PROJECT FARE TASK I REPORT

URBAN MASS TRANSPORTATION INDUSTRY

INFORMATION REQUIREMENTS

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION

URBAN MASS TRANSPORTATION ADMINISTRATION (UMTA)

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FOREWORD

Prior to 1971, the Accounting Committee of the American Transit Association had recognized an urgent need for comparative operating and financial data for the urban mass transit industry. The need for reliable, comparative financial and operating data was also recognized and expressed by researchers involved in industry planning and analysis activities.

In the spring of 1971, the American Transit Association (ATA) and the Institute for Rapid Transit (IRT) submitted a grant request to the Urban Mass Transportation Administration (UMTA) defining a proposed project to develop a uniform industry reporting system. This industry proposal was eventually modified and refined by UMTA, with industry participation and concurrence, into the formation of Project FARE. The project started on March 1, 1972, with a contract to Arthur Andersen & Co. as the prime contractor for Project FARE.

Under the contract, UMTA retains overall administrative control through its Project Technical Director who works directly with the Industry Control Board to provide policy direction for the project. The Industry Control Board provides direct input into the project through its sixteen members who represent a cross section of the urban mass transit industry.

This Board includes representatives from mass transit systems, commuter rail operations, the ATA, the IRT, the National Governor's Conference, and the National League of Cities. The UMTA Technical Director and the Board meet with the contractor periodically to establish policy, provide direct input, evaluate progress and review future work plans for the project.

The primary objective of Project FARE (Financial Accounting and Reporting Elements) is to develop and test a candidate reporting system which will accumulate transit industry financial and operating results by uniform categories. The system is to be designed so that it can eventually be implemented on an industry-wide basis. To ensure the feasibility of future implementation, the candidate reporting system will be tested for practicality and usefulness at selected operating sites.

Ultimately, the information collected through the industry-wide reporting system will be designed to address the wants of:

- Federal, state and local government agencies for transit industry analysis and for financial assistance program administration.
- Transit industry associations for monitoring industry performance.
- Individual transit systems for comparing their performance with other transit systems with similar characteristics.

The FARE project has been divided into the following tasks:

Task I	–	Identify the information requirements of the potential users of the system.
Task II	–	Survey the capability of selected transit systems to supply the information required.
Task III	–	Develop a candidate system of reporting elements for which implementation is currently feasible.
Task IV	–	Test implement the candidate system at selected transit systems.

Each of these tasks is to be concluded with the submission of a written task report by Arthur Andersen & Co. This is the report for Task I.

CHAPTER 1
INTRODUCTION

Chapter 1

INTRODUCTION

The trends in the economic characteristics of the urban mass transit industry have been documented in other recent studies and will not be repeated in depth here.[1] In the past two decades, operating costs have increased faster than fare box revenues. This trend has placed an increasing number of transit systems in the position of not being able to stretch revenues to cover operating costs. To alleviate this problem, these systems have been forced to explore various alternatives. Typical alternatives include raising fares, reducing service levels, seeking subsidies, or suspending operations. Public authorities have been established to take over the operations when the private owner suspended operations due to an unfavorable economic environment.

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1. The following two studies contain extensive description of the condition of the industry:
    1. Feasibility of Federal Assistance for Urban Mass Transportation Operating Costs, U. S. Department of Transportation,, November, 1971.
    2. Economic Characteristics of the Urban Public Transportation Industry, U. S. Department of Transportation, February, 1972.

The decline in the ability to cover operating expenses with fare box revenues is primarily associated with the decline in transit service demand. People have shifted from mass transit to the automobile to meet their mobility demands. This abandonment of mass transit in favor of automobiles has contributed to congestion, noise pollution, and air pollution -- major hallmarks of the deterioration of the quality of urban life.

For many communities and urban planners, these trends have induced a fundamental reevaluation of the nature and basic objectives of the transit industry. The concept of transit systems as profit-making enterprises is becoming more obscure as evidenced by the fact that more and more transit systems, both large and small, are becoming
the operating responsibility of public agencies. Transit systems are coming to be regarded as an essential public service somewhat similar to fire and police protection services. When their operations are viewed as public services, transit system managers can develop a broader view of the levels of service to be provided. The levels of service can be defined in the context of achieving goals other than just profit maximization. Mobility considerations in the urban area have become the prime target for most transit systems. For example, increased transit services can be aimed at workday automobile commuters in order to reduce travel-to-work time and pollution. Increased transit services can also be aimed at the needs of the community at large and subgroupings, such as the transportation disadvantaged -- the young, the elderly, the poor, and the handicapped.

This concept of transit services and the dire economic circumstances of the industry have led to supplementing operating revenues with public funds to cover costs. The subsidies have come from local, state, and Federal levels of government and have taken many forms. State and local subsidies have stimulated capital equipment expansion and replacement and have helped to cover current operating expenses. Federal aid has so far been restricted to capital grants and research and development; however, various types of operating assistance have been considered by the Congress for several years. It appears that Congress is ready to enact legislation for an operating subsidy program for urban mass transit.

1.1 RECENT RESEARCH EFFORTS

The foregoing general description of the industry has been substantiated by several recent research efforts. In each of these efforts, a common observation has been that the basic research information is incomplete and lacking in comparability and consistency. There is no procedure for collecting data in which all of the transit systems consistently apply the same standards for reporting their performance results. It has, therefore, not been possible to get an accurate measure of the operating deficit for the industry nor to obtain comparable measures of the levels of service being provided by the various transit systems. An improved information base describing the industry is a prerequisite to effective planning and administration of a program for assisting transit operations. The FARE Project was devised to help create that improved information base.

1.2 OTHER TRANSIT INDUSTRY REPORTING SYSTEMS

Previous attempts at systematic collection of data from transit systems have had limited effectiveness because of inherent deficiencies.

The American Transit Association (ATA) system for collecting financial and operating statistics is the most widely used system, and its products are widely referenced in research projects. However, the ATA reporting system provides for voluntary submission of reports by all transit systems in the United States and Canada; and only 10-15% of the systems file reports. The ATA system does not use a standard definition of reporting categories applied uniformly by all reporting entities. To the contrary, the system has different forms for the reports to be submitted according to Interstate Commerce Commission uniform charts of accounts or the American Transit Accountants' Association uniform charts of accounts. Because there are substantial differences between these charts of accounts, a transit system using an ICC chart cannot be compared with a transit system using an ATA chart. As a result, the reports of these two transit systems cannot be consolidated to accurately measure their aggregate financial performance.[1]

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1. These limitations are fully recognized by the ATA. The Association has therefore played a major supporting role in the development and conduct of the FARE Project.

Another system administered by the ATA is the Transit Pars Data Interchange. Pars is also based on voluntary reporting; but, contrary to the ATA financial reporting, those who report are obliged to use standard definitions for reporting categories. The data reported are used to calculate certain "derived ratios" and the percentage relationships between various cost categories and operating revenues. The calculated data are arrayed to show comparisons of a transit system with other transit systems and with the par for each category. The pars are standards developed by an ATA committee in the mid-fifties. The pars indicate the percentages of each operating revenue dollar that should go to various expense classes in order to leave 10% for net operating profit. Because transit systems have been converting from private to public operations with the accompanying change from a profit orientation to a service orientation, the pars concept needs to be improved by focusing on cost and service level measurement.

Organizations other than the American Transit Association have also attempted to develop reporting systems for the collection of data describing transit operations. The Michigan Department of Commerce, Bureau of Transportation contracted with the American Academy of Transportation, Ann Arbor, Michigan for the development of a reporting system for the state of Michigan. Similar efforts have been or are being conducted in the states of Wisconsin and Pennsylvania. The Michigan project stopped short of developing standard definitions for the reporting categories.

Any reporting system which is not based on a uniform application of standard reporting category definitions will fail to provide the consistency and reliability needed in operating performance data for the transit industry.

Although many transit systems use the ICC chart of accounts, they are not all required to report operating results to the ICC. Those transit systems not engaged in interstate operations nor in intercity operations for which the ICC must issue a license are not required to report their operating results to the ICC. The vast majority of transit systems do not report to the ICC, but many of them are required to report to their state department of transportation or state public utilities commission using the ICC reporting form or a variation thereof. The lack of centralized data collection and processing and the variations from state to state prevent this data collection effort from serving an industry-wide need.

1.3 FARE PROJECT

To fulfill the need for an improved transit industry reporting system, the FARE Project was defined through the joint efforts of the ATA, the Institute for Rapid Transit (IRT), and UMTA. The objectives of this project as stated in the contract are to "improve the consistency and reliability of financial and operating data on transit companies". In other words, the FARE Project is to produce a reporting system that will overcome the deficiencies in the existing reporting systems.

Two other projects being performed or being talked about by DOT bear close relationship to the FARE Project. The distinctions between these projects should be clearly understood.

The TOMS project (Transit Operations & Management Systems) and its associated project, SIMS (Service, Inventory, & Maintenance System - formerly TRANSMAN) are intended to develop improved internal information systems for transit system management. These projects may complement the FARE project if they successfully upgrade the capability of transit systems to supply the information to be reported in the FARE reporting system.

The Indicators Project has been under discussion within DOT, though an RFP has not been issued. From the general description of this project given by UMTA officials, it is expected to develop a system for the collection of a comprehensive data base describing urban mass transit needs and operations. Its purpose is like that

of the FARE Project, but its scope is larger in that it will include information sources other than just operating transit systems, e.g., state and local transportation planning agencies, highway departments, etc. As shown in Chapter 4, a substantial amount of transit industry information not being covered by the FARE Project is being left to a separate, complementary project such as the Indicators Project.

