	97,302	68,866	22,579	188,747
3	101,714	71,989	23,602	197,306
4	106,327	75,254	24,673	206,254
5	111,149	78,667	25,792	215,608
6	116,190	82,234	26,961	225,386
7	121,459	85,964	28,184	235,607
8	126,967	89,862	29,462	246,292
9	132,725	93,937	30,798	257,461
10	138,744	98,197	32,196	269,137
11	145,036	102,651	33,655	281,342
12	151,614	107,306	35,181	294,101
13	158,489	112,172	36,777	307,438
14	165,677	117,259	38,445	321,381
15	173,190	122,577	40,188	335,955
Total Cost	$2,028,708	$1,435,836	$470,753	$3,935,298

Exhibit 2

15-YEAR COST PROJECTION
BRAILLE
(Continued)

Total: Libraries, Agencies & MSCs

Year	Labor	Occupancy	All Other	Total Cost
Current	$1,461,191	$1,447,726	$417,863	$3,326,781
1	1,527,456	1,513,380	436,814	3,477,650
2	1,596,726	1,582,012	456,623	3,635,362
3	1,669,138	1,653,756	477,331	3,800,225
4	1,744,833	1,728,754	498,978	3,972,565
5	1,823,962	1,807,153	521,606	4,152,721
6	1,906,678	1,889,108	545,261	4,341,047
7	1,993,146	1,974,779	569,989	4,537,914
8	2,083,535	2,064,335	595,838	4,743,708
9	2,178,024	2,157,952	622,859	4,958,835
10	2,276,797	2,255,816	651,106	5,183,718
11	2,380,050	2,358,117	680,634	5,418,800
12	2,487,985	2,465,057	711,500	5,664,543
13	2,600,815	2,576,848	743,767	5,921,430
14	2,718,762	2,695,708	777,497	6,189,966
15	2,842,058	2,815,867	812,756	6,470,681
Total Cost	$33,291,157	$32,984,368	$9,520,422	$75,795,946

Exhibit 3

15-YEAR COST PROJECTION
MACHINES

Libraries and Agencies

Year	Labor	Occupancy	All Other	Total Cost
Current	$5,014,594	$1,350,764	$1,358,216	$7,723,574
1	5,293,907	1,426,002	1,433,868	8,153,777
2	5,588,778	1,505,430	1,513,735	8,607,942
3	5,900,073	1,589,282	1,598,050	9,087,405
4	6,228,707	1,677,805	1,687,061	9,593,573
5	6,575,646	1,771,259	1,781,030	10,127,935
6	6,9[illegible],909	1,869,918	1,880,234	10,692,061
7	7,328,573	1,974,073	1,984,963	11,287,609
8	7,736,775	2,084,029	2,095,525	11,916,329
9	8,167,713	2,200,109	2,212,246	12,580,068
10	8,622,655	2,322,655	2,335,468	13,280,778
11	9,102,937	2,452,027	2,465,554	14,020,517
12	9,609,970	2,588,605	2,602,885	14,801,460
13	10,145,246	2,732,790	2,747,866	15,625,901
14	10,710,336	2,885,006	2,900,922	16,496,264
15	11,306,902	3,045,701	3,062,503	17,415,106
Total Cost	$124,274,720	$33,475,455	$33,660,124	$191,410,299

Multistate Centers

Current	$45,067	$38,654	$8,564	$92,285
1	47,577	40,807	9,041	97,426
2	50,228	43,080	9,545	102,852
3	53,025	45,479	10,076	108,581
4	55,979	48,013	10,638	114,629
5	59,097	50,687	11,230	121,014
6	62,388	53,510	11,856	127,754
7	65,863	56,491	12,516	134,870
8	69,532	59,637	13,213	142,382
9	73,405	62,959	13,949	150,313
10	77,494	66,466	14,726	158,686
11	81,810	70,168	15,546	167,524
12	86,367	74,076	16,412	176,855
13	91,177	78,202	17,326	186,706
14	96,256	82,558	18,291	197,106
15	101,618	87,157	19,310	208,085
Total Cost	$1,116,883	$957,945	$212,240	$2,287,068

Exhibit 3

15-YEAR COST PROJECTION
MACHINES
(Continued)

