

TRANSPORTATION INFORMATION

**A Report to the Committee on Appropriations,
U.S. House of Representatives,
from the Secretary of Transportation**

**U.S. Department of Transportatio
May 1969**

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THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

May 29, 1969

Honorable Edward P. Boland
Chairman, Subcommittee on
Department of Transportation Appropriations
Committee on Appropriations
House of Representatives
Washington, D. C. 20515

Dear Mr. Boland:

Pursuant to the request from the House Committee on
Appropriations, contained in House Report 1596,
June 27, 1968, I am pleased to transmit the report
of the Department on "Transportation Information."

Sincerely,

A handwritten signature in black ink, appearing to read "Jay Byrd". The signature is fluid and cursive, with a large initial "J" and a long, sweeping underline.

Enclosure

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SUMMARY

Good decisions depend on careful analysis of pertinent information, yet decisions involving billions of dollars in transportation expenditures are frequently based on inadequate information. Without adequate information, the chances of costly errors in these decisions are greatly increased.

Many of our present transportation problems are in part due to lack of information in previous years. Industry and government at national, state and local levels have not been able to see the probable future consequences of many of their decisions, often because critical information was not available to them.

Present transportation information is characterized by significant gaps, fragmentation and incompatibilities. It is not possible to examine the transportation system as a whole or in terms of its related parts. The information problem is so great that considerable efforts will be required to bring about needed improvements in transportation information.

This report presents an initial five-year program for meeting the critical transportation information needs of industry and government at national, state and local levels.

The program provides for information on the flows of persons and goods, information on the activities (population and industry) that generate the flows, and information on the channels (transportation facilities and terminals) that carry the flows. This information would cover all modes of transportation - highway, rail, air, water and pipeline; and all geographic levels - urban, interurban (including regional-corridor), and international. Accident experience information is provided for under information on channels (transportation facilities and terminals), but transportation safety information is not treated comprehensively. It merits special attention and will be the subject of a separate study to be initiated in the near future.

The program presented in this report provides for use of existing transportation information programs to the greatest practicable extent. The urban portion of the program provides for research and development of the best methods of collecting transportation information so that maximum benefit can be obtained from current expenditures on transportation information under existing programs. The interurban and international portions of the program provide for the restructuring of existing transportation information programs

to render their products more compatible and more widely useable, as well as the development of critical new transportation information that is presently not available.

The program also provides a framework for consolidation and reallocation of transportation information functions both within and outside the Department. Continuing efforts throughout the period of development of the program will be directed to achieving worthwhile consolidations and reallocations that provide substantial improvements in the quality and usefulness of the transportation information under existing programs as well as reductions in costs. This does not imply a centralized data bank to serve all needs. Information is produced and needed at hundreds of locations throughout the country. All costs and benefits must be carefully considered in any proposals for the re-structuring of existing programs.

Success of the program will depend in large measure on participation and co-operation of industry and government organizations at national, state and local levels - made possible through the strong leadership of the Department of Transportation. The Department's leadership must be directed to the coalescence of a wide variety of mutual

interests through careful co-ordination. The great benefits of this program to industry and government will not be fully realized otherwise. Much of this co-ordination will be directed to the re-structuring of existing transportation information programs to serve wider groups of users with better information.

The program is estimated to cost \$35.6 million over a five-year period (from fiscal year 1970 through fiscal year 1974) for establishment of component information systems and related research and development; and \$6.5 million annually, when all component systems are operating on a continuing basis. Future year funding is subject to the determination of priorities in future years as well as the availability of funds to the Department.

Taking into account expenditures proposed under this program as well as probable future expenditures under existing programs, resources for transportation information over the next five years would be divided approximately as follows:

urban transportation	75%
interurban transportation	19%
international transportation	4%
other	<u>2%</u>
total	100%

The magnitude of expenditures involved in many decisions on transportation items is so great that even relatively small savings - resulting from the information program - will be large in absolute terms. These savings will pay for the cost of the information program many times over.

Improvements in transportation information can contribute significantly to improvements in the Nation's transportation system. The information program presented in this report represents a start towards the improvement of critical transportation information. The Department plans to continue to develop further transportation information programs that will assist government and industry in improving the transportation system.

I. INTRODUCTION

A. PURPOSE OF REPORT

The purpose of this report is to respond to a request from the House Committee on Appropriations for a report outlining in specific terms the Department's future plans in the field of transportation information, including the estimated funding and manpower required to carry out these plans.

The Committee's request is contained in their report on the Department of Transportation Appropriation Bill, 1969, in which they comment on the Department's transportation information planning activities as follows:

"TRANSPORTATION INFORMATION PLANNING
No new funds are requested for Transportation Information Planning in Fiscal 1969. The program has progressed slowly and is to be carried on with unobligated funds from fiscal year 1968. Last year, the Committee called on the Department to 'develop a more coherent and effective assignment of the responsibilities within the Office of the Secretary and among the administrations for Transportation Information and statistics functions'. There is no evidence that this has been done. The statutory basis for this program is broad in scope, relating to a wide range of statistical and other data collection activities concerning all aspects of transportation. The Committee requests that the Department present a report by January 1, 1969, outlining in specific terms what its future plans are in this field including the estimated funding and manpower required to carry them out." ^{1/}

1/ House Report 1596, H. R. Committee on Appropriations, 90th Congress, 2nd Session, Department of Transportation Bill 1969, June 27, 1968. (underlining added).

B. SCOPE OF REPORT

It is clear from numerous previous examinations of the transportation information problem, including examinations by Congressional Committees, that the deficiencies in existing transportation information are so great and that the problems are of such complexity and magnitude, that it will require a considerable expenditure of effort over a number of years to bring about needed improvements. ^{2/}

The preparation of plans to cover all aspects of this large and complex information problem will require a great deal more time than was available to the Department for the preparation of this report. The Department intends to continue to work on the total transportation information problem so that over a longer term all aspects of the problem will be studied. As studies are completed the Department will prepare transportation information plans and programs.

Meanwhile the Department has prepared this report on an initial transportation information program - one that is judged to be most useful at this time. This initial

^{2/} For excerpts from previous examinations and assessments of the transportation information problem refer to Appendix A "Deficiencies in Existing Transportation Information", p. 131.

transportation information program provides for the critical information needs of government and industry for effective transportation analysis, forecasting, planning and policy making.

While most of this report is taken up with a description of the Department's initial transportation information program, the last section of the report is devoted to a brief exploration of possible future developments in transportation information.

C. ORGANIZATION OF REPORT

The body of the report is organized as follows:

- . Section II examines transportation information needs, particularly as related to the transportation analysis, forecasting, planning and policy making needs of government and industry
- . Section III describes the immediate phase of the Department's initial transportation information program
- . Section IV outlines the full initial transportation information program on a five-year completion basis
- . Section V discusses implementation of the initial transportation information program
- . Section VI contains brief statements on the benefits of the initial transportation information program and on possible future developments in transportation information.

The report also contains appendices as follows:

- . deficiencies in existing transportation information - Appendix A
- . survey of existing transportation information - Appendix B
- . responsibilities and organization for transportation information activities - Appendix C
- . structure for the Department's initial transportation information program - Appendix D
- . descriptions of projects in the Department's initial transportation information program - Appendix E
- . problems in transportation data collection and processing - Appendix F
- . continuing data for urban transportation planning - Appendix G.

II. CRITICAL TRANSPORTATION INFORMATION NEEDS

One of the major problems that the Department has had to face in preparing this report has been the determination of the critical transportation information needs of industry and government. What the Nation receives for the \$170 billion it presently spends each year on the transportation of people and goods (20% of the gross national product) ^{1/} depends in large measure on the quality of decisions made by a wide variety of government and industry organizations including the following:

- . Federal, State and local governmental transportation planning, policy-making, regulatory and operating agencies
- . railroad companies; trucking companies; bus lines; air lines; water carriers; pipeline companies; mass transit operators; automobile, truck, bus, aircraft and other transportation equipment manufacturers; shippers; industry associations; travel organizations; and others.

Frequently the information base for making rational decisions involving large transportation expenditures is inadequate. Transportation information which supports analysis, forecasting, and planning for decision-making

^{1/} Transportation Association of America, Transportation Facts and Trends, Washington, D. C., April 1968.

that involves large transportation expenditures (or costs), is regarded as critical. It is estimated that it is in this area of transportation information needs, that the greatest overall returns on investments in transportation information can be expected. This is the basis for the following discussion of transportation information needs. ^{2/}

A. USERS OF TRANSPORTATION INFORMATION

Transportation information users and their information requirements for transportation analysis, forecasting, planning and policy-making are considered under four headings:

Department of Transportation

Other Federal Agencies

State and Local Government

Industry and Research Organizations

1. Department of Transportation

The same transportation information can serve several elements in the Department. For example, data on interurban person travel may be used by the Office of the Secretary, the Federal Aviation Administration,

^{2/} Transportation safety information is also critical, but it embraces special problems of such complexity that it warrants separate attention under an additional information program. This is proposed under Section VI of the report "Benefits and Future Developments" p.125.

the Federal Highway Administration, and the Federal Rail Administration. But for a more specific understanding of needs, the requirements of individual elements of the Department are considered separately.

a. Office of the Secretary

The Office of the Secretary is concerned with comprehensive and intermodal treatment of transport policy issues. The analysis of interurban person travel demand, interurban freight demand and urban transportation demand are considered below, as illustrative of the types of problems faced by the Office of the Secretary and the consequent data requirements. The Office of the Secretary has a number of additional important information requirements which are not covered by the three examples below, but which have been taken into account in the preparation of the Department's initial transportation information plans.

Interurban Person Travel Demand: A detailed understanding of passenger demand behavior is necessary to develop and evaluate Federal policy

in regard to interurban highway investment, air congestion, air regulation (fare structures and routing), airport investment, general aviation, and such special matters as the SST, V/STOL and new high speed ground transportation.

For effective analysis of passenger choices among modes or modal combinations (in order to provide a rational basis for policy decisions regarding regulation or public investment), information is needed on the origins and destinations of interurban trips by all modes of transportation, including travel time and cost for the complete door-to-door trips. This information is needed for several points in time (time-series data), to permit the analysis of changes over time and to provide a firm forecasting base.

Interurban Freight Demand: Analyses of interurban freight demand are needed to develop and evaluate policy on highway investment; rail, truck and air-cargo rate changes; airport and freight terminal requirements; the effects of technological development

such as containerization; and mergers in railways, trucking and airlines. Studies of the total demand and the elasticities of demand for freight transportation, and studies of the impact of transportation activity on regional economic development, are important; also studies involving computer "simulation" of flows in transportation networks.

Data requirements include time-series, origin-destination commodity flow data containing shipment characteristics such as size and weight, transit time, loss and damage, and rates charged; also data describing the transportation networks on a link by link basis.

Urban Transportation Demand: Transportation problems of crisis proportions exist in many cities. Although valuable pioneering work has been accomplished over the past 15 years in the field of urban transportation demand, (including "simulation" of flows in transportation networks, and quantification of land use-travel interrelationships), substantial additional work remains to be done to provide a sound basis for

effective urban transportation analysis, planning and policy-making at local, state and national levels. ^{3/}

For the necessary studies, compatible data are required from a cross-section of metropolitan areas on a time-series basis for: (i) origins and destinations of trips and shipments by all modes of transportation with door-to-door times and costs, and descriptions of the land uses at origins and destinations; (ii) land use locations, distributions and densities; and (iii) the networks of transportation facilities on a basis that will facilitate multi-modal and intermodal "simulations" of network flows.

b. Federal Aviation Administration

Airport congestion, adequacy of the air traffic control system, air route capacity, air travel safety, aircraft noise, ground access to airports,

^{3/} Previous work has been accomplished under urban transportation planning programs administered by the Bureau of Public Roads through State governments. The Bureau of Public Roads was made a part of the Department's Federal Highway Administration when the Department was formed in 1967. Urban transportation planning programs are discussed at several places later in the report.

the SST and V/STOL are major concerns of the Federal Aviation Administration.