CHAPTER 2
METHODOLOGY

Chapter 2

METHODOLOGY

In addition to certain administrative steps performed at the outset of the project, the first work step performed in Task I was the development of a preliminary statement of design criteria for the reporting system. The design criteria cannot be established in final form at this early point in the project since they are subject to continuing refinement in subsequent stages. However, on the basis of the project team's understanding of the scope and objectives of the project, a preliminary statement was developed to serve as a point of departure for subsequent work steps to be completed. As the work included under Task I progressed, the criteria were reviewed and refined periodically to reflect additional considerations which have been identified in the work performed to date. The criteria defined in Chapter 3 will serve a similar function in future tasks and be subject to further change as the project progresses.

2.1 INFORMATION REQUIREMENTS

The primary objective of the Task I work steps was to identify the anticipated information requirements of potential users. Our basic approach was to establish direct contact with a broad cross section of individuals in the industry who were expected to have valid input in the definition of information requirements. Frequently these contacts provided printed

materials of significance for the project reading file. This material has been analyzed by a member of the project team. Each personal contact and each reading file item of interest was described in the project synopsis file. The synopses were reviewed and some of the more significant reading file items were analyzed in greater detail to arrive at the initial description of industry information requirements in Chapter 4. We expect that this description of information requirements will be further refined, revised as necessary, and confirmed in later stages of the project. The people we contacted to seek basic input information for Task I were individuals with acknowledged experience and expertise in one or more of the following areas:

- Transit system operations.
- Federal government transportation program planning.
- Projects similar or complementary to the FARE Project.
- Regulation of transit operations.

2.2 INDUSTRY INFORMATION SOURCES

Some of the more important industry information sources contacted in Task I include the following:

Transit System Operations Expertise:

The FARE Project Industry Control Board composed of financial and operating executives from selected transit systems.

A consultant in transit system operations and former Chief Engineer of a major transit system.

Federal Government Transportation Program Planning Expertise:

- Department of Transportation personnel whose primary responsibilities include the performance of economic analyses of the urban mass transit industry and the planning of federal programs for aiding the industry.

- The Director of Financial Management for UMTA, who is also the technical director of the FARE Project for UMTA.

- An independent consultant for transportation system economic analyses, formerly with the Institute for Defense Analyses.

Similar and Complementary Projects Expertise:

- Persons from the Michigan Bureau of Transportation and the American Academy of Transportation who participated in the development of a reporting system for transit operators in Michigan.

- Financial managers of the Toronto Transit Commission whose system served as the basis for the development of an operating subsidy program for the Province of Ontario, Canada.

- UMTA and MITRE Corporation personnel who participated in the development of the TOMS and SIMS (formerly TRANSMAN) programs.

- ATA personnel who administer the various ATA data collection systems.

Transit Industry Regulation Expertise:

- Persons from the Michigan Bureau of Transportation who surveyed the regulatory reporting requirements of various states in their project for developing a reporting system for transit operators in Michigan.

- An official of the Interstate Commerce Commission.

CHAPTER 3
DESIGN CRITERIA

Chapter 3

DESIGN CRITERIA

One of the first work steps to be performed in Task I was development of the preliminary design criteria. This step was scheduled early to establish a benchmark for other work steps to follow in Task I. This early effort was designated "preliminary" to indicate that changes will be made to the design criteria as the project proceeds and more knowledge is gained which will affect criteria definition. Thus, the preliminary design criteria presented below represent a general statement of the objective and characteristics of the candidate reporting system.

3.1 REPORTING SYSTEM OBJECTIVE

The objective of the reporting system being designed in the FARE Project is to provide the basis for collection and analysis of a data library describing the periodic financial and operating results of the nation's urban mass transit industry.

3.2 GENERAL CHARACTERISTICS

In order to improve reliability and consistency of data from the levels that have prevailed for past reporting systems, standard definitions of reporting categories are to be uniformly applied by all transit systems generating input to the data library. The reporting categories are to be defined at the

lowest feasible level of "building blocks" to permit summarizing the data to higher level information categories in different ways according to the varying needs of different users. The potential users are expected to be federal, state and local government administrative and regulatory agencies, industry associations, and individual urban mass transit systems.

3.3 REPORTING PARTICIPANTS

The system is to be designed to cover urban mass transit systems providing transit services by the following modes:

- Commuter rail
- Rail rapid transit
- Streetcar/cable car
- Trackless trolley
- Motor bus
- Ferry boat

As the reporting system is intended to be used by many different interested parties, it will be most useful only when it receives the broadest possible participation by reporting transit systems. To obtain the broad participation necessary to make the system most effective, the various governmental agencies and industry associations may need to encourage the transit systems to participate. This type of encouragement, plus the transit systems' self-interest in valid comparison to peer groups, hopefully should provide broad-based participation.

3.4 REPORTING FREQUENCY

Generally, the data will be reported on an annual basis. However, there may be some special reporting categories for which data is desired more frequently. Each transit system participating in the reporting system will compute its annual data for a common twelve-month period.

3.5 REPORTING CONTENT

Chapter 4 of this report describes the information requirements for the industry as currently perceived by the potential users of the system. Not all of the information required by all of the users is obtainable from the transit systems, i.e., through this reporting system. Those information requirements which are expected to be satisfied through this system are so indicated in Chapter 4.

In general, the reporting categories will cover two main classifications:

- Operating statistics, such as, passengers carried, seat-miles offered, and other quantative data.

- Financial data (in the form of the building blocks) for management reports.

A standard definition for each reporting category will be developed in Task III.

3.6 REPORT GENERATION

This project will not yield an internal information system for transit operators, nor will it require conversion of any reporting transit operator's chart of accounts to the

reporting categories of this system. Nevertheless, it may be necessary for some transit operators to upgrade their internal information systems and chart of accounts to be able to report the data categories developed in the FARE Project. We expect that the data for the reporting categories in this system will be developed as follows:

1. For mechanized information systems

    a. Use the computer to translate each transit system account code to its corresponding FARE Reporting System account code and to print a trial balance by these latter codes.

    b. Develop the adjusting journal entries necessary to convert the transit system's regular accounting treatment to the standard treatment specified for FARE reporting.

    c. Post the adjusting entries to the FARE code trial balance (not to the computer master-files) and update the balances for each FARE category.

    d. Transcribe the FARE category balances from the trial balance to the FARE reporting form appropriate for the transit system's reporting classification.

2. For manual information systems

    a. Take off a trial balance of the general ledger on a worksheet.

    b. Indicate the corresponding FARE Reporting System account code for each transit system account code in the trial balance.

    c. Recast the trial balance in FARE code sequence showing an unadjusted balance for each FARE category.

    d. Same as b. for mechanized systems.

    e. Same as c. for mechanized systems.

    f. Same as d. for mechanized systems.

In most instances, we expect that the FARE categories will be defined at the same (or higher) level of detail as the internal transit system account codes, thus avoiding the necessity for analyzing a transit system account balance to split it between two or more FARE categories.

3.7 SYSTEM CONTROLS

To insure that improved consistency and reliability of reported data are obtained, certain controls should be implemented throughout the system. Since the generation of input to the system is widely decentralized, input control will take two forms:

1. Report preparation should be audited by a centralized audit team with a thorough knowledge of the reporting system. By auditing on a cyclical basis, each reporting transit system would have the preparation of its report audited periodically.

2. The reporting forms will include a reconciliation schedule similar to Schedule "M" in corporate income tax returns. By completing this schedule, the reporting transit system will reconcile the gain or loss for this report with the gain or loss for published financial statements to insure that none of the costs and/or revenues are inadvertently overlooked.

The design of controls over the processing of reports and the dissemination of output reports resulting from such processing will be part of the implementation of the system.

CHAPTER 4
INFORMATION REQUIREMENTS

Chapter 4

INFORMATION REQUIREMENTS

The FARE Project limits the range of concern to information about "transit system finances and operations." However, for some of the potential users identified in the contract, other kinds of transit industry information are also required. Some of this information is available only from sources other than transit systems, and some of it is not likely to be thought of as financial and operating data, although it may be available from transit systems. In Task I, we have identified a general level of information requirements for the industry, in total, to establish the basis for defining the specific requirements pertinent to Project FARE.

4.1 GENERAL INFORMATION STRUCTURE FOR TRANSIT INDUSTRY

The general information structure outlined in Exhibit 4.1-A is based upon an analytical framework for relating a production system to the market in which it operates. The production system, i.e., transit system, operates as a buyer of materials and services in a market referred to as a resource market. The production system also operates as a seller of the goods or services it produces in a market referred to as a consumption market. The analytical framework and its relationship to the general information structure are presented in Appendix A.

Within the scope of Project FARE, all of the information elements about transit system finances and operations are included in the first major category of the general information structure outlined in Exhibit 4.1-A on the next page. These information elements are described in greater detail in Section 4.2. The transit industry information elements which are beyond the scope of Project FARE are outlined in the last three major categories of the general information structure shown in Exhibit 4.1-A, and are described briefly in the remaining portions of Section 4.1.