Total: Libraries, Agencies, & MSCs

Year	Labor	Occupancy	All Other	Total Cost
Current	$5,059,661	$1,389,418	$1,366,730	$7,815,859
1	5,341,485	1,466,809	1,442,909	8,251,202
2	5,639,005	1,548,510	1,523,279	8,710,794
3	5,953,098	1,634,762	1,608,126	9,195,986
4	6,284,685	1,725,818	1,697,699	9,708,202
5	6,634,742	1.821,946	1,792,260	10,248,949
6	7,004,297	1,923,428	1,892,089	10,819,815
7	7,394,437	2,030,563	1,997,479	11,422,479
8	7,806,307	2,143,666	2,108,738	12,058,711
9	8,241,118	2,263,068	2,226,195	12,730,381
10	8,700,149	2,389,121	2,350,194	13,439,463
11	9,184,747	2,522,195	2,481,100	14,188,042
12	9,696,337	2,662,681	2,619,297	14,978,316
13	10,236,423	2,810,992	2,765,192	15,812,608
14	10,806,592	2,967,565	2,919,213	16,693,370
15	11,408,519	3,132,858	3,081,813	17,623,191
Total Cost	$125,391,603	$34,433,400	$33,872,364	$193,697,367

Exhibit 4

15-YEAR COST PROJECTION
RECORDED BOOKS

Libraries and Agencies

Year	Labor	Occupancy	All Other	Total Cost
Current	$16,080,128	$8,588,514	$5,512,136	$30,180,778
1	16,975,791	9,066,894	5,819,162	31,861,848
2	17,921,343	9,571,920	6,143,290	33,636,553
3	18,919,561	10,105,076	6,485,471	35,510,109
4	19,973,381	10,667,929	6,846,712	37,488,022
5	21,085,898	11,262,133	7,228,074	39,576,105
6	22,260,383	11,889,433	7,630,677	41,780,494
7	23,500,286	12,551,675	8,055,706	44,107,667
8	24,809,252	13,250,803	8,504,409	46,564,464
9	26,191,127	13,988,873	8,978,104	49,158,105
10	27,649,973	14,768,053	9,478,185	51,896,211
11	29,190,077	15,590,634	10,006,120	54,786,830
12	30,815,964	16,459,032	10,563,461	57,838,457
13	32,532,413	17,375,800	11,151,845	61,060,059
14	34,344,469	18,343,632	11,773,003	64,461,104
15	36,257,456	19,365,372	12,428,759	68,051,587
Total Cost	$398,507,503	$212,845,774	$136,605,115	$747,958,392

Multistate Centers

Current	$234,153	$95,980	$56,835	$386,969
1	247,196	101,326	60,001	408,523
2	260,965	106,970	63,343	431,278
3	275,500	112,928	66,871	455,300
4	290,846	119,218	70,596	480,660
5	307,046	125,859	74,528	507,433
6	324,148	132,869	78,680	535,697
7	342,203	140,270	83,062	565,535
8	361,264	148,083	87,689	597,036
9	381,386	156,331	92,573	630,290
10	402,630	165,039	97,729	665,398
11	425,056	174,232	103,173	702,460
12	448,732	183,936	108,919	741,587
13	473,726	194,182	114,986	782,894
14	500,113	204,997	121,391	826,501
15	527,969	216,416	128,152	872,537
Total Cost	$5,802,932	$2,378,637	$1,408,529	$9,590,098

Exhibit 4

15-YEAR COST PROJECTION
RECORDED BOOKS
(Continued)