In order to forecast and plan for future aviation needs, origin-destination data are required for all air travel, with information on passenger characteristics and the door-to-door trip. ^{4/} Origin-destination commodity data are also required - for air cargo. Comparable data on interurban travel and freight by other modes would be helpful; also data on the activities that generate air travel and freight, and data on noise sensitivities in the vicinity of airports - in terms of land uses and types of construction.

c. The Federal Highway Administration

As the National system of Interstate and Defense Highways nears completion the Federal Highway

^{4/} The Civil Aeronautics Board collects valuable data on terminal-to-terminal passenger travel by scheduled air carriers, but this does not include information on passenger characteristics or travel to and from the airport. Nor does it cover travel by air taxi or general aviation.

The Federal Aviation Administration collects valuable data on the characteristics of airports, air routes, and air traffic.

Administration has begun to identify the most pressing areas of demand for future highway investment. Policy proposals are being developed on:

- . optimum geographic concentration of future investments - major urban areas, smaller urban places or interurban corridors
- . most efficient class of future investment - new highway facilities, reconstruction of existing sections, improving safety or improving aesthetic qualities
- . proper magnitude of future investment, and extent of Federal participation
- . evaluations of the relative urgency of each of a large number of proposed projects - in order that investments having highest payoff can be identified for immediate attention.

Data are needed to support the development of these policy proposals. Also for individual highway facilities proposed for improvement, to properly locate the highway and to design and construct the most effective and efficient facility, data are needed on the geographic surroundings, the current and prospective neighboring land uses, and numbers, distribution, size and weight of anticipated travel.

Many of the required data are already being obtained through State departments of highways and transportation (for example, data on highway network characteristics and volumes), but additional data are needed such as data on urban highway freight flows and selected data on flows and transportation facilities of other modes.

d. Federal Rail Administration

Future rail passenger and freight potentials, equipment utilization, freight car shortages, improvements in rail technology, railroad safety, rail mergers and rate changes, are major concerns of the Federal Railroad Administration.

Needed data include: origin-destination data on commodity flows by rail, with hazardous materials identified; origin-destination data on interurban travel by rail in densely-developed regional corridors; and rail transportation network data. Also similar data for other modes of transportation would be useful.

e. Urban Mass Transportation Administration

The Urban Mass Transportation Administration's

present programs provide for loans and grants for mass transportation demonstrations, planning and research.

Financial and related data are required to determine the relative need of urban areas for mass transportation and their ability to pay for it. Data are required on the transit industry such as financial, operations and equipment data of transit companies and other operators. Data are required on urban transportation for mode choice analysis (the 1970 Census journey to work data will be useful; additionally some time-series origin-destination data with detailed trip and traveler characteristics are needed). Also data are required on desired system performance requirements as a basis for specifying research and development needs.

2. Other Federal Agencies

a. Civil Aeronautics Board

The Civil Aeronautics Board needs data in analyses of operating rights, fares, new and expanded air carrier service, market potential of new types of service (for example V/STOL), and the future role

of air cargo service; also the Board needs data for its promotional responsibilities. The Board's air passenger sample survey program provides valuable terminal-to-terminal, origin-destination data on passenger travel by scheduled air carriers.

Needed data include: (i) supplementary air passenger origin-destination data on passenger characteristics (such as income level and trip purpose) and on travel to and from the airport sufficient to describe door-to-door trips with travel times and costs; (ii) origin-destination data on travel by air taxi and general aviation; and (iii) origin-destination commodity data on air freight, including revenue and volume. Also of value would be travel origin-destination data of traveler characteristics for all modes of transportation in densely-developed regional corridor areas; and commodity origin-destination data for freight transported by other modes - particularly where air freight may be competitive in the future.

b. Interstate Commerce Commission

The Interstate Commerce Commission has a

need for data to support its regulatory analysis functions which embrace operating rights, mergers, rates, service requirements and abandonments - both intramodally and intermodally - for rail, water, and motor carriers, and oil pipeline companies.

Origin-destination data on the movement of goods and passengers by all modes of transportation would be particularly helpful and would improve the Commission's ability to make meaningful and useful analyses. Comprehensive transportation network data on all modes of transportation, which included information on carrier routes, services and facilities, would also be valuable - it would permit rapid comparison of routes, services and facilities, available by carrier, for specific geographic areas.

c. Corps of Engineers, Department of Defense

The Corps of Engineers in programming improvements in inland waterways, rivers and harbors, prepares analyses and plans to select projects that offer the greatest public benefit. Data on water

transportation flows and facilities are obtained by the Corps of Engineers , but their planning work is severely hampered by the absence of compatible data on other freight modes.

Data are needed on origins and destinations of commodities and on transportation network flows for rail, highway and pipeline modes in a form compatible with the data already collected on water transportation. Also compatible economic and demographic data would be valuable.

d. Other Agencies

Many other Federal agencies would have uses for the transportation information needed by the transportation agencies as discussed above. Among these are:

Department of Agriculture
Office of Business Economics,
Department of Commerce
Bureau of International Commerce,
Department of Commerce
Maritime Administration, Department
of Commerce
Bureau of Mines, Department of Interior
Federal Maritime Commission
Federal Power Commission
General Services Administration
Office of Emergency Preparedness
Post Office Department

3. State and Local Government

a. State Government

An excellent presentation was made recently by State of New York officials on Statewide transportation policy concerns, planning processes, analytic techniques, and consequent transportation data requirements. ^{5/} The New York State program provides a useful illustration for consideration of State transportation information requirements. Other States have developed or are in the process of developing similar programs.

New York State's program of data requirements includes compatible Statewide data for urban and inter-urban transportation across all modes - highway, rail, air, water and pipeline. The program is expected to meet the requirements not only of the State Department of Transportation, but also of other State agencies (such

^{5/} A group of papers on Statewide Transportation Planning was presented by officials of the New York State Department of Transportation at the annual meeting of the National Academy of Sciences - National Research Council's Highway Research Board, in Washington, D. C. in January, 1969. (The Department's Federal Highway Administration has encouraged Statewide highway planning in which the data and techniques characteristic of the urban transportation planning process are being extended to the State level).

as the Public Service Commission), and metropolitan transportation planning agencies and operating authorities.

The data requirements set forth in the program include data on transportation facilities, person travel, goods movement, economic factors, transportation regulations and policies, and activities.

The data requirements may be summarized as follows:

- . Data on the networks of transportation facilities that are compatible across modes so that interchanges between modes can be "simulated" by computer; specifically, data on the travelled way, the conveyance, the level of service and terminal facilities
- . Origin-destination data on door-to-door person travel by automobile, bus, rail and air including information on trip characteristics and traveler socio-economic characteristics, for through, interstate and intrastate travel on weekdays, weekends and holidays; also origin-destination data on interstate, intrastate and through commodity movements by highway, rail, air, water and pipeline
- . Data on transportation investments, employment and rates of return to determine the role of transportation in the economy of the State
- . Data on existing regulatory agencies, policies and regulations, and on the formulation of policies and implementation of regulations

- . Data on the location and intensity of activities (population, employment, land use) and potential sites for future activities.

It is expected that a great deal of the urban transportation information that has already been collected, can be utilized for Statewide purposes since much of this has been obtained on a consistent basis. ^{6/} Also it is expected that by careful programming and coordination of the data collection efforts for urban and Statewide (interurban) transportation planning purposes, an inter-relatable set of comprehensive transportation data will be soon realized. ^{7/}

The example provided by New York State (and other States that are developing similar programs) has great value for State and local government, the Federal government and the transportation industry.

^{6/} Since 1960 urban transportation planning studies in the New York upstate area have been conducted with the support of the Bureau of Public Roads (now part of the Federal Highway Administration), under the direction of a single agency, initially known as the Upstate New York Transportation Studies, and later formally made a part of the New York State Department of Public Works (which has since been largely merged into the State's new Department of Transportation).

^{7/} Additionally, in New York State much significant work has been done with the support of the Federal Highway Administration's National Highway Safety Bureau, in improving data for analyses of highway and motor vehicle safety.

It provides an opportunity for case studies of a number of aspects of Federal-State-local participation in transportation information operations - for example: the appropriate levels of government for conduct of various data collection operations; the respective transportation information roles of Federal, State and local government and private industry; and alternative plans for developing and maintaining compatible national, State and local transportation information.

The Department is most interested in pursuing these matters and every advantage will be taken of opportunities such as this for effecting improved co-ordination of information functions between the Department, and State and local government.

b. Local Government

As noted before, transportation problems of crisis proportions exist in many urban areas - particularly in the daily inefficiencies in commuting between home and work. Congested highways and inadequate public transportation cost the Nation millions

of dollars daily. Although, as previously noted, much valuable work has been done over the past 15 years in the development of techniques for urban transportation analysis and planning, every effort must be made to improve upon this work.

Comprehensive urban transportation planning processes have been established in 200 or so metropolitan areas, ^{8/} and to provide a factual basis for these processes comprehensive data have been obtained on travel, transportation facilities and land uses in each metropolitan area - more specifically: origin-destination data on door-to-door person travel by all modes with information on the characteristics of the trips and the travelers; origin-destination data on truck trips; data on the locations and intensities of land use, population and employment;

^{8/} The elements of the comprehensive urban transportation planning process are outlined in Federal Highway Administration Policy and Procedure Memorandum 50-9 which was issued pursuant to the authority contained in Section 134, Title 23, US Code. The urban transportation planning program is administered by the Federal Highway Administration through State governments. In some metropolitan areas the transportation planning program is partly supported by funds from the U. S. Department of Housing and Urban Development under the authority provided in Section 701 of the Housing Act.

and data on the transportation networks for computer "simulation" of network flows. ^{9/}

Although general standards have been adhered to, usually the data from one metropolitan area can not be matched easily with data from another area. The data have been collected at different times, on a "one-shot" basis, and typically the process has been costly and time-consuming. These data practices undoubtedly were the best that could be followed at the time, but improvements can and should be made in the near future.

A start already has been made to place the existing urban transportation planning processes (in the 200 or so metropolitan areas) on a continuing basis. Continuing urban transportation planning requires continuing data on travel, goods movement, transportation facilities and land use activities. Systematic improvement of these continuing data is

^{9/} For a detailed description and evaluation of these data, refer to Appendix B, p. 138.

feasible if appropriate action is taken now. An important first step would be to develop, test and promulgate the best methods for collection of each type of data. A research and development program aimed at quickly establishing "best" urban transportation data methods should be initiated now so that advantage can be taken of the results at the earliest date possible. ^{10/}

Besides this critical transportation information need for improved data collection methods for continuing data operations, the urban transportation planning agencies have needs for data for their areas, which are difficult or impossible to obtain except at a state or national level (for example, interurban rail freight flow data).

Additionally, there are the needs of transportation regulatory and operating authorities. An important example is the need of port authorities. They have a special interest in data on the true origin of

^{10/} For further details on continuing data operations in urban transportation planning refer to Appendix G, p. 233.

exports and the ultimate destination of imports handled through their port as a basis for determining solicitation areas. 11/

4. INDUSTRY AND RESEARCH ORGANIZATIONS

Many of the most important uses of transportation information are made by organizations outside of government, such as carriers, shippers, equipment manufacturers, travel organizations, industry associations, universities, and other research organizations. These organizations use transportation information for analysis, forecasting, and planning that provides a basis for making decisions on large expenditures that significantly affect the Nation's transportation system. Additionally, these organizations provide much of the source data for origin-destination information on commodity flows and travel, and equipment utilization.

Carriers, shippers and equipment manufacturers are increasingly making use of advanced methods of analysis for corporate planning and policy formulation.