Exhibit 4.1-A

General Structure of Urban Mass Transit
Industry Information Requirements

I. Information re existing transit system operations

A. Resources used in producing transit services - physical measures and cost.

B. Transit services offered - physical measures.

C. Transit services consumed - physical measures and revenues.

D. Social effects of transit system operation - physical measures and cost.

E. Financial condition of the transit system.

II. Information re potential demand for transit services

A. Characteristics of transit service consumers, actual and potential.

B. Consumer behavior in transit services market.

C. External effects of changes in consumption patterns.

III. Information re potential supply of resources for producing transit services

A. Characteristics of labor and capital supplied to the transit industry, actual and potential.

B. Supplier behavior in resources market.

C. External effects of changes in resource supply patterns.

IV. Information re development of technology for producing transit services

A. Implications of fundamental scientific discoveries on the technology of producing transit services.

B. Research and development efforts and findings

1. for transit service production
2. for resource allocation
3. for consumer behavior

C. External effects of technological developments

4.1.1 Potential Demand for Transit Services

Potential demand refers to consumption that would develop if the existing transit systems were modified in terms of fare structure, route and/or stop configuration, and frequency and quality of service. Analysis of potential demand necessarily involves studying the characteristics of consumers and their likely behavior in the transit system marketplace. For example, certain target groups (e.g., the aged, school children, physically handicapped) may be identified and their likely patronage estimated assuming a changed fare structure.

Demand analysis is, of course, an important aspect of transit system operations, but in the future this analysis is likely to be coordinated by urban transportation planners at the local, state and Federal levels. The U. S. Department of Transportation has recognized the need for coordinated urban area transportation planning in its implementation of financial assistance programs. Coordinated planning requires vesting in a single agency the responsibility for planning for all transportation modes for an urban area. The single agency's domain is generally greater than that of a single city, town, county, or other political subdivision. It is also greater than just highway planning, air travel planning, or mass transit planning. To fulfill these broad transportation planning responsibilities, the agency must collect information about the potential demand for all types of transportation services in its area. Until such time as these agencies acquire sufficient staff and a data base, transit systems and commuter railroads constitute the primary source for providing data relative to demand.

4.1.2 Potential Supply of Resources

Potential supply of resources refers to the labor and capital that could be used if certain conditions were met or constraints removed. For example, certain kinds of labor (e.g., part-time workers) might be employed as transit vehicle operators if there were no labor union or institutional constraints on their use. Certain vehicle sizes might be used for peak hour express runs if there were no regulatory constraints on their dimensions. Again, analyses of resources potentially available to the transit industry may be performed by planning agencies external to the transit system.

4.1.3 Development of Technology

Some research and development in the public transit industry has been performed under Federal Government sponsorship and funding by planning agencies, professional research contractors, equipment manufacturers, and transit systems. Much of this R & D has focused on new hardware systems, the improvement of existing hardware systems, and the development of software systems. Information about these R & D efforts should be collected from the organizations doing the work.

The degree of R & D performed by transit systems themselves is not generally known. A number of operators have developed better management techniques, scheduling techniques, internal accounting systems, marketing techniques, etc., but the results of many of these efforts have not been formally documented and disseminated. This is an important area of information that should be considered for regular reporting by transit system operators. It will not be pursued further in this report or project, but it should be considered for further treatment.

4.2 EXISTING TRANSIT SYSTEM OPERATIONS

The previous section identified the categories of information about existing transit system operations as being the major concern of this project. The remainder of this chapter presents in a series of exhibits an array of potential information requirements for transit system finances and operations. The next five subsections correspond to the breakdown of existing transit system information given in Exhibit 4.1-A. Additionally, the last subsection displays some ratios that may be derived from the basic data prescribed in the other subsections.

4.2.1 Resource Consumption in Transit Service Operations

The resources consumed in operating a transit system for a period of time may be categorized according to many familiar dimensions, such as function, organization, fund, and object class. Resources consumed may also be categorized according to multi-dimensional components, such as, object class within organization, fund within organization, etc.

There are practical limitations to the number of dimensions that can be efficiently used in an information system. Each dimension must be recognized in the definition of the lowest level information "building blocks" to be used. More dimensions mean more building blocks to be coded, controlled and processed. The design of an optimal information system must balance genuine information needs with simplicity of input generation. The number

of dimensions or combinations of dimensions to be used in this system should be governed by the expected uses to which the data will be put. This would be the minimum number of dimensions necessary to meet all genuine data requirements.

The dimensions to be used in this system have been selected on the basis of their ability to meet the greatest number of anticipated requirements without unduly complicating input preparation. The four proposed reporting dimensions are:

- Mode of transit service
- Transit system capital classifications
- Functional or activity classifications
- Natural expense or object classifications

The modes of transit service are listed in Exhibit 4.2.1-A. For each mode, the resource consumption information will be subdivided according to the other dimensions.

Exhibit 4.2.1-A

Modes of Transit Service

- Commuter rail service
- Rail rapid transit service
- Streetcar service
- Trackless trolley service
- Motor bus service
- Other services (incline railways, cable cars, personal rapid transit, etc.)

Note: At the request of UMTA's technical director for the FARE Project, we have started to review ferry boat services in certain major metropolitan areas and demand response transit systems. Because these modes of transit service were added to our considerations within the very recent past, we have not been able to incorporate complete treatment of them in this report. The remainder of the FARE Project work will include ferry boat and demand response service as modes of transit operations. Complete treatment
of these modes will be given in the remaining interim and final reports for the project.

The transit system capital classifications are listed in Exhibit 4.2.1-B. A description of the proposed content for each of these classifications is also presented in Appendix B. These classifications are a convenient grouping of the capital assets required for the production of transit services.

Exhibit 4.2.1-B

Transit System Capital Classifications

- Transit way and transit way structures and equipment
- Support facilities
  - power plant
  - network control system
  - shops and garages
  - general
- Revenue equipment
  - passenger
  - freight

The functional or activity classifications for transit expenses are listed in Exhibit 4.2.1-C. Each is used in combination with the capital classes listed in Exhibit 4.2.1-B.

Exhibit 4.2.1-C

Transit Expense Activity Classifications

- Consumption of capital (depreciation/amortization)
- Operation of capital
- Maintenance of capital

The natural expense classifications are listed in Exhibit 4.2.1-D. They indicate the object for which an expense has been incurred. Except for the interest, non-payroll taxes, and fringe benefit components, these categories are used in conjunction with a mode, capital, and activity combination.

Each natural expense category can be measured in terms of money, and some of them can be measured in terms of meaningful physical units. Practical difficulties arise with respect to the use of physical units, particularly when attempting to add or subtract measurements of resources consumed for which the physical units are incompatible. Since the money measure is a "least common denominator"
permitting arithmetic computations on various types of resources, the money measure will be used for all resource consumption categories. Physical unit measures will be used where practical.

Exhibit 4.2.1-D
Natural Expense Classifications

(Major classes)

(Subordinate classes)

Some categories are not properly associable with any combination of the mode classifications, capital classifications, and activity classifications shown in Exhibits 4.2.1-A, 4.2.1-B, and 4.2.1-C, respectively.

Labor
- Supervisory
- Staff and clerical
- Direct labor
- Temporary help

Fringe benefits for employees
- Fringe benefits distributed
- Employers' cost of workmen's compensation plan
- Employers' portion of FICA
- Employers' portion of pension plans
- Employers' portion of health insurance plans
- Employers' portion of disability insurance plans
- Employers' portion of unemployment insurance plans
- Vacation, holiday, and sick pay
- Other

Materials and supplies consumed
- Tires and tubes (including rentals)
- Fuel
- Propulsion power
- Rail
- Ties
- Ballast
- Other track material
- Signal systems material
- Power distribution system materials
- Paving materials
- Equipment maintenance parts
- Other

Services consumed
- Utilities
- Professional and technical services
- Advertising/promotion
- Travel

Property insurance

Indemnification expenses
- Liability insurance premiums
- Self-insurance costs (including cost of accident repairs)

Nonpayroll taxes
- Property taxes
- Excise taxes
- Sales taxes
- Income taxes
- Other taxes

Depreciation and amortization

Lease payments/rentals

Interest on debt obligations

The multi-dimensional categories of resource consumption which are reasonable and are desired for inclusion in the reporting system to be defined in Task III are presented in Exhibit 4.2.1-E. All of these data are expected to be obtainable from the operating transit systems and are expected to be available through routine data collection rather than through occasional special purpose studies. For the "labor" categories, the financial measure and man-hours for the reporting period are desired. Further, the number of employees assigned to each classification at the end of the reporting period is also desired.

Exhibit 4.2.1-E
Resource Consumption Classification Using Financial Measures for All Modes

	Transit Way and Transit Way Structures and Equipment			Passenger Revenue Equipment			Freight Revenue Equipment			Support Facilities: Power Plant			Support Facilities: Network Control System			Support Facilities: Shops and Garages			Support Facilities: General			Not Related to Capital Classifications
	Consumption	Operations	Maintenance	Consumption	Operations	Maintenance	Consumption	Operations	Maintenance	Consumption	Operations	Maintenance	Consumption	Operations	Maintenance	Consumption	Operations	Maintenance	Consumption	Operations	Maintenance	
Labor		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Supervisory		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Staff and Clerical		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Direct labor		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Temporary help																						
Fringe benefits for employees		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Fringe benefits distributed																						X
Employers' cost of workman's compensation plan																						X
Employers' portion of FICA																						X
Employers' portion of pension plans																						X
Employers' portion of health insurance plans																						X
Employers' portion of disability insurance plans																						X
Employers' portion of unemployment insurance plans																						X
Vacation, holiday, and sick pay																						X
Other																						
Materials and supplies consumed																						
Tires and tubes (including rentals)					X			X														
Fuel					X			X														
Propulsion power					X			X														
Rail			X																			
Ties			X																			
Ballast			X																			
Other track material			X																			
Signal systems material			X											X								
Power distribution system materials			X								X											
Paving materials			X																			
Equipment maintenance parts			X			X			X			X			X			X			X	
Other		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Services consumed																						
Utilities		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Professional and technical services		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Advertising/promotion					X			X														
Travel					X	X		X	X		X	X		X	X		X	X		X	X	
Property insurance		X	X		X			X			X			X			X			X		
Indemnification expenses		X																				
Liability insurance premiums		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Self-insurance costs (including cost of accident repairs)		X	X		X	X		X	X		X	X		X	X		X	X		X	X	
Nonpayroll taxes																						X
Property taxes																						X
Excise taxes																						X
Sales taxes																						X
Income taxes																						X
Other taxes																						
Depreciation and amortization	X			X			X			X			X			X			X			
Lease payments/rentals	X			X			X			X			X			X			X			
Interest on debt obligations																						X

Exhibits 4.2.1-F and 4.2.1-G indicate additional physical unit measures for resource consumption information categories. The categories in Exhibit 4.2.1-F agree with categories for which financial measures were specified in Exhibit 4.2.1-E. The categories in Exhibit 4.2.1-G do not correspond one for one with any of the financial categories, but they cover information about revenue vehicle fleets that relates to the lease payment and depreciation financial categories.