Total: Libraries, Agencies, & MSCs

Year	Labor	Occupancy	All Other	Total Cost
Current	$16,314,281	$8,684,494	$5,568,972	$30,567,747
1	17,222,987	9,168,220	5,879,164	32,270,371
2	18,182,307	9,678,890	6,206,633	34,067,831
3	19,195,062	10,218,005	6,552,342	35,965,409
4	20,264,227	10,787,147	6,917,308	37,968,682
5	21,392,944	11,387,992	7,302,602	40,083,538
6	22,584,531	12,022,303	7,709,357	42,316,191
7	23,842,489	12,691,945	8,138,768	44,673,202
8	25,170,516	13,398,886	8,592,097	47,161,500
9	26,572,514	14,145,204	9,070,677	49,788,395
10	28,052,603	14,933,092	9,575,914	52,561,609
11	29,615,133	15,764,865	10,109,292	55,489,291
12	31,264,696	16,642,968	10,672,380	58,580,044
13	33,006,139	17,569,982	11,266,832	61,842,952
14	34,844,581	18,548,630	11,894,394	65,287,605
15	36,785,424	19,581,788	12,556,912	68,924,124
Total Cost	$404,310,435	$215,224,411	$138,013,644	$757,548,490

APPENDICES

Appendix 1

COST AND OPERATIONAL INFORMATION REQUIRED FOR STUDY

Labor:	-	Wages/salaries by individual
	-	Labor loading rates or actual loadings (i.e., expenses for payroll taxes, pension benefits, sick leave, vacation leave, holiday leave, unemployment insurance, worker's compensation, all insurance)
	-	Volunteer labor, either in FTEs or hours
	-	Work flow charts (optional)
	-	Organization charts (optional)
	-	Position descriptions (optional)
	-	Existing productivity standards (optional)
Facility Space:	-	Actual rent charged operation (if leased), or
	-	Actual depreciation charged operation (if owned), or
	-	Actual rent charged parent organization and total parent facility area (if leased), or
	-	Actual depreciation charged parent organization and total parent facility area (if owned)
Occupancy:	-	Expenses for electricity, fuels, municipal services, repairs and maintenance of facility, and security
		- Actual cost for operation (if known), or - Actual cost for parent facility and parent facility area
Equipment:	-	Expenses for equipment that supports operation (e.g., desks, cabinets, computers, reproduction equipment, copiers, vehicles, shelves, dollies, microfiche, oscilloscopes, volt meters, Kurzweil, VCR, enlarger, etc.)
		- Property records detailing acquisition price, acquisition date, estimated useful life, age, annual depreciation, replacement cost, and similar information - Repairs and maintenance of equipment
Materials and Supplies:	-	Actual costs, if known, for machine repair parts and general supplies (mailing/packaging, forms, paper, labels, blank tapes, etc.)
	-	Budgeted or estimated costs, if actuals unknown
Telephone:	-	Long distance telephone costs
	-	Telephone line costs
Other data:	-	Collections of braille, recorded media, machines and large print
	-	Circulations of braille, recorded media, machines and large print
	-	Readership of braille, recorded media and large print
	-	Number of playback machine repairs
	-	Production/reproduction of recorded media and braille

Appendix 2

PERSONNEL INTERVIEW INSTRUMENT

ACTIVITY	TOTAL	BRAILLE	MACHINES	REC/MEDIA	L/PRINT
1) Receive, in-check and put away A) New items B) Returned items					
2) Receive patron requests and generate order A) Phone requests B) Walk-in requests C) Mail-in requests D) Manual selection and reference work					
3) Retrieve from storage and issue A) Pick item from storage B) Packaging C) Mailing D) Home delivery					
4) Collection Maintenance A) Weeding/Shifting B) Order new items C) Cataloguing					
5) Inspection					
6) Duplication of Books					
7) Retrieve items from patrons A) Letters B) Phone Calls C) Home visits					
8) Patron file A) Initial registration B) File updates C) CMLS					
9) Repair A) Simple diagnostics B) Clean-up C) Recordkeeping D) Transport to and from repair shops E) Electrical/Mechanical repair					
10) General and Supervisory A) Managerial/Administrative B) Conferences and travel C) Computer support D) Other					
OTHER OPERATIONS 1) Development and maintenance of art collection 2) Operation of radio broadcasting service 3) Special education programs 4) Production, storage and distribution of textbooks/ special interest/local interest material 5) Development and maintenance of regular print collection					