11/ The American Association of Port Authorities has approached the Department of Transportation on this matter and it is presently being studied.

They have increasing needs for more and better data on the "environment" in which they operate and they depend upon the Federal government for the supply of such information. Also they need transportation and related forecasts that are developed by government agencies and thus they have an interest in seeing that government agencies have adequate data to prepare reliable forecasts.

a. Carriers

Individual carriers need data for analyses in areas such as the following:

- . estimating their own share of the present and future transportation market with reference to competitors in their own mode and other modes - market research, market development studies, revenue and traffic forecasts, profit contribution studies, cost studies, studies of new industrial developments and distributive processes - new factories, warehouses and other production-storage facilities
- . planning for complementary service in conjunction with other modes including provision of through routes and joint rates - for example, for multimode movements of containerized freight; for air-truck freight handling
- . planning the orderly growth of their system to efficiently meet requirements and to minimize over-capacity or under-capacity

in facilities and equipment - system planning studies, capital investment planning studies, purchases of new equipment, construction of new facilities and improvements - for example, new roadways and terminals; new **vehicles** and aircraft; electrification and so on

- . planning operations to make maximum use of manpower and physical facilities - revising schedules, re-assigning equipment, scheduling maintenance, etc.
- . proceedings before regulatory agencies such as the Interstate Commerce Commission or the Civil Aeronautics Board - suspensions of tariffs; investigations of rates, divisions and practices; operating rights; acquisitions, consolidations and mergers; routes; sufficiency of existing transportation facilities, etc.

For these analyses, carriers need the following types of data: origin-destination data on person travel, compatible for all modes, with information on trip and traveler characteristics; origin-destination data on commodity flows, compatible for all modes with information on distance, freight revenue, weight, density, time-in-transit, type of equipment used, etc.; demographic and economic data suitable for forecasting growth of demand for transportation services; and data on schedules, operating rights and equipment utilization.

b. Shippers

Individual shippers need data for analyses in areas such as the following:

- . evaluating alternative locations for plants, warehouses, distribution centers and stores on the basis of the transportation costs and services to and from each location - determining traffic flow through intermediate manufacturers, warehousing and distribution cycles, for particular products.
- . identification of marketing areas for a particular product or group of products, estimating the flow of goods into the marketing areas from competitive sources, identification of the locations of firms producing similar or competitive products
- . determining the transportation costs and availability of raw materials required for a new product
- . comparison of loss and damages experience with the type and quality of packaging used in distribution; reducing claims for loss and damage
- . planning transportation equipment purchases for private shipping.

For these analyses shippers need the following types of data: origin-destination commodity flow data by the different modes including cost, time-in-transit, time in intermodal transfers, and loss and damage; data

on the relative cost and availability of transportation service by different modes, between specific locations, and comparable cost and transportation time information by shipper-owned vehicles.

c. Transportation Vehicle and Equipment Manufacturers

Research and development on new vehicles and equipment often involve large expenditures and risks on the part of manufacturers. The chances of making good decisions can be increased by reliable analyses and forecasts of such items as:

- . cost and performance requirements of equipment operators (for example, seat-mile costs, speed, length of haul, etc.)
- . transportation demand, by desired trip characteristics
- . growth trends in carrier routes, estimated operating costs, potential revenues, public acceptance of new types of equipment, and the probable effects of new equipment on the environment (for example, noise qualities).

Analyses and forecasts of these items can be the basis for manufacturers' estimates of market size by type of equipment and then in turn capital investment

projections and planning, production planning, planning for new products, formulating market plans, issuing purchase contracts, and manufacturing equipment components.

Major data requirements of equipment manufacturers correspond with those described above for carriers and shippers since equipment manufacturers must assess shipper demands, traveler demands and carrier markets as a first step in estimating equipment needs. For example, for estimates of demand for passenger vehicles the equipment manufacturer needs origin-destination data on total trip volumes and data on passengers' mode choices by trip purpose and distances, as well as data on carrier operating costs and passenger revenues.

d. Universities and Research Organizations

Many of the transportation data requirements of universities and research organizations are represented in the data requirements of agencies already discussed, since the bulk of transportation

research that is done in universities and other research organizations, is performed for these agencies. For example, research and development on transportation demand, forecasting and systems "simulation" models requires multi-modal data describing transportation networks on a link by link basis and describing origins and destinations of trips and shipments on a door-to-door basis - with costs and times for each mode used. Economic input-output studies require origin-destination commodity flow data for all modes of transportation including transportation costs. And, as noted before, urban transportation research requires easily-comparable transportation data for a cross-section of urban areas.

B. AVAILABLE TRANSPORTATION INFORMATION

The Department has made a careful review of existing transportation information to determine the extent to which the critical transportation information needs of government and industry could be met from existing sources - particularly the needs for transportation analysis, forecasting, planning and policy-making purposes. ^{12/}

^{12/} For details of the review, refer to Appendix B, "Survey of Existing Transportation Information", p. 138.

With few exceptions the existing programs do not provide for many important transportation information requirements. For example, the Civil Aeronautics Board program provides valuable origin-destination data for scheduled air passengers but there are no programs for interurban travel data by auto, bus or rail; and even the Civil Aeronautics Board program does not provide complete data on air travel. ^{13/}

The Corps of Engineers program provides important origin-destination data on domestic commodity flows by water, but at present there is no program for data on interurban freight flows by truck, rail or air; some data do exist on pipeline flows but these can not be easily matched with the data on commodity flows by water.

Data that describe the interurban networks of transportation facilities (including terminals) in a manner that permits their use for effective transportation analysis, forecasting, planning and policy-making, do not exist. The Federal Aviation Administration has data on airports and air routes, departments of highways and transportation in each of the 50

^{13/} As noted previously, significant gaps in air travel data include data on travel to and from the airports and on the characteristics of air passengers; and data on travel by air taxi and general aviation.

States have data on highways, individual railroads have data on railroads, the Corps of Engineers has data on ports and waterways, the Department of the Interior and the Federal Power Commission have data on pipelines, but these data are not easily accessible to outside agencies and they are located at widely separated points which makes it practically impossible to combine them. Even if the data were brought together in a single central place to facilitate combination, the forms of the data are so various that the costs of combining them would be prohibitive on an individual-study basis.

There are similar deficiencies in respect of data on the "distribution of activities" that generate interurban travel and freight (population, industry and land use distribution data), although the difficulties in this case are less severe.

The data for urban transportation collected by the 200 or so metropolitan transportation agencies, valuable though they are for individual metropolitan areas, are usually not easily comparable from one transportation study to another. Better data are needed to determine the social and environmental impacts of proposed transportation facilities, and to support integrated urban design of buildings and transportation

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facilities under joint development and other similar policies. Data are needed for urban areas of less than 50,000 population, which have been excluded from previous urban transportation planning programs. ^{14/} Most important, satisfactory standard methods are needed as soon as possible as a basis for continuing urban transportation data operations which will be soon underway in all metropolitan areas.

Because there are complete gaps in many areas of existing transportation information, and significant incompatibilities between the various pieces of transportation information that do exist, it is not possible to examine the transportation system as a whole and it is seldom possible to relate one aspect of the system to another. These data deficiencies severely hamper the ability of industry and government to perform effective transportation analysis, forecasting, planning and policy-making. Improvement in these capabilities is one of the most important means of effecting improvements in the transportation system itself.

C. SUMMARY OF TRANSPORTATION INFORMATION NEEDS

Many of the critical transportation information needs

^{14/} Lack of transportation data in urban areas of less than 50,000 population is being addressed in a Federal Highway Administration memorandum - now in preparation - on transportation planning requirements in these areas.

of government and industry are similar. The intersection of these needs can be represented diagrammatically as in Figure 1 on the following page, which shows the Department in a central position in the field of transportation. Because of its central position and multi-modal focus, the Department has a responsibility to take a lead role in providing the "common" transportation data that are needed for analysis, planning and policy-making not only by the Department, but also by industry and other governmental transportation agencies.

The Department is vitally interested in data that support analyses and forecasts, and planning and management functions which cut across modes and provide a whole view of transportation. Other Federal, State and local government transportation agencies, industries involved in providing transportation services or manufacturing transportation equipment, shippers and travel organizations, and university and other research organizations, have a wide interest in using the kinds of transportation data which are of interest to the Department.

The transportation information of wide common interest may broadly be summarized as follows:

INTERSECTION OF TRANSPORTATION DATA NEEDS

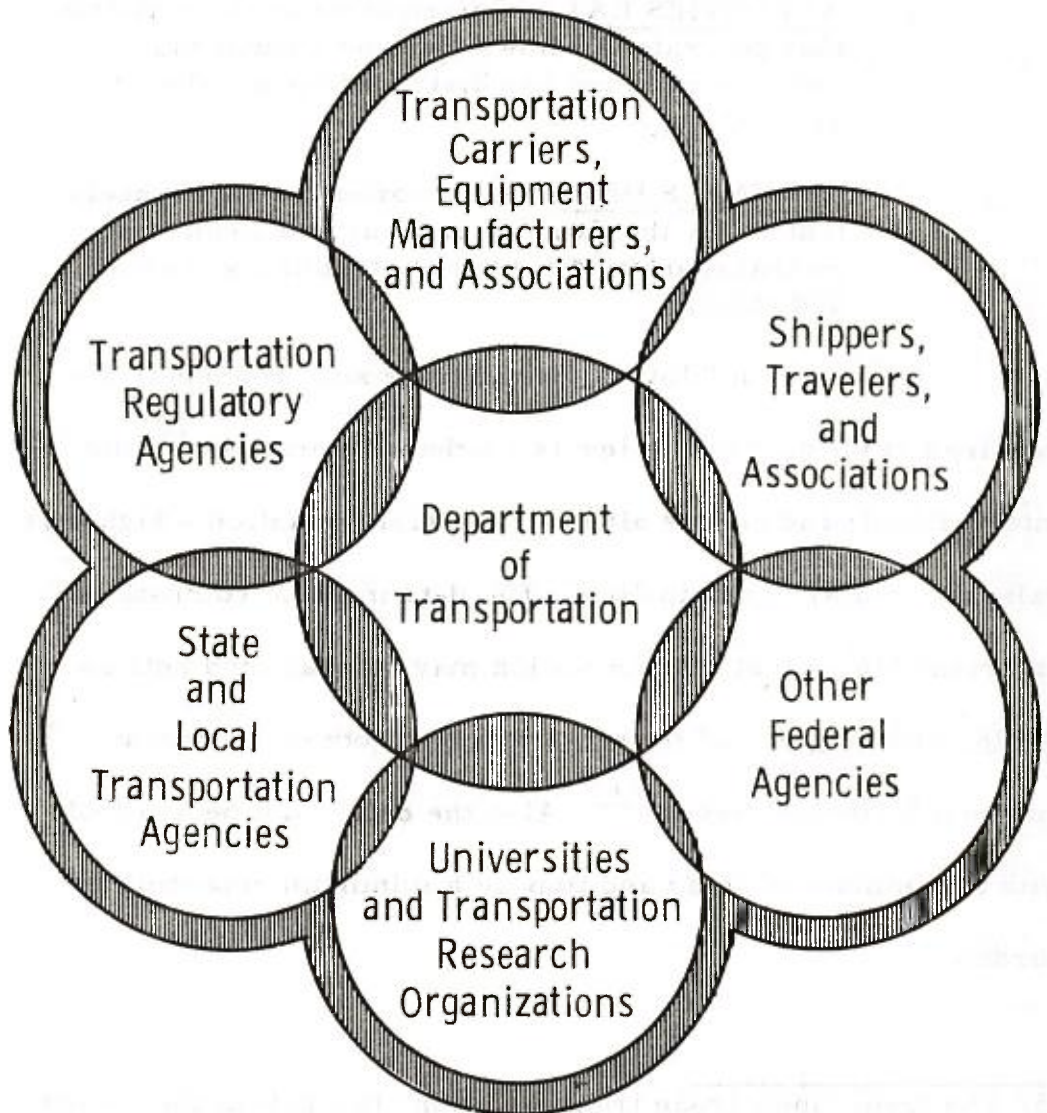


Figure 1: Intersection of the transportation data needs of the Department of Transportation and other transportation agencies.