Exhibit 4.2.1-F

Physical Measures of Resource Consumption

for All Modes of Transit Operations

Information Category	Unit of Measure
Tires and tubes for operation of passenger/freight revenue equipment	Tire-miles
Fuel for operation of passenger/freight revenue equipment (nonelectrified modes)	Gallons
Propulsion power for operation of passenger/freight revenue equipment (electrified modes)	Kilowatt-hours

Exhibits 4.2.1-F and 4.2.1-G indicate additional physical unit measures for resource consumption information categories. The categories in Exhibit 4.2.1-F agree with categories for which financial measures were specified in Exhibit 4.2.1-E. The categories in Exhibit 4.2.1-G do not correspond one for one with any of the financial categories, but they cover information about revenue vehicle fleets that relates to the lease payment and depreciation financial categories.

Exhibit 4.2.1-F

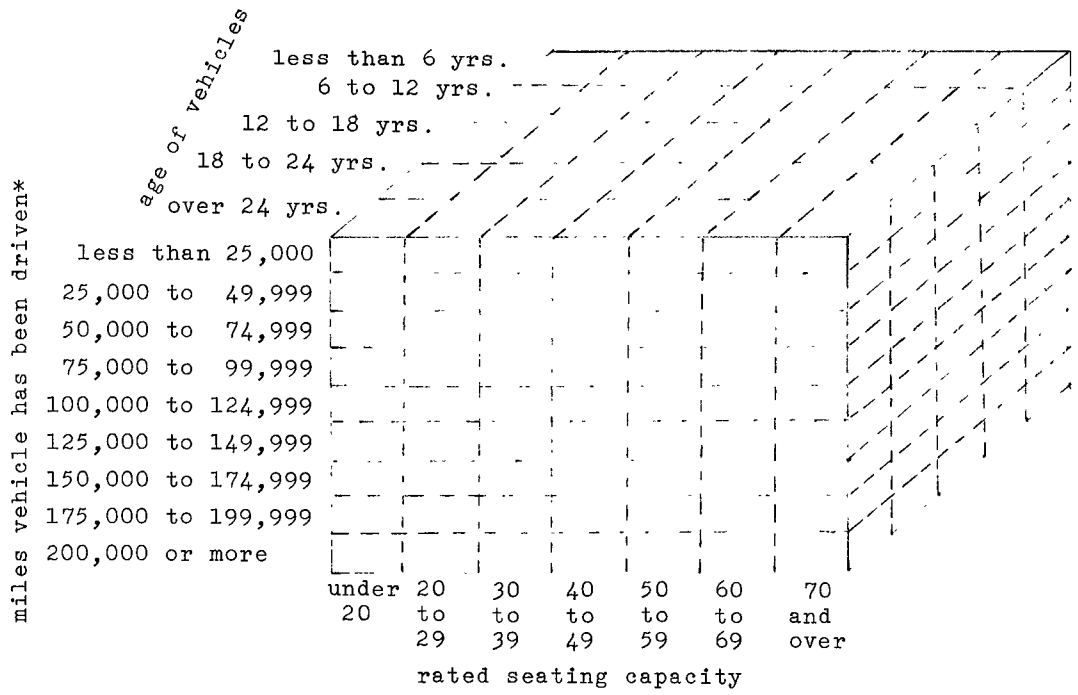
Physical Measures of Resource Consumption

for All Modes of Transit Operations

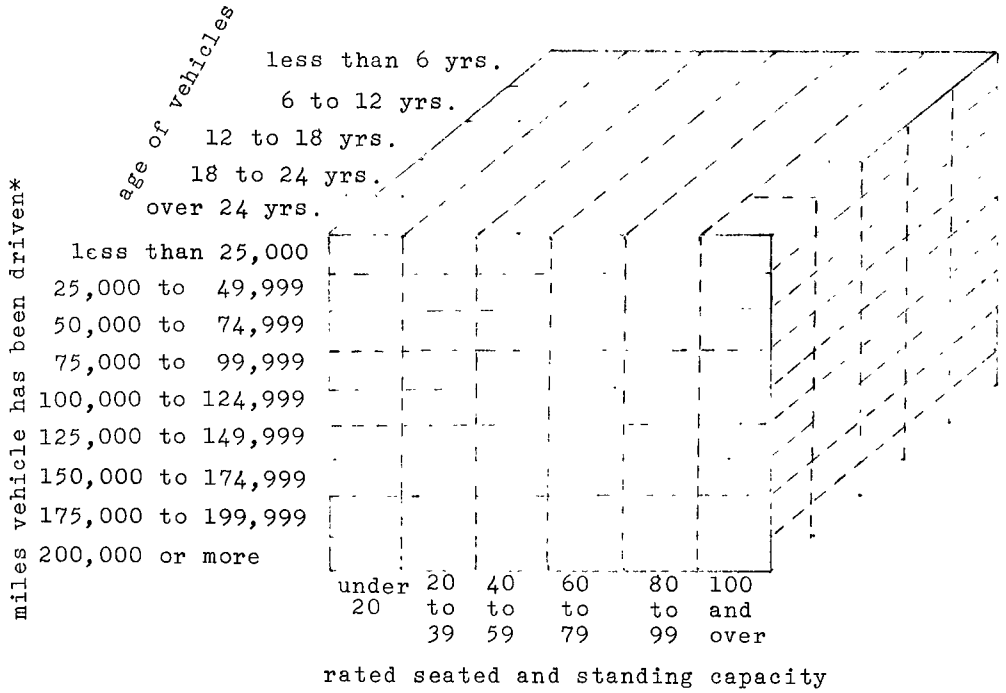
Information Category	Unit of Measure
Tires and tubes for operation of passenger/freight revenue equipment	Tire-miles
Fuel for operation of passenger/freight revenue equipment (nonelectrified modes)	Gallons
Propulsion power for operation of passenger/freight revenue equipment (electrified modes)	Kilowatt-hours

Exhibit 4.2.1-G
Revenue Vehicle Inventory

This information is desired according to three dimensions: age of vehicle, mileage vehicle has been driven and capacity of the vehicle. The matrices below portray the desired categories.



*NOTE: Ranges of numbers shown for miles driven are not representative of an actual mode. Different ranges must be developed for each mode of service.



4.2.2 Transit Services Offered

In discussing transit service offered to consumers, it is helpful to consider the following components of the transit service concept:

- accessibility of system to consumers
- frequency and speed of operation
- on time performance
- capacity offered
- comfort of ride
- employees producing transit service
- cleanliness and aesthetics of system facilities

The measurements of service offered described in the following paragraphs will be related to these service components. In all cases, measurement will be in physical units rather than financial units.

One of the major elements determining the accessibility of the transit system to its users is the route and stop structure. Exhibits 4.2.2.-A through 4.2.2.-D present the measurements that are desired to describe the route and stop structure. Exhibit 4.2.2-A covers the description of the transit way for the motor bus mode; 4.2.2.-B covers description of transit way for commuter rail, rail rapid transit, streetcars and trackless trolley modes, all of which have fixed guideway characteristics; 4.2.2.-C covers description of the stop structure for all modes; and 4.2.2-D covers description of the lines being operated along the transit ways for all modes.

Exhibit 4.2.2-A

Motor Bus Transit Way Descriptors

	Exclusive Busway	Reserved Lanes	Mixed Traffic
Interstate highway	(For each measure in the matrix, the miles of transit way are to be provided.)		
Freeway/expressway			
Arterial			
Collector streets			
Local streets			

Exhibit 4.2.2-B

Commuter Rail, Rail Rapid Transit, Streetcar and Trackless Trolley Transit Way Descriptors

	Commuter Rail	Rail Rapid Transit	Streetcar	Trackless Trolley
Electrified				
At grade - median				
At grade - separated				
At grade - other				
Subway		(For each measure in the matrix, the miles of transit way are to be provided.)		
Elevated				
Non-electrified				
At grade - median				
At grade - separated				
At grade - other				
Subway				
Elevated				

Exhibit 4.2.2-C

Transit System Stop Descriptors

	Transfer Points	Intermediate Stops	Line Ends
Major terminals			
Stations	(For each measure in the matrix, the total number of stops and the number of stops served by one or more express lines are to be provided.)		
Shelters			
Unsheltered stops			

Exhibit 4.2.2-D

Transit System Line Descriptors

Mode	Type of Line	Time of Service: Average Weekday					
		AM Peak	Midday	PM Peak	Night	Sat	Sun
Commuter Rail	Express Local						
Rail Rapid Transit	Express Local						
Streetcar	Express Local	(For each measure in the matrix, the number of transit lines in operation and the miles of transit line in operation are to be provided.)					
Trackless Trolley	Express Local						
Motor Bus	Express Local						

NOTE: The time periods spread across the top of the matrix are used in many of the following exhibits. To avoid forcing respondents into standard time periods that don't fit their operations, respondents will be asked to furnish the following time points for their operations:

- weekday commencement of service
- weekday start of AM peak period
- weekday end of AM peak period
- weekday start of PM peak period
- weekday end of PM peak period
- weekday termination of service
- Saturday and Sunday commencement of service
- Saturday and Sunday termination of service

With this information, hourly rates of vehicle-miles offered, passenger-trips consumed, etc., can be calculated. The data to be reported for each category are therefore total counts for each period rather than hourly rates.