Appendix 3

SAMPLE SITES VISITED

State	City	Facility Type
California	Los Angeles	Regional Library
California	Sacramento	Regional Library
Connecticut	Hartford	Regional Library
Florida	Daytona Beach	Regional Library
Georgia	Atlanta	Regional Library
Hawaii	Honolulu	Regional Library
Louisiana	Baton Rouge	Regional Library
Maine	Augusta	Regional Library
Maryland	Baltimore	Regional Library
Michigan	Lansing	Regional Library
Missouri	Jefferson City	Regional Library
Ohio	Cincinnati	Regional Library
Oklahoma	Oklahoma City	Regional Library
Pennsylvania	Philadelphia	Regional Library
Texas	Austin	Regional Library
Utah	Salt Lake City	Regional Library
Washington	Seattle	Regional Library
Subtotal		**17**
Ohio	Cincinnati	Multistate Center
Pennsylvania	Philadelphia	Multistate Center
Utah	Salt Lake City	Multistate Center
Subtotal		**3**
Alabama	Talladega	Subregional Library
Arkansas	Magnolia	Subregional Library
California	Fresno	Subregional Library
Florida	Miami	Subregional Library
Georgia	Rome	Subregional Library
Illinois	Chicago	Subregional Library
Indiana	Merrillville	Subregional Library
Kansas	Great Bend	Subregional Library
Maryland	Hyattsville	Subregional Library
Michigan	Farmington Hills	Subregional Library
Michigan	Muskegon	Subregional Library
Nevada	Las Vegas	Subregional Library
New York	Bellport	Subregional Library
Virginia	Arlington	Subregional Library
Virginia	Staunton	Subregional Library
Subtotal		**15**
Total		**35**

Appendix 4

LETTER MAILED TO SAMPLE SITES

September 7, 1989

Library and Resource Center
For the Blind and Physically Handicapped
Alabama Institute for Deaf and Blind
705 South Street, P.O. Box 698
Talladega, Alabama 35160

Attention: Mrs. Teresa Lacy, Librarian

Reference: Costs of Library Services Study
Contract Number L70086

Dear Mrs. Lacy:

Technology Management Corporation (TMC) has been contracted by the Library of Congress, National Library Service for the Blind and Physically Handicapped (NLS/BPH) to conduct a study to determine how much it actually costs the network of cooperating libraries and NLS/BPH to provide library services to visually and physically handicapped individuals. Your operation has been selected as a sample site to be visited by our study team, who will gather baseline cost and operational data for these functions.

The intended site visit is neither a financial audit nor an efficiency review of your operation. Your operation will not be rated or ranked relative to other operations in the network. However, we do intend to determine the costs of providing services to your patrons and to gain a familiarity with the operating methods and procedures employed at your site.

To this end, we have attached a listing of cost and operational data that is required for the performance of this study. It would be extremely helpful if as much this information as possible is made available upon arrival of the study team on-site. Any data furnished to the study team will be used solely for the purpose of this study and will be kept completely confidential.

You will be contacted either by myself or by another TMC study team member by telephone prior to the site visit to your facility. If you have any questions of a technical nature, please do not hesitate to call me at (703) 684-3017. If you have any questions of an administrative nature, please contact Mr. Stephen Prine, the NLS/BPH Network Study Project Monitor, at (202) 707-0727. We truly depend upon and appreciate your cooperation in this effort.