- . FLOWS DATA: information on the flows of persons and goods (origin-destination data with characteristics of trips and travelers, or shipments and commodities, for all modes of transportation)
- . ACTIVITIES DATA: information on the activities that generate the flows (data on population, industry and land use distributions and densities by location)
- . CHANNELS DATA: information on the channels that carry the flows of persons and goods (data on transportation networks, terminals, services, and safety).

The data on "flows", "activities" and "channels" are required at all geographic levels - urban, interurban^{15/} and international; and across all modes of transportation - highways, rail, air, water, and pipeline. The data must be compatible and relatable so that transportation may be examined both as whole, and in terms of its related parts, both on a current and on a historical basis.^{16/} Also the data must be available with a minimum of delay and impose a minimum reporting burden.

^{15/} The term "interurban transportation" throughout the report is meant to include regional-corridor transportation as well as other domestic intercity transportation and transportation between the United States and border areas.

^{16/} For further details on the general structuring of transportation data requirements refer to Appendix D, p. 183.

III. INITIAL TRANSPORTATION INFORMATION PROGRAM - IMMEDIATE PHASE

The Department has prepared an initial transportation information program to meet the essential needs of industry and government for "flows", "activities", and "channels" data, as discussed in the preceding section of the report. The Immediate Phase of the initial transportation information program is described in this section of the report - under two headings:

- . objectives of the immediate phase
- . projects in the immediate phase

A. OBJECTIVES OF THE IMMEDIATE PHASE

There are three major program areas in the Immediate Phase of the initial transportation information program - urban transportation, interurban transportation, and system development. Objectives of these three program areas are outlined below.

1. Urban Transportation

The prime objective of the urban portion of the transportation information program is to obtain maximum benefit from the present expenditures on urban transportation

information, that are incurred for data collection in the 200 or so urban transportation planning agencies in the country. Current data collection and processing expenditures are at least \$20,000,000 annually. ^{1/}

The urban portion of the transportation information program is therefore directed at improving the methods of data collection employed in the urban transportation planning agencies. The program provides for research and development to establish quickly the best methods for obtaining the various data required for urban transportation planning - including mass transportation, airport access, and integrated urban design studies; and to find ways of ensuring that these methods will be used in urban transportation planning agencies in their continuing data operations. ^{2/}

1/ The bulk of this money for data collection and processing comes from urban transportation planning funds administered by the Department's Federal Highway Administration (through State governments) under Section 134, Title 23, US Code. Some of the money comes from funds authorized under Section 701 of the Housing Act, administered by the Department of Housing and Urban Development. The remainder comes from State and local matching funds (approximately one-third of the total).

2/ A discussion of requirements, problems and need for research and development in relation to continuing data operations for urban transportation planning, is contained in Appendix G, p. 233.

The expected results of this program are that urban transportation data would be made easier to obtain, less costly, more relevant, inter-relatable to interurban and international data, and compatible with other data in urban information systems developed under other Federal-agency sponsored programs such as those of HUD, HEW, Department of Labor, Justice etc. Increased compatibility between transportation data for different urban areas, between urban and interurban transportation data and between transportation and other data will facilitate transportation and other related research, analysis and planning at the urban level, as well as urban transportation policy-making at Federal, State and metropolitan levels.

One of the first steps in the research and development program on methods would be to obtain a sample of the data that have been previously collected in urban transportation planning studies in order to examine commonalties, inconsistencies, accuracy and other matters and to evaluate previous collection methods.

2. Interurban Transportation

The objective of the interurban portion of the Immediate Phase of the initial transportation information program is to provide interurban transportation (including regional-corridor) data that are not now available under existing programs, and that are regarded presently to be of highest priority, based on co-ordination with a cross-section of data users.

Interurban person travel data projects provide for:

(i) a national travel survey which will give an overall picture of trip-making levels and trip purpose by family type and income level for all modes; and (ii) a national program of surveys of air travelers as a means of learning about airport access, trip purpose, and reasons for choice of air - also data will be obtained on travel by air taxi and general aviation, and ways will be developed of combining all of these data with the data on air passenger travel presently being obtained by the Civil Aeronautics Board.

Interurban freight data projects provide for: (i) origin-destination commodity flow data for rail, based on waybill sampling and subsequently rail shipper-receiver surveys and (ii) origin-destination data on truck freight including data on non-regulated trucking movements.

Interurban transportation facilities data projects provide for transportation network data, including accident (safety) experience data, on interurban highway networks and rail networks. Data now being developed on functional classification of highways in State departments of highways and transportation, in co-operation with the Federal Highway Administration, will be used as source input for the highway facilities data project.

3. System Development

The principal objectives of system development projects in the Immediate Phase of the initial transportation information program are to (i) provide basic tools that are necessary to achieve geographic and definitional compatibilities in urban, interurban and other transportation data, (ii) design and develop data systems that will permit inter-relatability of the data for a wide variety of analytic functions - also rapid processing, publication and dissemination of data to a wide variety of data users, (iii) provide for keeping abreast of developments in transportation data collection and processing, and (iv) provide for co-ordination of transportation and other data collection

and processing methods at Federal, State and local government levels and in private industry in order to facilitate information interchange.

B. PROJECTS IN THE IMMEDIATE PHASE

The major work projects contained in the Immediate Phase of the initial transportation information program are as follows: ^{3/}

1. Urban Transportation (1.00)
 - a. Urban Person Travel Data Methods (1.10)
 - b. Urban Goods Movement Data Methods (1.20)
 - c. Urban Transportation Facilities Data Methods (1.30)

2. Interurban Transportation (2.00)
 - a. Interurban Person Travel Data - Air (2.13)
 - b. Interurban Person Travel Data - All Modes (2.17)
 - c. Interurban Goods Movement Data - Highway (2.21)
 - d. Interurban Goods Movement Data - Rail (2.22)
 - e. Interurban Goods Movement Data - Air (2.23)
 - f. Interurban Transportation Facilities Data - Highway (2.31)
 - g. Interurban Transportation Facilities Data - Rail (2.32)

Numbers at right of project titles are project numbers.

"Interurban transportation" includes regional-corridor transportation, other domestic intercity transportation and transportation between the United States and border areas.

3. Systems Design and Development (4.00)

- a. Systems Design and Development (4.10)
- b. Geo-Coding System (4.21)
- c. Commodity Coding System (4.22)

Descriptions of each of these projects are given below. From the project descriptions it will be seen that work on many of the projects will extend beyond fiscal year 1970. Plans for funding in future years are set out in Section IV of the report, "Initial Transportation Information Program - Five-year Costs and Schedules." Future-year funding is subject to the determination of priorities in future years as well as the availability of funds to the Department.

Scheduled completion times are stated in the project descriptions below in terms of ultimate completion dates. Each project will be phased so that useable products are provided at many points in time before the ultimate completion date. In many cases the phasing will provide for successive major additions to a basic product.

Each of the projects described below will benefit a large number of data users. It will be most important, and essential to a successful program, to co-ordinate

closely the planning and development work for each of these projects, with data users or representatives of data users, both within and outside of the Department. This important co-ordination work is discussed in Section V of the report, "Implementation of the Initial Transportation Data Program".

1. Urban Transportation (1.00) ^{4/}

a. Urban Person Travel Data Methods
(project 1.10)

This project will provide for research and development of improved methods of collecting and processing origin-destination data on travel in urban areas, including travel time, cost, distance, trip purpose, mode of transportation, and information on the socio-economic characteristics of the traveler and the land use activities at the origins and destinations of the trips. Research and development will be oriented to the needs of continuing data operations in urban transportation and other studies, and a primary objective will be to ensure that future urban travel data are fully compatible so that use on a comparative basis is facilitated. Provisions will be made for obtaining interurban travel data to the extent feasible.

^{4/} Data items to be obtained in each project are indicated in outline form in the project descriptions. For illustrative, detailed listings of data items, refer to Appendix D, p.183.

Work will be accomplished by a structured series of studies of (i) previously-collected urban travel data to determine precise uses and specifications (including accuracy), and to evaluate data methods used; (ii) data requirements in view of present and likely future urban transportation problems and analytic techniques available for approaching these problems; and (iii) new methods of obtaining required data including consideration of use of 1970 Census journey-to-work data together with proxies for non-work trips, standardized geographic coding and periodicity in surveys.

The project is estimated to cost a total of \$900,000, and is scheduled over a 3 to 4 year period. Estimated costs cover research and development, testing, preparation of manuals, training aids, and a data collection-processing "package." Work will be performed under outside contracts, interagency agreements and other co-operative arrangements. Urban and Statewide transportation planning agencies will be involved. \$100,000 is budgeted for initial studies in fiscal year 1970.

b. Urban Goods Movement Data Methods
(project 1.20)

This project provides for research and development of methods of obtaining origin-destination data on goods movements in urban areas including shipment time, cost, distance, type of commodity, weight, density, mode of transportation used, and information on the characteristics of the shipper and receiver and, the land uses at origins and destinations. Research and development will be oriented, as in project 1.10 above, to the needs of continuing data operations in urban transportation and other studies. Also

the problems of integrating data on urban goods movements will be addressed - particularly in respect of movements by highway.

Only limited data on goods movement in urban areas have been obtained in the past - mostly movements of trucks. Research and development on methods for obtaining these data will be of a pioneering nature and will be costly compared with research and development on methods for obtaining data on person travel (project 1.10). Previous methods used in urban areas will be reviewed and evaluated. Methods used for obtaining data on interurban goods movements will be examined for their relevance to urban goods movement data problems both methodologically and in terms of relating urban and interurban data. Also data requirements will be examined carefully in relation to analytic techniques available for use of the data.

The project is estimated to cost a total of \$3,000,000, and is scheduled over a 4-year period. Estimated costs include research, development, testing, preparation of manuals, training aids, and a data collection-processing "package". Work will be performed under outside contracts, inter-agency agreements and other co-operative arrangements. Urban and Statewide transportation agencies will be involved. \$100,000 is budgeted for initial studies in fiscal year 1970.

c. Urban Transportation Facilities Data Methods
(project 1.30)

This project will provide for research and development of improved methods of obtaining and recording data on urban transportation facilities networks and terminals, including highways, bus routes, truck routes, subways, commuter rail, freight rail, airports, sea-ports, and other terminal and transfer facilities. The project will develop methods of inter-relating data on transportation facilities networks and terminals, geographically (urban, interurban and international), and across modes, with provision for intermodal interchanges.

The data items to be considered for networks and terminals, on a link-node basis, will include travel time, delay time, waiting time, travel costs, capacity variables, traffic volume, carrier schedules, accident (safety) experience, expenditures on improvements and maintenance, etc.

Work will be accomplished by study of methods used in urban and Statewide transportation studies and in the interurban transportation facilities projects provided for in the initial transportation information program. Use of machine methods including co-ordinate readers, and automatic plotting will be considered. A data collection processing "package" that can be used by urban and Statewide transportation agencies in continuing data operations, will be developed. It is intended that the geo-coding system provided for under project 4.21, described below, will provide a common geographic base for urban transportation facilities data, as well as person travel, goods movement and activities distribution data.

The project is estimated to cost a total of \$1,650,000 and is scheduled over a 3 to 4 year period. Estimated costs include research, development, testing, preparation of manuals, training aids, and a data collection processing "package." Work will be performed largely under outside contracts, interagency agreements and other co-operative arrangements. Urban and Statewide transportation planning agencies will be involved. \$100,000 is budgeted for initial studies in fiscal year 1970.