In addition to describing the route and stop structure, it is necessary to describe the residential population and the employment, shopping, and activity centers being served by the given route and stop structure. Exhibit 4.2.2-E covers demographic statistics of people residing within certain distances of the transit system stops. Exhibit 4.2.2-F covers employment, shopping, and activity centers within certain distances of the stops.

Exhibit 4.2.2-E

Characteristics of Residents to Whom
Transit Services are Offered

	Measurements Within Distance of Nearest Transit System Stop					
	Central City			Urban Fringe		
	1/8 Mile	1/4 Mile	1/2 Mile	1/8 Mile	1/4 Mile	1/2 Mile
Land area for residential use	square miles					
Single family dwelling units	)					
2-4 family dwelling units	)number of dwelling units					
5-or-more family dwelling units	)					
People under 16 years of age	)					
People 16 to 22 years of age	)					
People 22 to 64 years of age	)					
People over 64 years of age	)					
	)					
Males	)					
Females	)					
	)					
Caucasians	)					
Blacks	)					
Orientals	)					
Spanish-Americans	)					
Other races	)					
	)					
Not handicapped	)					
Handicapped, but ambulatory	)					
Severely handicapped	)					
	)					
Family income under $3,000/year	)					
Family income $3,000-5,000/year	)number of people. The totals for					
Family income $5,000-10,000/year	)each of the eight dimensions shown					
Family income $10,000-25,000/year	)should be equal					
Family income over $25,000/year	)					
	)					
Professional and technical	)					
Managerial	)					
Clerical	)					
Sales	)					
Operatives	)					
Private household workers	)					
Craftsmen, foremen	)					
Service workers	)					
Laborers	)					
Housewives	)					
Unemployed	)					
	)					
Drivers	)					
Non-Drivers	)					
	)					
Family own no automobiles	)					
Family owns one automobile	)					
Family owns two automobiles	)					
Family owns three or more automobiles	)					

Exhibit 4.2.2-F

Characteristics of Non-Residential Centers Served by Transit Systems

	Measurements Within Distance of Nearest Transit System Stop					
	Central City			Urban Fringe		
	1/8 Mile	1/4 Mile	1/2 Mile	1/8 Mile	1/4 Mile	1/2 Mile
Land area for non-residential use			square footage			
Real estate used for retail facilities	)					
Real estate used for wholesale facilities	)					
Real estate used for industrial facilities	)					
Real estate used for cultural/educational facilities	)		square footage			
Real estate used for health care facilities	)					
Real estate used for parking facilities	)					
Real estate used for recreational facilities			square mileage			
Peak load capacity of retail facilities	)					
Peak load capacity of wholesale facilities	)					
Peak load capacity of industrial facilities	)					
Peak load capacity of cultural/educational facilities	)		number of people			
Peak load capacity of health care facilities	)					
Peak load capacity of parking facilities	)					
Peak load capacity of recreational facilities	)					
Employment of professional and technical	)					
Employment of managerial	)					
Employment of clerical	)					
Employment of sales	)					
Employment of operatives	)		number of people			
Employment of private household workers	)					
Employment of craftsmen/foreman	)					
Employment of service workers	)					
Employment of laborers	)					
Employment of housewives	)					

The frequency and speed component of transit service is measured by the categories presented in Exhibit 4.2.2-G

Exhibit 4.2.2-G

Transit System Frequency and Speed Information Categories

	Average Weekday					
	AM Peak	Midday	PM Peak	Night	Sat	Sun
Vehicles in operation						
express lines				number of vehicles		
local lines						
One-way vehicle trips						
express lines						
local lines				number of trips		
Average one-way trip speed						
express lines				miles per hour		
local lines						
Average vehicle trip distance						
express lines				miles		
local lines						

Note: This information should be broken down by the various modes of transit service offered by the transit system. Exhibit 4.2.1-A identifies the modes of transit service.

The information needed to describe capacity offered is presented in Exhibit 4.2.2-H.

Exhibit 4.2.2-H

Capacity Offered Information Categories

	Average Weekday					
	AM Peak	Midday	PM Peak	Night	Sat	Sun
Seating capacity offered						
Standing capacity offered						
Seat - miles offered						
Running time						
Layover time						
Deadhead time						

Note: This information should be broken down by the various modes of transit service offered by the transit system. Exhibit 4.2.1-A identifies the modes of transit service.

The vehicle age and mileage reported in Exhibit 4.2.1-G bear significantly on the comfort of ride component of transit service. In addition, the information categories shown in Exhibit 4.2.2-I are desired to further measure the comfort aspect of transit service.

Exhibit 4.2.2-I

Comfort Information Categories

	Cushioned Seats	Hard Seats	Air Conditioned	Not Air Conditioned
Commuter rail cars Rail rapid transit cars Streetcars Trackless trolley cars Motor buses			(Number of vehicles for each category in the matrix is to be provided.)	
Passenger area per seat			(Square feet)	

The components of service discussed up to this point have not covered the human input aspect of service. From one transit system to another with identical capital asset structure and utilization, the application of people can make a great difference in service offered. Therefore, the measures shown in Exhibit 4.2.2-J are desired to complete the description of transit services offered.

Exhibit 4.2.2-J

Employees Producing Transit Service

	Average Weekday					
	AM Peak	Midday	PM Peak	Night	Sat	Sun
Regular operators - express						
Regular operators - local						
Extra operators - express						
Extra operators - local	(Number of employees for each category to be reported.)					
Line supervisors						
Security agents						
Ticket/token sales personnel						
Route and schedule informa- tion operators						

Note: For the operator categories, this information should be broken down by the various modes of transit service offered by the transit system. Exhibit 4.2.1-A identifies the modes of transit service.

4.2.3 Transit Services Consumed

The measures of transit services consumption consist primarily of passenger count statistics indicated in Exhibits 4.2.3-A and 4.2.3-B. Exhibit 4.2.3-A covers annual counts and 4.2.3-B covers daily measures. Many of the measures indicated are not routinely collected by operating transit systems, but are obtainable through periodic special purpose studies.

Exhibit 4.2.3-A

Annual Passenger Counts

	Regular Service		Charter
	Express Lines	Local Lines	Service
Annual origination passengers (1)	(These categories are to be broken down by the modes of transit service identified in Exhibit 4.2.1-A)		
Annual passenger line trips (2)			
Average passenger line trip length			

Note (1): The originating passenger count is incremented by one for each journey a person makes via the transit system, regardless of how many line trip segments constitute that journey.

Note (2): The passenger line trip count is incremented by one for each embarkation of a rider onto a transit system vehicle, regardless of whether or not he pays a fare upon embarkation.

Exhibit 4.2.3-B

Daily Passenger Counts

	Average Weekday					
	AM Peak	Midday	PM Peak	Night	Sat	Sun
Passenger count-express		Number of passengers.				
Passenger count-local						
Passenger line trip count						
express lines		Number of passenger line trips.				
local lines						
Average passenger line trip length		Miles.				
express lines						
local lines						
Average passenger line trip time		Minutes.				
express lines						
local lines						
Passenger destinations-express	)					
Residence	)					
Place of employment	)					
Shopping center	)					
Cultural/educational facility	)					
Recreational facility	)					
Health care center	)					
Other	)					
Passenger destinations-local	)					
Residence	)					
Place of employment	)					
Shopping center	)	(Number of passengers for				
Cultural/educational facility	)	each category to be reported.)				
Recreational facility	)					
Health care center	)					
Other	)					
Type of fare-express	)					
Regular fare	)					
School fare	)					
Senior citizen fare	)					
Handicapped person fare	)					
Free transfer	)					
Paid transfer	)					
Other	)					
Type of fare-local	)					
Regular fare	)					
School fare	)					
Senior citizen fare	)					
Handicapped person fare	)					
Free transfer	)					
Paid transfer	)					
Other	)					

Note: This information should be broken down by the various modes of transit service offered by the transit system. The modes of transit service are identified in Exhibit 4.2.1-A.

Transportation revenues are obviously directly related to the transit services consumed, i.e., they are the financial measure of transit service consumption. The categories by which revenues are to be reported are shown in Exhibits 4.2.3-C and 4.2.3-D. The revenues from passenger movement shown in Exhibit 4.2.3-C are not routinely collected by the time periods shown. The allocation of daily revenue collections to these time periods can be accomplished using parameters that are developed and periodically validated through special purpose studies.

Exhibit 4.2.3-C

Revenue from Passenger Movement

	Average Weekday					
	AM Peak	Midday	PM Peak	Night	Sat	Sun
Regular service						
express fares						
local fares						
special fares						
Charter service						

Note: This information should be broken down by the various modes of transit service offered by the transit system. The modes of transit service are identified in Exhibit 4.2.1-A.