Sincerely,
TECHNOLOGY MANAGEMENT CORPORATION

Jerome L. Ducrest
Project Manager

Appendix 5

GSA RENT SYSTEM OCCUPANCY RATES FOR NETWORK SITES

State	City	Zip Code	Facility Type	Visited	Occupancy Rate
AK	Anchorage	99518	RL	N	$16.77
AL	Anniston	36207	SRL	N	$8.25
AL	Dothan	36301	SRL	N	$8.09
AL	Huntsville	35804	SRL	N	$9.18
AL	Montgomery	36130	RL	N	$9.75
AL	Talladega	35160	SRL	Y	$4.67
AL	Tuscaloosa	35401	SRL	N	$5.32
AR	Fayetteville	72701	SRL	N	$4.78
AR	Fort Smith	72901	SRL	N	$7.79
AR	Jonesboro	72401	SRL	N	$4.78
AR	Little Rock	72201	RL	N	$8.94
AR	Magnolia	71753	SRL	Y	$4.78
AZ	Flagstaff	86001	SRL	N	$9.38
AZ	Phoenix	85008	RL	N	$8.97
AZ	Phoenix	85016	MLA	N	$8.97
AZ	Prescott	86303	SRL	N	$8.63
CA	Fresno	93728	SRL	Y	$8.63
CA	Los Angeles	90029	RL	Y	$13.35
CA	Sacramento	95818	RL	Y	$6.94
CA	San Francisco	94115	SRL	N	$18.28
CO	Denver	80203	RL	N	$8.34
CT	Rocky Hill	06067	RL	Y	$11.80
DC	Washington	20001	RL	N	$17.90
DE	Dover	19901	RL	N	$11.78
FL	Bradenton	34205	SRL	N	$11.46
FL	Cocoa	32922	SRL	N	$12.08
FL	Daytona Beach	32115	RL	Y	$11.46
FL	Ft. Lauderdale	33301	SRL	N	$15.27
FL	Ft. Myers	33901	SRL	N	$11.80
FL	Jacksonville	32205	SRL	N	$9.23
FL	Miami	33138	SRL	Y	$7.84
FL	Orlando	32801	SRL	N	$13.21
FL	Riveria Beach	33408	SRL	N	$11.36
FL	Tampa	33602	SRL	N	$10.79
GA	Albany	31701	SRL	N	$6.38
GA	Athens	30601	SRL	N	$4.28
GA	Atlanta	30310	RL	Y	$10.66
GA	Augusta	30901	SRL	N	$5.63
GA	Bainbridge	31717	SRL	N	$6.42
GA	Brunswick	31523	SRL	N	$4.88
GA	Columbus	31995	SRL	N	$4.88
GA	Dublin	31040	SRL	N	$4.88
GA	Gainesville	30505	SRL	N	$4.88
GA	LaFayette	30728	SRL	N	$4.88
GA	Macon	31201	SRL	N	$8.66
GA	Rome	30161	SRL	Y	$4.88
GA	Savannah	31499	SRL	N	$10.50
GA	Valdosta	31601	SRL	N	$5.62
HI	Honolulu	96815	RL	Y	$17.11

Appendix 5

GSA RENT SYSTEM OCCUPANCY RATES FOR NETWORK SITES (Continued)

State	City	Zip Code	Facility Type	Visited	Occupancy Rate
IA	Des Moines	50309	RL	N	$9.94
ID	Boise	83702	RL	N	$7.50
IL	Carterville	62918	SRL	N	$6.08
IL	Chicago	60608	SRL	Y	$11.05
IL	Chicago	60608	RL	N	$11.05
IL	Coal Valley	61240	SRL	N	$6.08
IL	La Grange Park	60525	SRL	N	$12.19
IL	Pekin	61554	SRL	N	$8.85
IL	Quincy	62301	SRL	N	$6.08
IN	Columbus	47201	SRL	N	$7.39
IN	Elkhart	46516	SRL	N	$9.62
IN	Evansville	47708	SRL	N	$9.62
IN	Indianapolis	46204	MLA	N	$10.75
IN	Indianapolis	46204	RL	N	$10.75
IN	Merrillville	46410	SRL	Y	$10.71
KS	Emporia	66801	RL	N	$7.18
KS	Great Bend	67530	SRL	Y	$7.94
KS	Hutchinson	67501	SRL	N	$6.23
KS	Kansas City	66101	SRL	N	$8.24
KS	Manhattan	66502	SRL	N	$8.90
KS	Norton	67654	SRL	N	$7.94
KS	Topeka	66604	SRL	N	$7.94
KS	Wichita	67202	SRL	N	$9.17
KY	Covington	41011	SRL	N	$8.33
KY	Frankfort	40602	RL	N	$9.00
KY	Louisville	40203	SRL	N	$8.75
LA	Baton Rouge	70802	MLA	N	$9.88
LA	Baton Rouge	70802	RL	Y	$9.88
MA	Cambridge	02142	MLA	N	$17.30
MA	Watertown	02172	RL	N	$17.30
MA	Worcester	01603	SRL	N	$12.85
MD	Baltimore	21201	RL	Y	$13.52
MD	Bethesda	20817	SRL	N	$14.03
MD	Hyattsville	20782	SRL	Y	$10.16
ME	Augusta	04333	RL	Y	$11.80
MI	Alpena	49707	SRL	N	$11.23
MI	Ann Arbor	48104	SRL	N	$12.99
MI	Battle Creek	49016	SRL	N	$8.39
MI	Detroit	48226	SRL	N	$10.94
MI	Farmington Hills	48018	SRL	Y	$9.64
MI	Flint	48504	SRL	N	$11.23
MI	Grand Rapids	49503	SRL	N	$12.00
MI	Lansing	48909	RL	Y	$16.50
MI	Lansing	48909	SRL	N	$16.50
MI	Marquette	49855	SRL	N	$6.05
MI	Mt Clements	48044	SRL	N	$7.50
MI	Muskegon	49442	SRL	Y	$11.23
MI	Port Huron	48060	SRL	N	$7.56
MI	Portage	49002	SRL	N	$12.02
MI	Traverse City	49684	SRL	N	$10.51