2. Interurban Transportation

a. Interurban Person Travel Data - Air
(project 2.13)

This project will provide origin-destination data on interurban travel by air taxi, other non-scheduled air carriers, and general aviation, including information on travel time, costs, distance, trip purpose, traveler characteristics, type of aircraft, travel to and from the airport and connecting flights (so as to provide data on the complete door-to-door trip). Also the project will provide for development of a national program of surveys of air passengers traveling by scheduled air carriers to obtain data on (i) travel to and from airports including origin and destination, travel time, cost, distance and mode of transportation used, and (ii) data on purpose of the air travel, reasons for choice of air, etc. These data will be combined with the data on terminal-to-terminal air passenger travel by scheduled air carriers presently being obtained on a continuous basis by the Civil Aeronautics Board. Together these sets of data will provide a comprehensive picture of domestic interurban travel by air.

Work will be accomplished by on-plane and airport surveys of passengers. Research and development of methods will include a review and evaluation of methods used for previous surveys in the New York metropolitan area, the upstate New York area, Atlanta, St. Louis, Cleveland, Washington-Baltimore and elsewhere. Also the recent surveys of international general aviation (originating outside of the United States but using US airspace and facilities) will be reviewed for methodological relevance.

The project is estimated to cost a total of \$400,000, and is scheduled for completion over a 2 to 3 year period. Estimated costs include research and development, collection and processing of initial data including tabulation, publication and dissemination. Continuing data operations are estimated to cost \$200,000 annually. Work will be performed under outside contracts, inter-agency agreements, and other co-operative arrangements. \$100,000 is budgeted for initial studies in fiscal year 1970.

b. Interurban Person Travel Data - All Modes
(project 2.17)

This project will provide a national picture of interurban person travel by all modes (auto, air, bus, rail), including information on trip length, trip frequency, purpose, travel time, travel cost, vacation cost, place of residence, income, family size, automobile availability, mode used, evaluation of transportation service available, etc.

Data will be obtained by stratified, clustered sampling of households with re-interviews in order to obtain maximum useful information at least cost. The purpose of the project is

to obtain information for analysis of the total interurban travel market, modal shares of the travel market, and the elasticities of demand between modes. This project will not yield information on origin-destination patterns by modes for specific geographic regions. This information is to be obtained by surveys of interurban travel by each mode. ^{5/} Information obtained under this project will not duplicate information to be collected under the Federal Highway Administration's general survey of travel (primarily urban), presently under development through the Bureau of Census. Insofar as feasible, periodic updating of these data should be provided for in the 5-year national travel surveys of the Census of Transportation. Considerable modification of techniques would be necessary to obtain the important in-depth data envisaged in this project, which is not obtained under the Census of Transportation in its present form.

The project is estimated to cost a total of \$500,000, and is scheduled for completion over a 3 to 4 year period. Estimated costs include research, design and development, sample selection, data collection and processing, tabulation, publication and dissemination. Work will be performed under interagency agreement or outside contract. \$500,000 is budgeted for fiscal year 1970.

^{5/} For further explanation of this point refer to Appendix E, "Project Descriptions - Initial Transportation Information Program," p. 201.

c. Interurban Goods Movement Data - Highway
(project 2.21)

This project will provide origin-destination data on major interurban goods movements by highway, including commodity carried, shipment, weight, size, distance, time, freight revenue, equipment type, etc. It will cover all interurban highway movements - interstate and intrastate common carriers, private, Federal fleets, etc.

Methods for obtaining the data include combining existing Motor Freight Conference data, a sample of truck license plates and a sample of truck shippers. Use of mail surveys and photographing of license plates will be explored. Maximum use will be made of existing records such as freight bills, to minimize time and cost to truckers and the Department. A data collection "package" that can be administered by the States will be prepared. Inter-relatability of data on interurban and urban goods movements by highway will be examined.

The project is estimated to cost a total of \$850,000, and is scheduled over a 3-year period. Preliminary data would be available well before project completion. Estimated costs include research, development, testing and operation of the component data system for a trial period of up to one year; also publication and dissemination of initial data. Continuing data acquisition activities are estimated to cost \$400,000 to \$500,000 per year, including publication and dissemination of data, update, improvement, and expansion - for example, to clearly identify truck movements associated with export-import, and to include significant movements between the United States and border countries - Canada and Mexico. \$300,000 is budgeted for 1970 (\$250,000 was committed in fiscal 1969).

Preliminary specification of research and development tasks has been completed and these will be started in the near future under outside contract. Continuing data activities will be performed by a combination of outside contracts, interagency agreements and cooperative arrangements with State departments of transportation or highways and other appropriate agencies.

d. Interurban Goods Movement Data - Rail
(project 2.22)

This project will provide origin-destination data on major interurban goods movements by rail, including commodity carried, weight, distance, time in transit, freight revenue, equipment type, etc.

Data will be obtained by a combination of a sampling of rail waybills and a sample of rail shippers. The waybill sample will be based on the program which was administered by the Interstate Commerce Commission until 1967. Maximum use will be made of machine-readable records available from the data processing systems of the railroads in order to minimize reporting burdens, and to facilitate speedy processing of the data so it can be made available on a timely basis. Modifications will be made in the design of the sample used in the Interstate Commerce Commission program to obtain improved data on less frequent commodity movements.

The project is estimated to cost a total of \$650,000, and is scheduled over a 2 to 3 year period. Preliminary data would be available well before project completion. Estimated costs include research, development, testing and operation of the component data system for a period of up to one year; also publication and dissemination of data and

processing of 1967, 1968 and 1969 waybill information presently held by the Interstate Commerce Commission under an agreement with the Department. Continuing data acquisition activity is estimated to cost \$250,000 per year, including publication and dissemination of data, update, improvement, and expansion - for example, to clearly identify rail movements associated with export-import, and to include movements between the United States and Canada. \$200,000 is budgeted for fiscal year 1970 (\$250,000 was committed for fiscal 1969).

With the close co-operation of the Association of American Railroads, the railroad companies traffic associations, the railroads and the Interstate Commerce Commission, preliminary specification of research and development tasks has been completed and these will be started in the near future under outside contract. Continuing data activities will be performed under an interagency agreement or an outside contract.

e. Interurban Goods Movement Data - Air
(project 2.23)

This project will provide origin-destination data on major interurban goods movements by air, including commodity carried, weight, size, value, distance, time, freight revenue, equipment type, etc.

Data will be obtained by sampling air freight bills and air shippers.

The project is estimated to cost \$400,000 total and is scheduled for completion over a 2 to 3 year period. Preliminary data would be available well before project completion. Estimated costs include research, development, testing

and operation of the data system for a trial period of up to one year; also publication and dissemination of initial data. Continuing data acquisition activities are estimated to cost \$200,000 per year including publication and dissemination of data, update, improvement, and expansion to include movements between the United States and border countries. \$50,000 is budgeted for initial studies in fiscal year 1970.

The initial data system will be developed under inter-agency agreement or outside contract. Continuing data acquisition will be performed under interagency agreement or outside contract.

f. Interurban Transportation Facilities Data - Highway
(project 2.31)

This project will provide data on the interurban highway network for each link (segment) in the network including data on location, travel time, length, travel speeds, number of lanes, traffic volumes, accident (safety) experience, year built, expenditures on improvements and maintenance, etc.; also some data on truck operating rights, bus schedules, ton-miles, seat-miles, etc.

Maximum use will be made of data to be obtained in the Federal Highway Administration, Bureau of Public Road's national highway functional classification study. These data will have to be mapped State by State and then converted to machine-readable form. Semi-automatic methods employing co-ordinate digitizers and automatic plotters will be used. A data collection "package" for use by States will be prepared.

The project is estimated to cost a total of \$1,000,000 and is scheduled for completion over a 2 year period. Estimated costs include development of methods,

mapping, co-ordinate reading, data processing, automatic plotting, publication and dissemination of initial data, etc. Continuing data acquisition activity is estimated to cost \$400,000 per year. \$100,000 is budgeted for initial studies in fiscal year 1970.

Basic research and development of method has been completed in previous work of lesser scope. Actual data acquisition will be performed under a combination of interagency agreements, outside contracting and cooperative arrangements with State departments of highways and transportation. Continuing data acquisition activity will be performed under similar arrangements.

g. Interurban Transportation Facilities Data - Rail
(project 2, 32)

This project will provide data on the interurban rail network for each link (segment) in the network including: location, length, transport time, number of main and second tracks, length and spacing of passing tracks, traffic volume, signalization, accident (safety) experience, etc.

Work will involve transfer of information from maps into machine-readable records using semi-automatic methods, including co-ordinate digitizers and automatic plotters.

The project is estimated to cost a total of \$800,000, and is scheduled for completion over a 3-year period. Partial data would be available at an early date. Estimated costs include research, development, mapping, co-ordinate reading, data processing, automatic plotting, publication and dissemination of data, etc. Continuing data acquisition activities are estimated to cost \$150,000 per year. \$100,000 is budgeted for initial studies in fiscal year 1970.

Work on the initial data system will be performed under interagency agreement or outside contract. Continuing data activities will be performed under interagency agreement or outside contract.

a. Systems Design and Development
(project 4.10)

This project provides for (i) overall design and development of the transportation data information system to handle data obtained under the separate projects in the initial transportation information program - to ensure that these data are fully inter-relatable for a wide variety of analytic techniques, and to ensure rapid processing, publication and dissemination of data; (ii) continuing research on new developments in information collection, management and retrieval and development of proposals for improvement of transportation information systems so that these can be kept up-to-date and efficient; and (iii) co-ordination of development of various transportation information systems and other related information systems to facilitate information interchange.

Design and development work will proceed in two stages. Design will include specification of data inputs and outputs for the separate projects, and combinations of projects, provided for in the initial transportation information program also specification of the form of outputs, such as, magnetic computer tape, printed tabulations, publications, maps, charts, other graphic displays, etc. Development will include adaptation of existing computer software packages, preparation of new packages, writing of computer programs, etc. Items to be considered will include development, documentation, management and updating of the data base, hardware, software, geo-coding and commodity coding

systems, confidentiality of certain data, easy access to the data, rapid turn-around, flexibility, etc.

The project is estimated to cost a total of \$2,200,000 and is scheduled over a 3-year period. Work will be accomplished under outside contract and interagency agreement. \$200,000 is scheduled for initial design and coordination studies for fiscal year 1970.

b. Geo-Coding System
(project 4.21)

This project will provide a computer-based data processing system for assigning uniform geographic codes including co-ordinates for locations represented in transportation and other data, such as: origins and destinations of trips, locations of accidents, nodes at each end of links in the transportation networks, locations of population, industry, land use, etc. For urban areas the system will assign very detailed geographic codes (generally to the blockface level), which will permit almost unlimited flexibility in the areal aggregation of data. This will permit a wide variety of comparative studies at micro- and macro-levels which would otherwise not be possible. Inter-relating of data on travel, transportation facilities and land use at a detailed level will be facilitated, and this will provide a basis for coordinating transportation, land development and other environmental policies (urban renewal, conservation, new towns, etc.). The geo-coding system will also facilitate distance calculations, spatial analyses, automatic plotting, and other graphic displays of data.

The system for urban areas will be realized by support and expansion of the system now being developed under the direction of the Bureau of

the Census for the 1970 Census of Population and Housing. Development of the first phase of this system already has been strongly supported by HUD, DOT, and State and local government agencies. The system for rural areas, which must be compatible with the system for urban areas, will require considerable research and development since little previous work has been done. Extension to cover locations beyond the continental United States should be relatively easy since relatively few locations are involved.