Exhibit 4.2.3-D

Revenue from Non-Passenger Services

	Commuter Rail	Rail Rapid Transit	Streetcar	Trackless Trolley	Motor Bus

Goods and mail movement

- regular freight revenue
- express freight revenue
- U. S. Mail revenue
- baggage revenue

Auxiliary operations

- station concessions
- vehicle concessions
- freight and baggage storage
- parcel room receipts
- advertising services

4.2.4 Social Effects of Transit System Operations

The manner in which transit system operations affect society has been widely recognized. However, the nature of the effects has generally been described in qualitative rather than quantitative terms. There are many social effect areas for which definition of meaningful units of measure remains elusive, such as measurement of noise pollution and the impact on residential and employment opportunities. The social effect measures that are quantifiable and are desired for inclusion in this reporting system are shown in Exhibit 4.2.4-A.

Exhibit 4.2.4-A

Transit Operation Social Impact Measures

	Commuter Rail	Rail Rapid Transit	Streetcar	Trackless Trolley	Motor Bus
Number of fatal accidents					
Transit system passenger fatalities					
Pedestrian fatalities					
Other vehicle occupant fatalities					
Number of non-fatal injury accidents					
Transit system passengers injured					
Pedestrians injured					
Occupants of other vehicles injured					
Number of property-damage-only accidents					
Tons per day of air pollutant emissions					
• carbon monoxide					
• hydrocarbons					
• nitrous oxides					
• sulphurous oxides					
• aldehydes					
• particulate					
Square miles of land area used exclusively for transit services					
Noise-dBA (decibels on the A-scale)					

4.2.5 Financial Condition of the Transit System

This section covers those financial measures not previously covered that are necessary to produce the statements of operations, financial condition, and sources and uses of funds for the reporting transit system.

Exhibits 4.2.5-A and 4.2.5-B cover current period revenue classifications. Exhibit 4.2.5-A covers non-transportation revenues, and 4.2.5-B covers subsidies to cover current period operating expenses.

Exhibit 4.2.5-A

Non-transportation Revenues

- Maintenance services performed for other entities.
- Vehicle rentals.
- Rent from buildings and other property.
- Investment income.
- Gain (Loss) on disposition of fixed assets.
- Other

Exhibit 4.2.5-B

Subsidization and Reimbursement Payments

for Current Period Operations

	Source of Subsidy		
	Federal	State	Local
Cash Grants, Subsidies, and Reimbursements			
General subsidy of operating expenses			
Fare based subsidy, i.e., subsidization of reduced fares for special classes of riders			
Expense based subsidy			
Forgiveness or reimbursement of taxes			
Forgiveness or reimbursement of interest			
Special utilities rates			
Reimbursement of transit system maintenance expense			
Reimbursement of snow removal costs			
Reimbursement of security costs			
Other			
Subsidies in Kind			
Security services			
Snow removal			
System maintenance and repairs			
Other			

Exhibit 4.2.5-C covers certain types of subsidies that amount to equity transactions. These categories would be reported on the statement of financial condition, not on the statement of operations.

Exhibit 4.2.5-C

Subsidization of Capital Asset Replacement/Expansion

	Source of Subsidy		
	Federal	State	Local
Cash grants for replacement or expansion of capital assets.			
Forgiveness or reimbursement of sales and/or excise taxes on purchase of capital assets			
Provision of services in kind during capital replacement/expansion project.			
Other			

Exhibits 4.2.5-D, E and F show the categories necessary to produce the statement of financial condition. The tangible operating property (Exhibit 4.2.5-E) is requested in this detailed form to permit centralized calculation of depreciation according to the analyst's needs and to permit calculation of the total investment in transit system assets using price-level accounting. The long-term debt (Exhibit 4.2.5-F) is requested in this detailed form to permit analysis of debt service requirements.

Exhibit 4.2.5-D

Miscellaneous Balance Sheet Categories

Current Assets

- Cash
- Receivables
- Material and supplies inventory
- Other current assets

Tangible Operating Property (see Exhibit 4.2.5-E)

Non-operating Tangible Property

Intangible Assets

Investments and Special Funds

Deferred Charges

Other Debit Items

Current Liabilities

- Trade payables
- Accrued payroll liabilities
- Accrued tax liabilities
- Current portion of long-term debt
- Other current liabilities

Unfunded Pension Liability

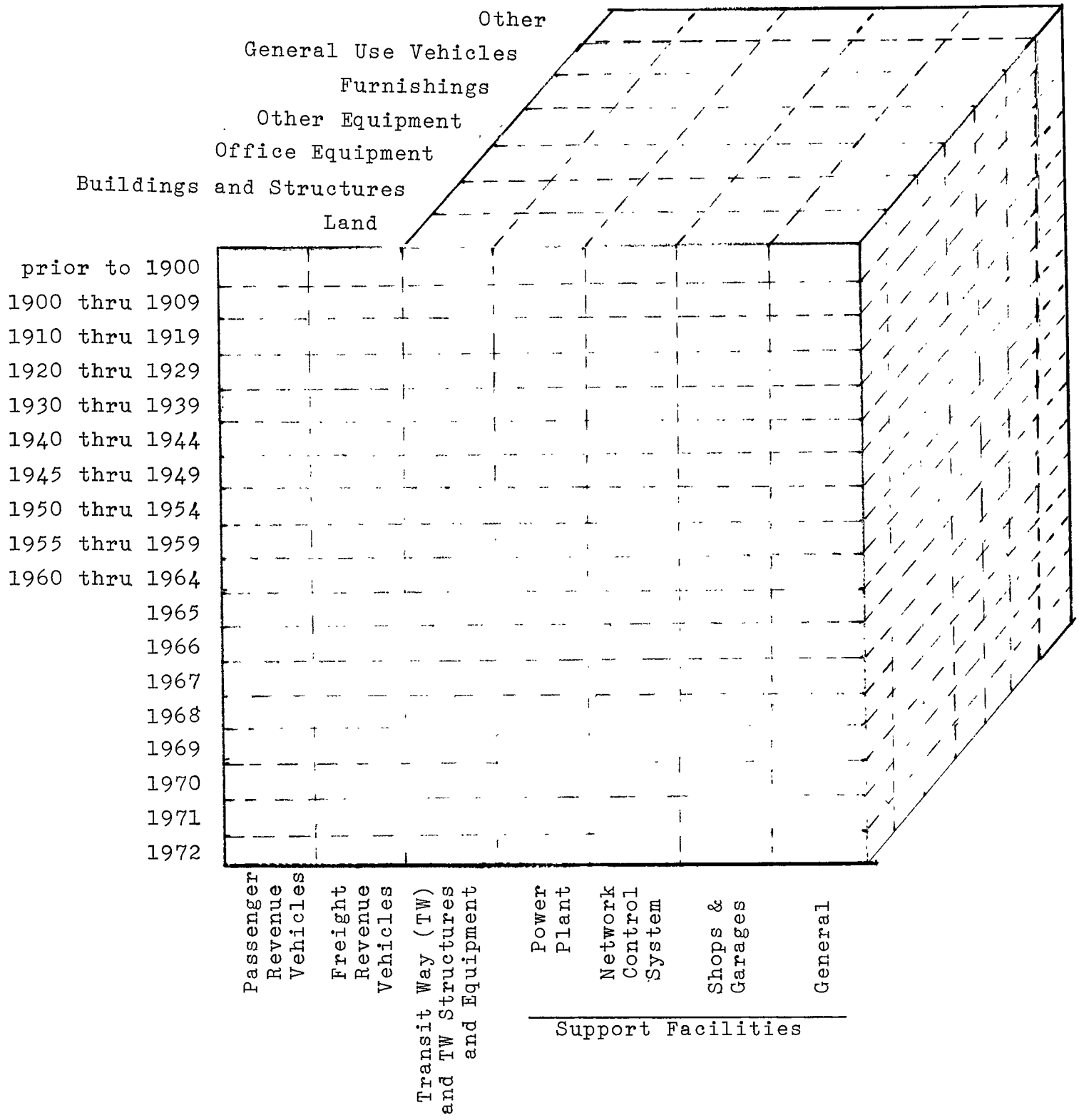
Deferred Credits

Equity

- Investment in transit system
- Capital grants
- Unrestricted accumulated earnings (loss)
- Restricted reserves

Exhibit 4.2.5-E

Tangible Operating Property



For each category shown in the matrix, the cost basis of property acquired in that period and the cost basis of property of that period's vintage that has been retired are to be reported.

Exhibit 4.2.5-F

Long-Term Debt

	Equipment Obligations	Bonds	Other Long-Term Debt Instruments
Date of issue			
Face value of issue			
Premium (discount) on issue			
Nominal interest rate			
Retired at reporting date			
Retirement required in next year			
Retirement required in second year			
Retirement required in third year			
Retirement required in fourth year			
Retirement required in fifth year			
Retirement required after fifth year			

Note: This information is required for each issue of a long-term debt instrument for which a liability existed at the reporting date.

4.2.6 Derived Ratios

The previous sections have indicated the basic data elements that need to be collected. It is contemplated that these elements would be input to a centralized computer system that would manipulate the data and produce an extensive series of reports for various users. Exhibit 4.2.6-A presents a list of some of the more important ratios that can be developed from the data elements input to such a system. The list is not intended to be exhaustive, but is designed to give an idea of the analytical potential of the proposed reporting system.