Appendix 5

GSA RENT SYSTEM OCCUPANCY RATES FOR NETWORK SITES (Continued)

State	City	Zip Code	Facility Type	Visited	Occupancy Rate
MI	Wayne	48184	RL	N	$9.75
MN	Faribault	55021	RL	N	$10.63
MN	St. Paul	55104	MLA	N	$9.88
MO	Jefferson City	65109	RL	Y	$6.08
MS	Jackson	39206	RL	N	$10.11
MT	Helena	59620	RL	N	$8.64
NC	Raleigh	27635	RL	N	$9.62
ND	Grand Forks	58202	MLA	N	$8.64
NE	Lincoln	68508	RL	N	$4.46
NE	North Platte	69101	SRL	N	$4.43
NH	Concord	03301	RL	N	$11.80
NJ	Trenton	08618	RL	N	$11.78
NM	Santa Fe	87503	RL	N	$8.63
NV	Carson City	89710	MLA	N	$10.50
NV	Carson City	89710	RL	N	$10.50
NV	Las Vegas	89119	SRL	Y	$11.63
NY	Albany	12230	RL	N	$12.20
NY	Bellport	11713	SRL	Y	$14.63
NY	New York	10013	RL	N	$10.81
NY	Uniondale	11553	SRL	N	$16.34
OH	Cincinnati	45202	RL	Y	$12.14
OH	Cleveland	44114	RL	N	$11.05
OH	Columbus	43266	MLA	N	$11.60
OK	Oklahoma City	73111	RL	Y	$8.24
OK	Tulsa	74103	SRL	N	$11.87
OR	Salem	97310	RL	N	$9.83
PA	Philadelphia	19107	RL	Y	$14.57
PA	Pittsburgh	15213	RL	N	$11.54
PR	San Juan	00901	RL	N	$17.11
RI	Providence	02903	RL	N	$18.24
SC	Columbia	29202	RL	N	$9.62
SD	Pierre	57501	RL	N	$8.64
TN	Nashville	37219	RL	N	$9.68
TX	Austin	78701	RL	Y	$15.60
UT	Salt Lake City	84115	RL	Y	$9.44
VA	Alexandria	22310	SRL	N	$14.66
VA	Arlington	22201	SRL	Y	$17.70
VA	Fairfax	22301	SRL	N	$8.34
VA	Fredericksburg	22401	SRL	N	$9.00
VA	Hampton	23669	SRL	N	$9.00
VA	Newport News	23601	SRL	N	$9.00
VA	Richmond	23222	RL	N	$9.42
VA	Roanoke	24016	SRL	N	$9.00
VA	Staunton	24401	SRL	Y	$9.00
VA	VA Beach	23455	SRL	N	$9.40
VI	St. Croix	00840	RL	N	$17.11
VT	Montpelier	05602	RL	N	$11.80
WA	Seattle	98129	RL	Y	$11.99
WI	Milwaukee	53233	RL	N	$10.63
WV	Charleston	25305	RL	N	$12.67

Appendix 5

GSA RENT SYSTEM OCCUPANCY RATES FOR NETWORK SITES (Continued)