The project is estimated to cost a total of \$400,000, and is scheduled over a 4 to 5 year period. Periodic updating of the system will be necessary and costs for this are expected to average \$200,000 annually. Work will be performed under outside contract, interagency agreement or other co-operative arrangements. \$200,000 is budgeted for initial work in fiscal year 1970.

c. Commodity Coding System
(project 4.22)

This project will provide a computer-based system for assigning uniform codes for commodities, so that the various commodity codes used by carriers for each mode of transportation and by different governmental agencies will be reduced to a common form for data processing purposes. At present a complex variety of over a dozen incompatible commodity coding systems are used by the different modes of transportation and often several coding systems are found within a single mode. Development of this system will permit comparative studies of commodities carried by each mode, and merging of data on commodities carried by different modes. Also it will permit inter-relating of transportation data on commodities with data on industries.

Development of this system does not imply adoption of a uniform standard commodity code for all modes of transportation but ultimately it could facilitate industry efforts to achieve some degree of compatibility between the various commodity codes.

The system will be developed in separate stages, to provide for inter-relating of all commodity codes with the Standard Transportation Commodity Code - STCC (which is relatable to the Standard Industrial Classification - SIC). Work will be closely co-ordinated with the joint committee on the Standard Transportation Commodity Code which has done much valuable work in this area. The Department is already represented on this committee.

The project is estimated to cost a total of \$300,000 and is scheduled over a 3 to 4 year period. Work will be performed under outside contract or inter-agency agreement. \$50,000 is budgeted for work in fiscal year 1970.

C. SUMMARY OF IMMEDIATE PHASE

The Immediate Phase of the Department's initial transportation information program provides for high-priority transportation information needs of industry and government at national, state and local levels as follows:

Urban Transportation \$5.55 million: for research and development to determine quickly the best methods of collecting urban transportation data on person travel, goods movement and transportation facilities. These methods can then be adopted for collecting transportation

data on a continuing basis in the Nation's 200 or so metropolitan transportation planning agencies. Thus benefits from current expenditures on urban transportation data - approximately \$20 million annually - could be maximized.

Interurban Transportation \$5.1 million: for national travel data; supplementary air travel data; rail, highway, and air freight data; and interurban rail and highway transportation facilities data. These data are either not available under existing programs or are not available in a compatible form. Existing data will be used to the greatest extent practicable.^{10/}

System Design and Development \$3.45 million: for research, co-ordination, and the development of tools that will ensure that the various data obtained under component data systems are interrelatable for a wide variety of analytic purposes and also are susceptible to rapid processing, publication and dissemination to a wide variety of users.

Of the total of \$14.1 million estimated for all projects in the Immediate Phase of the program, \$2.5 million is budgeted for fiscal years 1969 and 1970. This would permit undertaking initial studies for many of the projects; and extensive research and development of data for some - namely, the projects providing for data on national travel and on rail and highway freight movements.

^{10/} "Interurban transportation" includes regional-corridor transportation, other domestic intercity transportation and transportation between the United States and border areas.

IV. INITIAL TRANSPORTATION INFORMATION PROGRAM - FIVE-YEAR COSTS AND SCHEDULES

The full initial transportation information program is presented in this section of the report. All major work projects, in both the Immediate and Future phases of the program are included. Program areas, priorities and continuing data acquisition are discussed first, then summary tables are presented, covering costs and schedules for the full initial program on a five-year completion basis.

A. PROGRAM AREAS AND PRIORITIES

The full program is estimated to cost a total of \$35.6 million, scheduled over five years. ^{1/} This total cost covers research and development on urban transportation data methods, establishment of component data systems for interurban and

	(\$000)
. urban transportation data methods	\$ 6,350
. interurban transportation data	22,950
. international transportation data	2,850
. system design and development	3,450
Total	<u>\$35,600</u>

1/ As noted in Section III of the report, future-year funding is subject to the determination of priorities in future years as well as the availability of funds to the Department.

Also as noted in Section III the term "interurban transportation" includes regional-corridor transportation, other domestic intercity transportation and transportation between the United States and border areas.

international transportation data systems, and system design and development - as follows:

The \$6,350,000 total in the initial transportation information program for urban transportation data methods, as noted in Section III of the report, is provided for the purpose of ensuring that maximum benefit is obtained from expenditures under other programs on urban transportation data. Projecting these expenditures (currently \$20,000,000 annually), over the same period for which the transportation information program is scheduled (5 years), would provide a total of \$100,000,000. This is regarded as a conservative estimate. Additionally it is expected that much useful data, including detailed journey-to-work data, will be provided from the 1970 Census of Population and Housing. Benefits from the \$6,350,000 provided in the Department's initial transportation information program for urban transportation data methods would accrue not only to urban transportation planning agencies but also to numerous government and industry organizations at local, state and national levels. The expected end-result is systematized compatible times-series urban transportation data of wide usefulness to government, industry and other organizations.

The \$22,950,000 total in the program for interurban transportation data, is provided for the purpose of establishing component data systems furnishing: (i) interurban "flows" data on person travel and goods movement, (ii) interurban "channels" data on transportation facilities including terminals, and (iii) interurban "activities" data - data on the activities that generate travel and freight flows including data on land use, industry, population and employment densities and distributions. Many of these data are not presently available while those that are available are not in a compatible form. Projects are tailored accordingly, so that use will be made of existing data to the greatest practicable extent. The expected end-result is systematized, compatible time-series interurban transportation data of wide usefulness to government, industry, and other organizations.

The \$2,850,000 in the program for international transportation data is provided for the purpose of establishing component data systems furnishing data on international ocean and air person travel, goods movement, transportation facilities and "activities" (population and industrial activities that generate international flows of persons and goods). International data for highway, rail and pipeline modes -

involving significant movements between the United States and border countries - are provided for as extensions of interurban data. The expected end-result of the international portion of the program as for the urban and interurban portions of the program, is systematized, compatible, time-series data of wide usefulness to government, industry and other organizations.

The \$3,450,000 in the initial transportation information program for system design and development, as explained in Section III of the report, is provided for work in systems design, systems development, special research and co-ordination which will ensure an efficient information system that permits inter-relatability of the data for a wide variety of purposes, as well as rapid processing, publication and dissemination of data to a wide variety of users.

Taking into account both the total estimated costs of the Department's initial transportation information program over a five-year period (\$35.6 million), and the estimated expenditures under other ongoing transportation information

programs over the same five-year period (\$106 million), ^{2/} the total expenditures on transportation information for the five-year period would approximate \$142 million. This total would be distributed roughly as follows:

	(\$ millions)	
. urban	107	75%
. interurban	26	19%
. international	6	4%
. other	3	2%
Total	142	100%

This division of total transportation information funds reflects the Department's best present view of priorities in transportation information for urban, inter-urban and international data - considering present transportation problems, the existing state of information, critical transportation information needs, and the differential costs of providing the transportation. Also the grouping of projects in the Immediate and Future phases of the program and the scheduling of the projects as set out in the summary tables below, represent the Department's best present judgement on priorities time-wise.

^{2/} Estimated as approximately \$100 million on urban transportation information and approximately \$6 million on inter-urban and international. The estimate of \$100 million for urban is calculated as 5 years at \$20 million annually, which is regarded as a conservative estimate of future annual expenditures on urban transportation information.

However, the program is subject to change both in the allocations of funds between program areas and projects and in the scheduling of projects. As new problems or issues arise or as old ones assume greater importance, the transportation information priorities will have to be changed. Also the information priorities must be closely related to the data requirements of the analytic techniques available to transportation data users, which support transportation forecasting, planning and policy-making functions. ^{3/}

B. CONTINUING DATA ACQUISITION AND TIME-SERIES DATA

The total of \$35.6 million, as stated above, provides for establishment of component data systems for interurban and international transportation data, for overall system design and development, and for research and development on urban transportation data methods. Taken together these portions of the program may be characterized as the "research and development stage" of the program. Additionally there is a "continuing data acquisition stage."

^{3/} The process to be followed in setting priorities is considered in section V of the report "Implementation of the Initial Transportation Information Program," pp. 95 and 96.

The research and development stage, in general, includes initial planning, research and development of data collection and data processing methods, sampling design, conduct of initial survey, initial data acquisition costs, and publication and dissemination of initial data.

The continuing data acquisition stage, in general, includes acquisition of new data, repeat of a survey (using methodology established in the research and development stage), updating of basic data files, creation or updating of historical (time-series) basic data files, and publication and dissemination of standard, current and time-series data. The annual costs for continuing data acquisition activities are estimated to reach a peak of \$6.5 million when all component data systems are on a continuing basis.

The initial transportation information program must be established on a continuing basis to meet the needs of continuing transportation planning and policy making processes. Transportation planning and policy making must be a continuing process to provide for changes in the characteristics and patterns of travel and goods movements; changes in the location and density of population, industry and land uses; changes in standards

of living and other social and economic conditions; changes in taste, transport technology and so on.

Initial data collection and acquisition provided for in the research and development stage of the program, will result in data for one point in time only. Continuing data activities will result in data for several points in time (time-series data), which will be much more useful than the initial one-time data in a number of ways. For example time-series data will provide the ability to:

- . analyze trends, detect changes, improve forecasting methods, and make new forecasts
- . compare new forecasts with old and adjust transportation plans and policies
- . trace the "incidence" of particular changes in the transportation system or the environment in which it operates (which will permit particular adjustments to be made in plans and policies to bring about desired improvements)
- . monitor and measure the effectiveness of programs of the Department and other transportation agencies providing for improvements to the transportation system (so that the program can be re-evaluated and if necessary adjusted within a cost-effectiveness framework under the Department's Planning-Programming-Budgeting System)
- . monitor and measure the effectiveness of the transportation elements of joint programs (e. g. of DOT, HUD, HEW, etc.) for social, economic, aesthetic and other improvements in the urban and rural environment (again, so that the programs can be re-evaluated and if necessary adjusted, to better achieve goals and objectives within a cost effectiveness frame - under the PPB system of the several departments involved)

- . respond on a quick-reaction basis to a wide range of transportation problems and policy issues as they arise (because of the ability to rapidly analyze data pertinent to the problem or issue in some depth - current data with comparable background data)

Each of the above activities requires an inter-related body of current and past data which can only be provided by continuing data acquisition. These time-series data must be fed into and through an analytic process which aims to project the demand for transportation services, both as a result of the interaction of the needs of individuals and businesses and as a result of the capability of the transportation system to meet those needs. This predictive capability in turn serves two purposes. First, it is essential in monitoring the performance of the transportation system and the emergence of new trends in transportation demand. This is so because many apparent new trends are simply the result of changes in location, income, product mix, or system capabilities. Second, the predictive capability can be used to test the feasibility and utility of proposed changes in transportation policy. It thus becomes an important adjunct to transportation planning and policy making activities in government and industry.

The close inter-relationship between transportation information and the analytic processes which the information

feed, indicates that the development of data capabilities must go hand in hand with the development of analytical capabilities. Also, it is clear that these analytical capabilities point in the direction of extensive modeling of the transportation system.

A well-tested set of models and parameters, a set of basic "activities distribution" data, and a set of transportation facilities data would permit synthesis by computer simulation of travel patterns, goods flows, and transportation behavior, as well as system response in any particular area as of the present, and under alternative plans. This is the basic capability required for transportation planning and policy making.

Development of models which would permit the reproduction of transportation behavior over the whole spectrum with some degree of realism, will require detailed data to determine the "causes" of the transportation behavior. Once these models are operational the need for detailed data to determine the "causes" of transportation behavior would be reduced. Later appearance of wide discrepancies between predicted and actual performance would, however, indicate

the need to investigate possible new trends and new factors - possibly also the need for additional data.

These considerations add a new dimension to the initial transportation information program. The need for continuing data on activities distributions (population, employment, land use, etc.) will remain fairly constant. The need for continuing data on transportation facilities (link volumes, speeds, capacity variables, accidents, etc.) will also remain fairly constant. However, the need for some of the detailed data on person travel and goods movement could be reduced, when models which reproduce transportation behavior reasonably well have been developed, tested, and made fully operational. The initial transportation information program will be carefully developed with these considerations in mind.