Exhibit 4.2.6-A

Derived Ratios

Revenue Analysis

1. Percentage distribution of revenue by source of funds.

2. Percentage distribution of transportation revenue by reported classifications.

3. Percentage distribution of passenger movement revenue by reported classifications.

4. Analysis of regular passenger revenue -

   a. Regular passenger revenue per regular passenger
   b. Regular passenger revenue per regular passenger-mile
   c. Regular passenger revenue per regular passenger seat-mile
   d. Regular passenger revenue per regular passenger seat
   e. Regular passenger revenue per regular revenue vehicle-mile

5. Analysis of charter passenger revenue -

   a. Charter passenger revenue per charter passenger
   b. Charter passenger revenue per charter passenger-mile
   c. Charter passenger revenue per charter seat-mile
   d. Charter passenger revenue per charter seat
   e. Charter passenger revenue per charter revenue vehicle-mile

6. Analysis of total passenger movement revenue-

   a. Passenger movement revenue per revenue vehicle
   b. Passenger movement revenue per employee
   c. Passenger movement revenue per man-hour

Cost Analysis

1. Percentage distribution of costs by capital classifications

2. Percentage distribution of costs by activity

3. Percentage distribution of costs by natural expense classifications.

4. Percentage distribution of labor costs by occupation classification

Exhibit 4.2.6-A

Derived Ratios - Continued

5. Analysis of costs in relation to revenue

   a. Total cost/total revenue from all sources
   b. Operating and maintenance cost/transportation revenue
   c. Operating and maintenance cost/passenger movement revenue

6. Analysis of passenger revenue equipment operating and maintenance (O & M) costs.

   a. O & M costs per passenger-mile
   b. O & M costs per seat
   c. O & M costs per seat-mile
   d. O & M costs per revenue vehicle
   e. O & M costs per revenue vehicle-mile
   f. O & M costs per O & M manhour
   g. O & M costs per O & M employee

7. Analysis of passenger revenue equipment Operating costs

   a. Operating cost per passenger mile
   b. Operating cost per seat
   c. Operating cost per seat-mile
   d. Operating cost per revenue vehicle
   e. Operating cost per revenue vehicle-mile
   f. Operating cost per platform hour
   g. Operating cost per revenue vehicle operating employee man-hour
   h. Operating cost per revenue vehicle operating employee

8. Analysis of passenger revenue equipment maintenance costs

   a. Maintenance cost per passenger-mile
   b. Maintenance cost per seat
   c. Maintenance cost per seat-mile
   d. Maintenance cost per revenue vehicle
   e. Maintenance cost per revenue vehicle-mile
   f. Maintenance cost per platform hour
   g. Maintenance cost per vehicle maintenance employee man-hour
   h. Maintenance cost per vehicle maintenance employee

9. Note: Similar analyses, as in 6, 7, and 8, can be made of all other capital classifications

10. Analysis of Payroll

   k. Revenue vehicle operators wage payments per

      1. platform hour
      2. operating employee man-hour
      3. revenue vehicle mile
      4. operating employee

Exhibit 4.2.6-A

Derived Ratios - Continued

b. Revenue vehicle maintenance wage payments per

1. maintenance employee man-hour
2. maintenance employee
3. revenue vehicle mile

c. Non-O & M wages and salary payments per

1. non-O & M man-hour
2. non-O & M employee

Resource Utilization Analysis

1. Employment of labor

a. Percentage distribution of total man-hours by reported classifications
b. Maintenance man-hours/operator man-hours
c. Non-O & M man-hours/operator man-hours

2. Labor-capital ratios

a. Total employees per revenue vehicle
b. Operator employees per revenue vehicle
c. Total man-hours per platform hour
d. Operator man-hours per platform hour
e. Maintenance man-hours per revenue vehicle
f. Maintenance man-hours per revenue vehicle-mile

3. Vehicle utilization

a. Distribution of revenue vehicle miles per vehicle
1. per year express local
2. per day express local
3. per period in the day express local

b. Percentage distribution of vehicles by age

c. Percentage distribution of revenue vehicles

1. by period in the day express local
2. in operation or maintenance and reserve

Exhibit 4.2.6-A

Derived Ratios - Continued

d. Percentage distribution of platform hours

1. Running time
2. Deadhead
3. Layover

Passenger Density Analysis

1. Percentage distribution of regular passengers by period in the day, by express and local service

2. Percentage distribution of regular passenger-miles by period in the day, by express and local service

3. Regular passengers per

a. Transit way mile
b. Line-mile
c. Seat
d. Seat-mile
e. Revenue vehicle
f. Revenue vehicle-mile
g. Platform hour
h. Employee
i. Operating employee

Service Level Analysis

1. Frequency and speed of service (by period in the day and by express and local service)

a. Average vehicle trip speed (input)
b. Average vehicle trip length (or average length of line) (input)
c. Average number of vehicles per line
d. Headway (minutes between vehicles)
e. Vehicles per line-mile

2. Accessibility

a. Transit way miles and line-miles per square mile of urbanized area.
b. Stops per

1. Transit way mile
2. Line-mile

Exhibit 4.2.6-A

Derived Ratios - Continued

c. Percentage distribution of population characteristics within 1/8 mi, 1/4 mi, and 1/2 mi of stops

d. Percentage distribution of land use characteristics within 1/8 mi, 1/4 mi, and 1/2 mi of stops

e. Percentage distribution of employment characteristics within 1/8 mi, 1/4 mi, and 1/2 mi of stops

f. Percent of stops that are transfer stops

g. Transfer stops per line-mile

3. Capacity offered (by period in the day and by express and local service)

a. Seats per

1. running time hour
2. platform hour

b. Seats plus standing per

1. running time hour
2. platform hour

c. Seat-miles per

1. running time hour
2. platform hour

d. Seat-miles/passenger-mile

4. Comfort

a. Percent of vehicles that

1. are air conditioned
2. have padded seats

b. Percent of stops that are unsheltered

5. Employees producing transit service

a. Passengers per regular driver by period of day, express and local
b. Passengers per extra driver by period of day, express and local
c. Passengers per supervisor by period of day
d. Passengers per sales personnel by period of day

CHAPTER 5
TASK II PLANS

Chapter 5

TASK II PLANS

The contract for the FARE Project defines TASK II as a survey of transit industry reporting capability. We will follow a phased approach in conducting this survey. First, a reporting capability questionnaire was mailed to a large segment of the urban public transportation industry. Second, a detailed field study will be conducted at a smaller number of transit locations to obtain in-depth analyses of reporting capabilities.

5.1 SURVEY QUESTIONNAIRE

The Transit Industry Reporting Capability Survey Questionnaire was developed concurrently with the work performed in Task I to shorten overall industry response time. Its primary purpose is to provide broad industry coverage in measuring the industry's present reporting capability. In a later task, the information requirements identified in Task I must be balanced with the reporting capability identified in Task II to develop a practical reporting system which can be implemented in the foreseeable future.

The questionnaire is divided into multiple sections by type of operation to simplify the response requirement for single-mode operators. The questionnaire has been approved by the Industry Control Board, appropriate officials in the

Department of Transportation, and the Clearance Officer in the Office of Management and Budget. A copy of this questionnaire and a copy of the special version for commuter rail operators is presented under separate cover. The questionnaire has been distributed to potential respondents according to the following sampling plan:

Group Identification	No. of Transit Systems in Group	No. of Transit Systems Circularized
A. Commuter railroads.	17	17
B. Transit systems providing rail rapid, streetcar, or trackless trolley service in addition to or in lieu of bus service.	16	16
C. Major bus-only transit systems serving urban areas of 250,000 or more people.	66	66
D. Minor bus-only transit systems serving urban areas of 250,000 or more people and all bus-only systems serving urban areas of less than 250,000 people.	468	91

The small number of potential respondents in groups A and B above indicates that their responses can be processed manually. Their responses, except for the part of the group B responses pertaining to bus operations, will be recorded on columnar working paper to permit easy tabulation of the number of systems that can supply a particular type of data.

The large number of potential respondents in groups B, C, and D, will be processed by a computer to provide quick analyses. These analyses are intended to help define the stratification of the reporting structure and the reporting capabilities for each group.

The questionnaire responses are expected to disclose a significant disparity of reporting capability between individual transit systems. If all transit systems were assigned to a single reporting stratum, the reported data would be either unreliable and inconsistent or defined at such a high level of generalization as to be of little utility. The analysis of the questionnaire responses will be directed toward detecting differences in reporting capability within strata and between strata.

For the purpose of illustrating the analyses that will be performed, assume that for one analysis the respondents will be stratified on the basis of the number of buses they operate. Stratum A covers operators of 400 buses or more, B covers 75 through 399, and C covers less than 75 buses. For each stratum, a report will be printed showing the reporting capability for each question and the identity of the transit systems in the stratum. This information will identify reporting capability differences within each stratum.

STRATUM A

Question Identification	Number of Responses		% of Stratum	
	Yes	No	Yes	No
I.A.1. XXXXXXXXX	15	10	60	40
I.A.2. XXXXXXXXX	19	6	76	24
VIII.9. XXXXXXXXX	3	22	12	88

Transit systems in stratum A:

NYCTA
CTA

Atlanta Transit

A second report will be generated showing for each question the reporting capability of each stratum. This information will identify reporting capability differences between the strata.

QUESTION I.A.1.

Stratum ID	Number of Responses		% of Stratum	
	Yes	No	Yes	No
A	15	10	60	40
B	16	24	40	60
C	20	60	25	75
All strata	51	94	35	65

The information from these two reports will help us define the optimum reporting stratification for improving the reliability and consistency in the financial and operating data reported, a major objective of the project.

5.2 FIELD STUDIES

The field studies are to be conducted after the responses to the mailed questionnaires have been processed and analyzed. The field studies will include:

- Issues that should have gone into the mailed questionnaire if its development could have been postponed until completion of Task I.
- Points that have been raised through the analysis of the responses to the mailed questionnaire.

In order to test out the tentative work plan for these field studies, two pilot field studies were performed in June. One study was conducted at the Dallas Transit System (a major bus-only transit system) and one was conducted at the Cleveland Transit System (a combination bus and rail transit system).