Stcte	City	Zip Code	Facility Type	Visited	Occupancy Rate
WV	Charleston	25301	SRL	N	$12.67
WV	Huntington	25701	SRL	N	$5.78
WV	Parkersburg	26101	SRL	N	$7.68
WV	Romney	26757	SRL	N	$6.00
WV	Wheeling	26003	SRL	N	$5.45
WY	Cheyenne	82002	MLA	N	$7.50

Appendix 6

COST PREDICTION MODELS
REGIONAL LIBRARIES AND MACHINE LENDING AGENCIES

PREDICTED COST CATEGORY	BRAILLE BOOK OPERATIONS	PLAYBACK MACHINE OPERATIONS	RECORDED BOOK OPERATIONS
Labor	Stratified Mean Step-Function Cost=24,786 If BRFTE < 0.6 Cost=49,437 If 0.6 ≤ BRFTE < 1.6 Cost=104,140 If BRFTE ≥ 1.6 where BRFTE = $\left(\frac{\text{Braille Circulation}}{\text{Total Circulation}}\right)$ * Reported FTEs	Stratified Mean Step-Function Cost = 52,822 If RMRS + RMCIR < 415,000 Cost= 130,932 If RMRS + RMCIR ≥ 415,000 where RMRS = Recorded Book Readership and RMCIR = Recorded Book Circulation	Regression Equation Cost = -42,215 + 16,165 FTE where FTE = Total Reported Staff (FTE) R^2 = 0.85
Occupancy	Regression Equation Total Area (sf) = 999.77 + 0.098 COLLBR where COLLBR = Braille Collection (volumes) R^2 = 0.90 Cost = Total Area * GSA Library Rate	Regression Equation Total Area (sf) = 408.3 + 0.091 MAINV where MAINV = Total Machine Inventory R^2 = 0.79	Regression Equation Total Area (sf) = -413.64 + 0.069 COLLRM where COLLRM = Recorded Book Collection R^2 = 0.85
Other	Regression Equation Cost = -95.4 + 0.558 COLLBR where COLLBR = Braille Collection (volumes) R^2 = 0.68	Regression Equation Cost = 5,837 + 4.495 MAREP where MAREP = Total Machine Repairs R^2 = 0.71	Regression Equation Cost = 20,912 + 7.112 RMRS where RMRS = Recorded Book Readership R^2 = 0.68

Appendix 7

COST PREDICTION MODELS
SUBREGIONAL LIBRARIES

PREDICTED COST CATEGORY	BRAILLE BOOK OPERATIONS	PLAYBACK MACHINE OPERATIONS	RECORDED BOOK OPERATIONS
Labor	Stratified Mean Step-Function Cost=24,786 If BRFTE < 0.6 Cost=49,437 If 0.6 ≤ BRFTE < 1.6 Cost=104,140 If BRFTE ≥ 1.6 where BRFTE = $\left(\frac{\text{Braille Circulation}}{\text{Total Circulation}}\right)$ * Reported FTEs	Stratified Mean Step-Function Cost = 9,524 If RMRS < 2,000 Cost = 31,523 If RMRS ≥ 2,000 where RMRS = Recorded Book Readership	Regression Equation Cost = 10,744 + 25.41 RMRS where RMRS = Recorded Book Readership R^2 = 0.81
Occupancy	Regression Equation Total Area (sf) = 999.77 + 0.098 COLLBR where COLLBR = Braille Collection (volumes) R^2 = 0.90 Cost = Total Area * GSA Library Rate	Regression Equation Total Area (sf) = -130.84 + 0.0205 COLLRM where COLLRM = Recorded Book Collection R^2 = 0.73 Cost = Total Area * GSA Library Rate	Regression Equation Total Area (sf) = 39.21 0.075 COLLRM where COLLRM = Recorded Book Collection R^2 = 0.87 Cost = Total Area * GSA Library Rate
Other	Regression Equation Cost = -95.4 + 0.558 COLLBR where COLLBR = Braille Collection (volumes) R^2 = 0.68	Regression Equation Cost = -3,223.5 + 1,910.09 FTE where FTE = Total Reported Staff (FTE) R^2 = 0.67	Regression Equation Cost = 2,353 + 6.87 RMRS where RMRS = Recorded Book Readership R^2 = 0.78

END

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Date Filmed

March 29, 1991