Additional considerations apply at the urban level because, as already noted, continuing data operations are closer to starting at the urban level than at other program levels; also data operations are widely decentralized, being chiefly carried on in 200 or so metropolitan transportation planning agencies. ^{4/}

^{4/} These additional considerations are addressed in Appendix G, p. 233.

C. FIVE-YEAR COSTS AND SCHEDULES

Tables 1 through 5 below show the initial transportation information program on a five-year completion basis. 5/

The total estimated costs of \$35.6 million for the research and development stage, are spread as follows:

<u>Fiscal</u> <u>Year</u>	<u>Estimated Research</u> <u>Development, Survey</u> <u>and Publication Costs</u> <u>6/</u> (\$000)
1969	\$ 500
1970	2,000
1971	7,400
1972	10,300
1973	10,500
1974	4,900
Total	<u>\$35,600</u>

5/ For details on the structure of the initial transportation information program, together with a discussion on the requirements of data compatibility, and illustrations of data items, refer to Appendix D, p. 183.

6/ Does not include annual continuing data acquisition costs estimated to reach a peak of \$6.5 million annually when all component data systems are on a continuing basis.

As noted previously, future-year funding is subject to the determination of priorities in future years as well as the availability of funds to the Department.

The general program and sub-program areas reflected in Tables 1 through 5 are as follows:

Urban Transportation

- Person Travel Data Methods
- Goods Movement Data Methods
- Transportation Facilities Data Methods
- Activities Distribution Data Methods ^{7/}

Interurban Transportation

- Person Travel Data
- Goods Movement Data
- Transportation Facilities Data
- Activities Distribution Data

International Transportation

- Person Travel Data
- Goods Movement Data
- Transportation Facilities Data
- Activities Distribution Data

System Development

- System Design and Development
- Geo-Coding and Commodity Coding Systems

^{7/} "Activities distribution" data includes data on the activities that generate travel and freight flows, i. e. data on the location, types, densities and distributions of population, employment, industry, land use, etc.

Table 1: Initial Transportation Information Program -
Five-Year Cost Summary

Table 1 contains estimated costs, by sub-program areas, for the initial transportation information program, on a five-year completion basis, under two headings:

- . Estimated Research, Development, Survey and Publication Costs
- . Estimated Peak Annual Continuing Data Acquisition Costs

Research, development, survey and initial publication and data dissemination costs are estimated to total \$35.6 million for the five-year period or an average of approximately \$7.1 million annually.

Annual costs for continuing data acquisition activities are estimated to reach a peak of \$6.5 million annually when all the component data systems of the programs are on a continuing basis - at the end of the fifth year. These costs would cover the costs of maintaining the data bases of the component data systems in a current state, and the basic costs of file processing to produce standard tabulations.

INITIAL TRANSPORTATION INFORMATION PROGRAM
FIVE-YEAR COST SUMMARY

Table 1

Program and Sub-Program Areas		Estimated Research, Development, Survey and Publication Costs* (\$000)	Estimated Peak Continuing Data Acquisition Costs ** (\$000)
1. 00	<u>URBAN TRANSPORTATION</u>		
1. 10	Person Travel Data Methods	\$ 900	---
1. 20	Goods Movement Data Methods	3, 000	---
1. 30	Transportation Facilities Data Methods	1, 650	---
1. 40	Activities Distribution Data Methods	800	---
2. 00	<u>INTERURBAN TRANSPORTATION</u>		
2. 10	Person Travel Data	4, 700	\$1, 600
2. 20	Goods Movement Data	14, 450	2, 500
2. 30	Transportation Facilities Data	3, 400	800
2. 40	Activities Distribution Data	400	150
3. 00	<u>INTERNATIONAL TRANSPORTATION</u>		
3. 10	Person Travel Data	900	300
3. 20	Goods Movement Data	1, 200	400
3. 30	Transportation Facilities Data	450	100
3. 40	Activities Distribution Data	300	50
4. 00	<u>SYSTEM DEVELOPMENT</u>		
4. 10	Systems Design and Development	2, 200	400
4. 20	Geo-Coding and Commodity Coding Systems	1, 250	200
	Total	\$35, 600	\$6, 500

* Includes costs of program specification and contract administration; and costs of contracts for (1) research and development, (2) conduct of surveys, (3) data acquisition, and (4) processing of data through to initial tabulations, summaries, publication, and dissemination.

Table 2: Initial Transportation Information Program -
Schedule by Program Areas

Table 2 contains the schedule for major work projects by program areas, on a five-year completion basis. End-dates for each project (where the time-bars end on the table), are dates when the initial intensive period of data organization or data acquisition would end and continuing data acquisition would begin.

Actual use of some of the data from a given component data system could begin well before the end dates shown in the schedule. For example, some rail freight data from project 2.22 (Interurban Goods Movement Data - Rail) should be available for use early in 1970, although the initial intensive period of data organization is shown as ending in the first quarter of fiscal year 1971. This is because the whole project includes such items as revision and implementation of a new waybill sample design and design and implementation of a rail shipper survey. These can be added successively to a basic data system which is developed quickly to satisfy urgent data user needs.

Continuing data acquisition activities are indicated in Table 2 by a "c" after project end-dates, for projects that would have substantial continuing data acquisition activities.

Table 2

INITIAL TRANSPORTATION INFORMATION PROGRAM - SCHEDULE BY PROGRAM AREAS

Program Project No.		FY 1969	FY 1970	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975	Program Project No.
1.00	<u>URBAN TRANSPORTATION</u>								
1.10	Person Travel Data Methods								1.10
1.20	Goods Movement Data Methods								1.20
1.30	Transportation Facility Data Methods								1.30
1.40	Activity Distribution Data Methods								1.40
2.00	<u>INTERURBAN TRANSPORTATION</u>								
2.111	Person Travel Data - Auto*								2.111
2.112	- Bus*								2.112
2.12	- Rail*								2.12
2.13	- Air								2.13
2.17	- All Modes								2.17
2.21	Goods Movement Data - Highway								2.21
2.22	- Rail								2.22
2.23	- Air								2.23
2.24	- Water								2.24
2.26	- Intermodal Transfers								2.26
2.27	- All Modes								2.27
2.31	Transportation Facilities Data - Highway								2.31
2.32	- Rail								2.32
2.33	- Air								2.33
2.34	- Water								2.34
2.35	- Pipeline								2.35
2.40	Activities Distribution Data - Population and Industry								2.40
3.00	<u>INTERNATIONAL TRANSPORTATION</u>								
3.13	Person Travel Data - Air								3.13
3.14	- Ocean								3.14
3.23	Goods Movement Data - Air								3.23
3.24	- Ocean								3.24
3.33	Transportation Facilities Data - Air								3.33
3.34	- Ocean								3.34
3.40	Activity Distribution Data - Population and Industry								3.40
4.00	<u>SYSTEM DEVELOPMENT</u>								
4.10	Systems Design and Development								4.10
4.20	Geo-Coding and Commodity Coding Systems								4.20

* Principally interurban person travel data in densely-developed regional corridors.

c - Indicates continuing data acquisition activity intended after date shown on schedule. End dates are dates when initial intensive period of data organization or data acquisition would end. Actual use of some of the data could begin well before the end dates. For interurban data, the continuing data acquisition phase would include extension to cover significant movements between the United States and border countries - Canada and Mexico.

Table 3: Initial Transportation Information Program - Costs
by Program Areas

Table 3 contains estimated costs, by major work projects within program areas, for the initial transportation information program, on a five-year completion basis. Table 3 corresponds with Table 2 so that costs and schedule can be easily compared.

Estimated annual costs for continuing data acquisition activities, which are included in Table 1, are not included in Table 3. These are estimated to total \$6.5 million annually at peak.

Estimated costs which are included in Table 3 are for research, development, survey or initial data acquisition, publication and dissemination of initial data, and program administration. These cover the costs of establishment and initial implementation of the component data systems under the initial transportation program, as distinct from the costs of maintaining the data bases of the component data systems in a current state; or they cover the costs of research and development work only, in the case of those projects which do not have a continuing data acquisition stage - such as the projects under the urban portion of the program.

Table 3

ILLUSTRATIVE INITIAL TRANSPORTATION INFORMATION PROGRAM - COSTS BY PROGRAM AREAS*

Program Project No.		FY 1969 (\$000)	FY 1970 (\$000)	FY 1971 (\$000)	FY 1972 (\$000)	FY 1973 (\$000)	FY 1974 (\$000)	TOTAL (\$000)	Program Project No.
1.00	<u>URBAN TRANSPORTATION</u>								
1.10	Person Travel Data Methods		100	100	500	200		900	1.10
1.20	Goods Movement Data Methods		100	600	1,500	800		3,000	1.20
1.30	Transportation Facilities Data Methods		100	250	900	400		1,850	1.30
1.40	Activities Distribution Data Methods			100	500	200		800	1.40
2.00	<u>INTERURBAN TRANSPORTATION</u>								
2.111	Person Travel Data - Auto**				500	800	400	1,700	2.111
2.112	- Bus**				250	350	200	800	2.112
2.12	- Rail**				250	350	200	800	2.12
2.13	- Air		100	800				900	2.13
2.17	- All Modes		500	300				500	2.17
2.21	Goods, Movement Data - Highway	250	300	300				850	2.21
2.22	- Rail	250	200	400				650	2.22
2.23	- Air		50	350				400	2.23
2.24	- Water				50	500		550	2.24
2.26	- Intermodal Transfers			150	600	4,000	3,000	11,400	2.26
2.27	- All Modes		100	900	4,250			1,000	2.27
2.31	Transportation Facilities Data - Highway		100	700				800	2.31
2.32	- Rail		100	600				700	2.32
2.33	- Air							600	2.33
2.34	- Water				50	350		400	2.34
2.35	- Pipeline					200	400	600	2.35
2.40	Activities Distribution Data - Population and Industry			300				400	2.40
3.00	<u>INTERNATIONAL TRANSPORTATION</u>								
3.13	Person Travel Data - Air				50	550		600	3.13
3.14	- Ocean				50	250		300	3.14
3.23	Goods Movement Data - Air				50	350		400	3.23
3.24	- Ocean			300		50	450	800	3.24
3.33	Transportation Facilities Data - Air					50	150	200	3.33
3.34	- Ocean				50	200		250	3.34
3.40	Activities Distribution Data - Population and Industry					300		300	3.40
4.00	<u>SYSTEM DEVELOPMENT</u>								
4.10	Systems Design and Development		100	1,000	600	500		2,200	4.10
4.20	Geo-Coding and Commodity Coding Systems		250	650	150	100	100	1,250	4.20
	Totals	500	2,000	7,400	10,300	10,500	4,900	35,600	

*Includes costs of program specification and contract administration; costs of contracts for (1) research and development, (2) conduct of surveys, (3) data acquisition, and (4) processing of data through to initial tabulations, summaries, publication, and dissemination.

**Principally interurban person travel data in densely-developed regional corridors.

NOTE: Future-year funding is subject to the determination of priorities in future years as well as the availability of funds to the Department.

Table 4: Initial Transportation Information Program -
Schedule for Immediate and Future Phases

Table 4 contains the schedule for major work projects in the initial transportation information program, grouped under Immediate Phase and Future Phase - on a five-year completion basis. The information presented in Table 4 is essentially the same as that presented in Table 2, except that it is regrouped to clearly show the schedule for the immediate phase as opposed to the schedule for the future phase.

Also this table shows more clearly the coupling of projects time-wise to ensure that sub-groups of data, which often will be used in combination, will be available concurrently - for example: interurban highway data on goods movement and transportation facilities; interurban rail data on goods movement and transportation facilities, etc.