Based on the pilot study results, the work plan for the field studies calls for the following interviews:

- A briefing on the FARE Project and the field study with the top level executive group of the transit system.
- An overview of the transit system organization and operations with the assistant general manager - administration.

- Separate reviews of the transportation, maintenance, scheduling, marketing, and long-range planning functions with the appropriate executives.

- A review of the management information system with the controller, chief accountant, and head of data processing services.

In these reviews we will ask for copies of charts of accounts being used and copies of internal and external reports being generated in order to assemble substantive evidence of reporting capability. We will also go over the questionnaire response submitted to clarify answers and insure that questions were uniformly interpreted by the respondents.

We plan to identify the transit systems at which a field study will be performed after the questionnaire responses have been processed. At this time, it appears that about 30 to 40 transit systems will be asked to participate in the field studies.

APPENDIX A

Appendix A

Relationship of Production System to Resource and Consumption Markets

Note: The diagram of this analytical scheme (page A-5) may be folded out so that it may be viewed while reading the narrative material. The narrative has been developed by following the diagram from right to left.

The market for transit service consists of consumers with certain characteristics, incomes, attitudes with respect to transit, etc. Consumers are willing to use the transit system if it matches their needs for convenience, comfort, timeliness, etc., and if the total cost of using the system is less than that of other alternatives such as automobiles, taxis, and walking.

The producer of the transit services must forecast (in the normative sense) demand and design a transit system to meet the demand at minimum resource cost. The producer enters the resource (labor and capital) markets with certain requirements as dictated by the transit system design. The resource markets respond by offering their goods and services at various prices.

Usually the interaction between the producer and the resource suppliers yields a compromise with respect to the prices and quality of the resources. The producer must therefore modify

the production system design to accommodate the actual availability and cost of resources. Thus, the quality and price (fare) of the service actually rendered to the consumer market may differ from the original plan based on the forecast demand. Consumers will react to this change and adjust their attitudes and consumption accordingly.

Thus, there is a continuous interaction going on between the producer and consumers on the one hand and the producer and resource suppliers on the other. The transit system actually operated and the service actually rendered is a complex compromise with respect to all of the interest groups involved.

There are three other aspects of the diagram that are worth noting. First, the overall economic system is a constrained system, i.e., there are institutional and technical constraints on what can be accomplished at any point in time. For example, the producer may not be able to acquire the resources he needs simply because they are not available, because labor unions may not agree to the working conditions implied by the system, or because the financial capital markets are unfavorable.

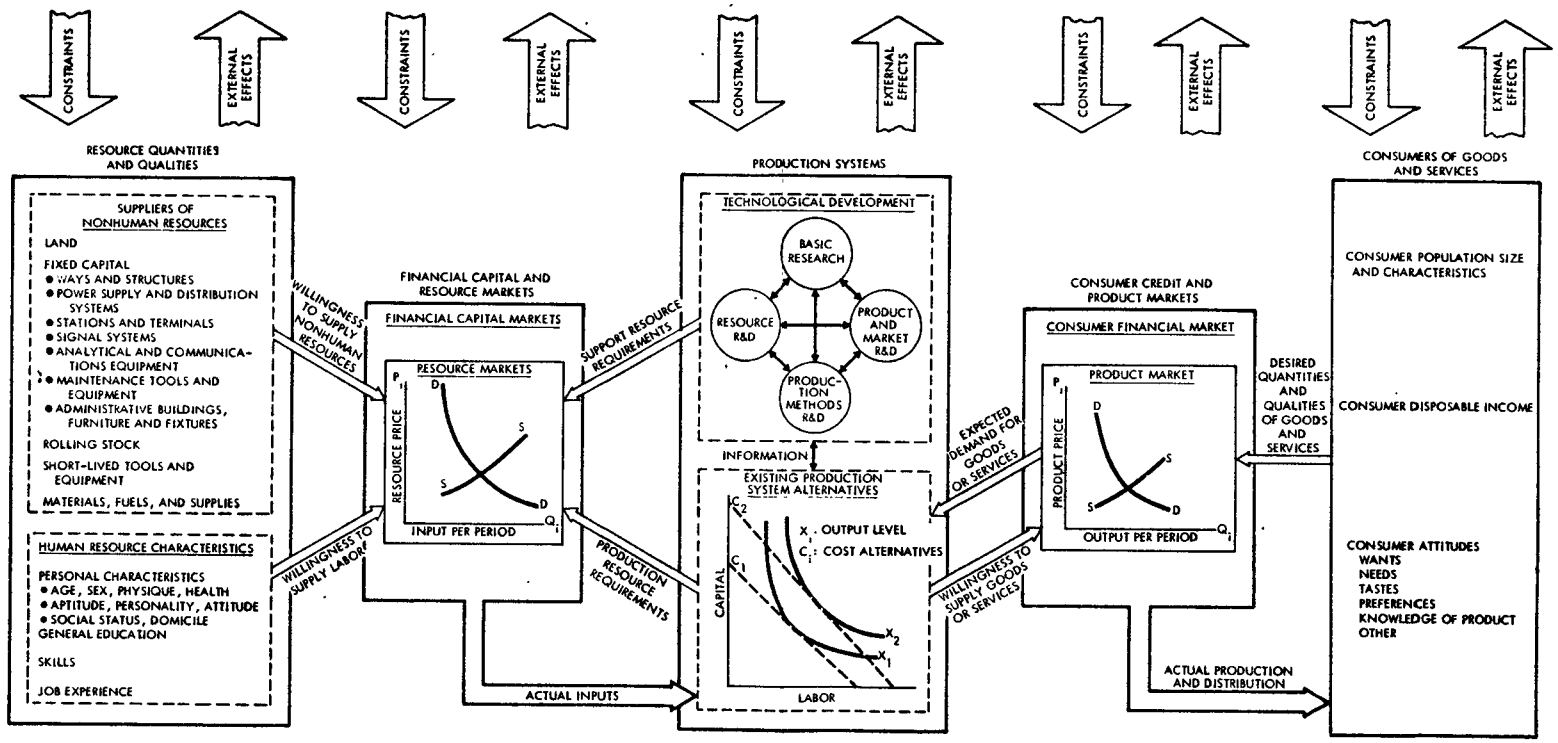
Second, technological development is also an interactive activity. Production methods R & D is stimulated by the problems encountered by existing transit systems and by fundamental scientific discoveries which may bear on transit system technology. Moreover, resource and consumer market R & D can have important impact on production methods R & D.

Finally, every aspect of the system has implications regarding external effects, i.e., social costs imposed by the system that are not absorbed by the system. The classic example is air pollution imposed by the system vehicles. Actions to mitigate air pollution can be taken at the resource supplier level, at the operating transit system level, or at the consumer level. External effects must be examined whenever major changes in the transit system design are contemplated.

The general structure of information requirements for the urban mass transit industry described in Exhibit 4.1-A is closely related to the foregoing generalized analytical scheme. The first major category encompasses information about existing transit system operations and is directly related to the lower half of the "production systems" box, the "financial capital and resource markets" box, and the "consumer financial market" box. The second major category encompasses information about the potential demand for transit services, including transit services not now being tendered by any existing transit system. This category is directly related to the "consumers of goods and services" box and the "consumer financial market" box. The third major category encompasses information about the potential supply of resources for producing transit services, including resources available to but not being used by an existing transit system. This category is directly related to the "resource quantities and qualities" box and the "financial capital and resource markets" box. The last major category encompasses information

about the development of technology for producing transit services and is directly related to the upper half of the "production systems" box and the "financial capital and resource markets" box.

RELATIONSHIP OF PRODUCTION SYSTEM TO RESOURCE AND CONSUMPTION MARKETS



APPENDIX B

Appendix B

Transit System Capital Classifications

- Transit Way and Transit Way Structures and Equipment

  This category includes all of the physical facilities of the below listed types that are located along the routes where transit services are offered.

  - land
  - roadway structures i.e., tunnels, bridges, elevation structures, etc.
  - guideways, i.e., track and roadbed
  - stations, terminals, shelters, and other buildings
  - power distribution equipment
  - network control equipment associated directly with the transit way
  - furniture and fixtures
  - vehicles and equipment used predominantly for maintaining transit way and transit way structures and equipment

- Support Facilities - Power Plant

  This category includes all of the physical facilities of the below listed types that are used in the generation of power.

  - land
  - buildings
  - furniture and fixtures
  - power generation equipment

- vehicles and equipment used predominantly for maintaining the power plant

- Support Facilities - Network Control System

  This category includes all of the physical facilities of the below listed types that are used in network control except for those facilities associated directly with the transit way.

  - land
  - buildings
  - furniture and fixtures
  - network control equipment
  - vehicles and equipment used predominantly for maintaining and operating the network control system

- Support Facilities - Shops and Garages

  This category includes all of the physical facilities of the below listed types that are used for servicing and maintaining revenue and nonrevenue vehicles.

  - land
  - buildings
  - furniture and fixtures
  - machinery and tools
  - vehicles and equipment used predominantly for maintaining shops and garages

- Support Facilities - General

  This category includes all of the physical facilities of the below listed types that are used in the general administration of transit system operations.

  - land
  - buildings
  - furniture and fixtures
  - general office equipment
  - computation equipment
  - vehicles and equipment used predominantly in the maintenance of administrative office buildings and the performance of general administrative functions.

- Revenue Equipment - Passenger

  This category includes all rolling stock used exclusively or predominantly for providing passenger transit services.

- Revenue Equipment - Freight

  This category includes all rolling stock used exclusively or predominantly for providing freight transit services.