Table 4
INITIAL TRANSPORTATION INFORMATION PROGRAM - SCHEDULE FOR IMMEDIATE AND FUTURE PHASES

Program Project No.	FY 1969	FY 1970	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975	Program Project No.
	IMMEDIATE PHASE							
1.10								1.10
1.20								1.20
1.30								1.30
2.13								2.13
2.17								2.17
2.21								2.21
2.22								2.22
2.23								2.23
2.31								2.31
2.32								2.32
4.10								4.10
4.21								4.21
4.22								4.22
	FUTURE PHASE							
1.40								1.40
2.11, 12								2.11, 12
2.24								2.24
2.26								2.26
2.27								2.27
2.33								2.33
2.34								2.34
2.35								2.35
2.40								2.40
3.13								3.13
3.14								3.14
3.23								3.23
3.24								3.24
3.33								3.33
3.34								3.34
3.40								3.40

* Principally interurban person travel data in densely-developed regional corridors.
 c. Indicates continuing data acquisition activity intended after end date shown on schedule. End dates are dates when initial intensive period of data organization or data acquisition would end. Actual use of some of the data could begin well before the end dates. For interurban data, the continuing data acquisition phase would include extension to cover significant movements between the United States and border countries - Canada and Mexico.

Table 5: Initial Transportation Information Program - Costs for Immediate and Future Phases

Table 5 contains estimated costs, for major work projects in the initial transportation information program, on a five-year completion basis, under the same two groupings as are shown for Table 4 - Immediate Phase and Future Phase - so that costs and schedule can be easily inter-related.

As noted in connection with Table 3, the estimated annual costs for continuing data acquisition activities, which are included in Table 1, are not included. These are estimated to total \$6.5 million annually at peak.

Also as noted in connection with Table 3, the estimated costs which are included, are for research, development, survey or initial data acquisition, publication and dissemination of initial data and program administration. These cover the costs of establishment and initial implementation of the component data systems under the initial transportation information program, as distinct from the costs of maintaining the data bases of the component data systems in a current state; or they cover the costs of research and development work only, in the case of those projects which do not have a continuing data acquisition stage - such as the projects under the urban portion of the program.

ILLUSTRATIVE INITIAL TRANSPORTATION INFORMATION PROGRAM - COSTS FOR IMMEDIATE AND FUTURE PHASES*

Table 5

Program- Project No.		FY 1969 (\$000)	FY 1970 (\$000)	FY 1971 (\$000)	FY 1972 (\$000)	FY 1973 (\$000)	FY 1974 (\$000)	TOTAL (\$000)	Program Project No.
<u>IMMEDIATE PHASE</u>									
1.10	Urban Person Travel Data Methods		100	100				900	1.10
1.20	Urban Goods Movement Data Methods		100	600	500	200		3,000	1.20
1.30	Urban Transportation Facilities Data Methods		100	250	1,500	800		1,650	1.30
2.13	Interurban Person Travel Data - Air			800	900	400		900	2.13
2.17	Interurban Person Travel Data - All Modes		500	300				500	2.17
2.21	Interurban Goods Movement Data - Highway	250	300	200				850	2.21
2.22	Interurban Goods Movement Data - Rail	250	200	200				650	2.22
2.23	Interurban Goods Movement Data - Air		50	350				400	2.23
2.31	Interurban Transportation Facilities Data - Highway		100	900				1,000	2.31
2.32	Interurban Transportation Facilities Data - Rail		100	700				800	2.32
4.10	Systems Design and Development		100	1,000	600	500		2,200	4.10
4.21	Geo-Coding System		200	500	100	50	50	900	4.21
4.22	Commodity Coding System		50	150	50	50	50	350	4.22
<u>FUTURE PHASE</u>									
1.40	Urban Activities Distribution Data Methods			100				800	1.40
2.11, 12	Interurban Person Travel Data - Auto, Bus, Rail**				500	200		3,300	2.11, 12
2.24	Interurban Goods Movement Data - Water				1,000	1,500	800	550	2.24
2.26	Interurban Goods Movement Data - Intermodal				50	500		600	2.26
2.27	Interurban Goods Movement Data - All Modes			150	600	4,000	3,000	11,400	2.27
2.33	Interurban Transportation Facilities Data - Air			600	4,250			600	2.33
2.34	Interurban Transportation Facilities Data - Water				50	350		400	2.34
2.35	Interurban Transportation Facilities Data - Pipeline					200	400	600	2.35
2.46	Interurban Activity Distribution Data			400				400	2.46
3.13	International Person Travel Data - Air				50	550		600	3.13
3.14	International Person Travel Data - Ocean				50	250		300	3.14
3.23	International Goods Movement Data - Air			300	50	350	450	800	3.23
3.24	International Goods Movement Data - Ocean					50	150	200	3.24
3.33	International Transportation Facilities Data - Air				50	200		250	3.33
3.34	International Transportation Facilities Data - Ocean				50	300		300	3.34
3.40	International Activities Distribution Data							35,600	3.40
	Total	500	2,000	7,400	10,300	10,500	4,900		

* Includes costs of program specification and contract administration and costs of contracts for (1) research and development, (2) conduct of surveys, (3) data acquisition, and (4) processing of data through to initial tabulations, summaries, publication, and dissemination.

** Principally interurban person travel data in densely-developed regional corridors.

NOTE: Future-year funding is subject to the determination of priorities in future years as well as the availability of funds to the Department.

The following explanatory notes apply to all of the preceding tables - Tables 1 through 5.

1. Cost Estimates

Cost estimates are based on the best knowledge available to the Department of the probable difficulty of the problems most likely to be encountered in the research and development and continuing data acquisition work. Wherever possible, the likely sizes of samples and probable numbers of data cells were taken into account. It is judged that the cost estimates for the projects in the Immediate Phase of the initial transportation information program are in general more reliable than those for projects in the Future Phase of the program.

After exploratory research has been completed on any given project it may be necessary to revise the project cost estimate. However, it is not expected that revisions of individual project cost estimates will lead to revisions of cost estimates for the total program or major portions of the program.

2. Project Descriptions

Projects in the Immediate Phase of the program were described in the preceding section of the report.

However, summary descriptions for all projects (projects in both the Immediate and Future Phases) are contained in a separate appendix, for easy reference. 8/

3. Interurban Person Travel Data

Interurban person travel data are provided for in the initial transportation information program as follows:

project 2.111 - auto travel

project 2.112 - bus travel

project 2.12 - rail travel

project 2.13 - air travel

project 2.17 - travel by all modes

It may appear that since interurban person travel data would be obtained in project 2.17 for all modes that the other projects for obtaining interurban person travel by auto, bus, rail, and air, represent an unnecessary duplication of data collection. Such is not the case.

These projects complement one another.

As noted in the description of project 2.17 in Section II of the report, this project would not yield origin-destination data by modes for specific geographic regions. In this project data will be obtained by means of a stratified,

8/ Refer to Appendix E, p. 201.

clustered sample of households with re-interviews. The sample size would be too small to yield useful origin-destination data, and increasing the sample size to the point where it would yield useful origin-destination data would be prohibitively expensive. (However, a small sample of this type is well suited to obtaining maximum information at least cost on the interurban travel market, for the purposes of analyzing and forecasting the future total interurban travel market, auto-air-bus-rail shares of the market, elasticities of demand between modes and so on).

On the other hand the projects covering interurban travel by auto, air, bus and rail would yield maximum origin-destination data for specific geographic regions at least cost (they would not provide essential travel market data that would be provided by project 2.17). Also the projects covering interurban auto-bus-rail travel would be principally directed to obtaining these data in densely-developed regional corridors - where intermodal competition exists. Data on air travel would be structured so that it could be merged with the auto-

bus-rail data for a given regional corridor. Full use would be made of the analytic and data collection techniques developed for the Northeast Corridor Transportation project for the "regional-corridor" type surveys of auto-bus-rail travel - insofar as they are valid for other regional corridors. For this reason the start dates for these projects are scheduled to coincide with the completion of analysis and data collection for the Northeast Corridor Transportation project. It is expected that these projects would be programmed on a corridor-by-corridor basis.

4. Interurban Goods Movement Data

Generally speaking the points made in the note above on interurban person travel data projects, also apply to the interurban goods movement data projects. Each of the various interurban goods movement data projects in the program complement one another to yield all essential data at least cost.

However, there is a further important point in connection with the freight data projects. The state of the art in interurban freight demand analysis and data collection is not as advanced as that for interurban

person travel analysis and data collection. Therefore a more cautious approach to data collection is indicated, and this is reflected in the design of the goods movement data projects in the initial transportation information program.

The projects for rail-highway-air-water goods movement data provide for basic "waybill" surveys and additionally small shipper-receiver surveys. The "waybill" surveys would provide origin-destination data by modes for specific geographic regions. The shipper-receiver surveys would provide limited freight market data. The experience in data methodology and analysis gained from the small shipper-receiver surveys would provide a basis for deciding on the merits of the larger-scale shipper-receiver survey provided for in project 2.27; and also a basis for deciding on methods to be employed in this project.

9/ For further details on this point refer to Appendix E, p.201.

D. SUMMARY OF INITIAL PROGRAM

The full initial program provides for additional projects to those proposed in the Immediate Phase so that, in sum, over a five-year period a comprehensive, systematized body of transportation data would be available. This would embrace all modes of transportation, (highway, rail, air, water and pipeline), at all geographic levels (urban, interurban - including regional-corridor - and international). The transportation data that would be available would include data on the flows of persons and goods, the activities (population and industry) that generate these flows, and on the channels (transportation facilities including terminals) that carry these flows.

A schedule for performance of the major work projects in the initial program has been proposed (on a five-year completion basis) which reflects the best present judgment of priorities. This schedule is subject to change as new problems arise or as old problems assume greater importance.

The total cost for the full initial information program is estimated at \$35.6 over a five-year period. This is for initial research and development and establishment of

component data systems and includes the \$14.1 million cost for the Immediate Phase of the program.

The estimated annual cost for continuing data acquisition is \$6.5 million - when all component data systems are operating on a continuing basis. This would be the cost of maintaining the data bases of the component data systems in a current state and the cost of furnishing time-series data. Time-series data are essential to effective government and industry transportation analysis, forecasting and planning on a continuing basis - especially in order to take account of changes.

V. IMPLEMENTATION OF THE INITIAL TRANSPORTATION INFORMATION PROGRAM

Shippers, carriers, equipment manufacturers, travel organizations, industry associations, research organizations, local, state, and national transportation agencies, and many others can benefit greatly from the products of the initial transportation information program and each has an important role to play in its implementation. The Department's role is to provide leadership, to weld together mutual interests, to foster co-operation, to ensure co-ordination, and to provide direction to existing and new data collection efforts.

Implementation of the Department's initial transportation information program, whether at the program or project level, consists of several steps, including the following:

- . identifying critical transportation problem areas for industry and government; establishing priorities; and determining analysis and information needs
- . inventorying existing data, and identifying data gaps and duplications
- . establishing frameworks for data systems, geographic standards and definitional standards
- . designing data collection methods; pretesting and validating methods; and determining collection agencies

- . establishing new data collection programs; augmenting or re-structuring existing data collection programs; and providing for dissemination of data, continuing data acquisition, and continuous monitoring of component data systems.

These steps are shown in a tentative work-flow diagram, in Figure 2 on the following page. This illustrates in general terms, the Department's approach at program and project levels, to the implementation of the initial transportation information program. Some of the more important aspects of implementation are discussed below in terms of:

- . co-ordination of supply, production and use of data
- . performance of program work
- . program administration.

A. CO-ORDINATION OF SUPPLY, PRODUCTION AND USE OF DATA

Statements on information needs are contained at several places in the report. These statements need to be sharpened into precise data specifications for the implementation of the information program, and this sharpening must be achieved through close co-ordination of data users' requirements; these requirements must be considered in the light of problems of supply of raw data, and processing of data - whether from existing information programs or new ones.

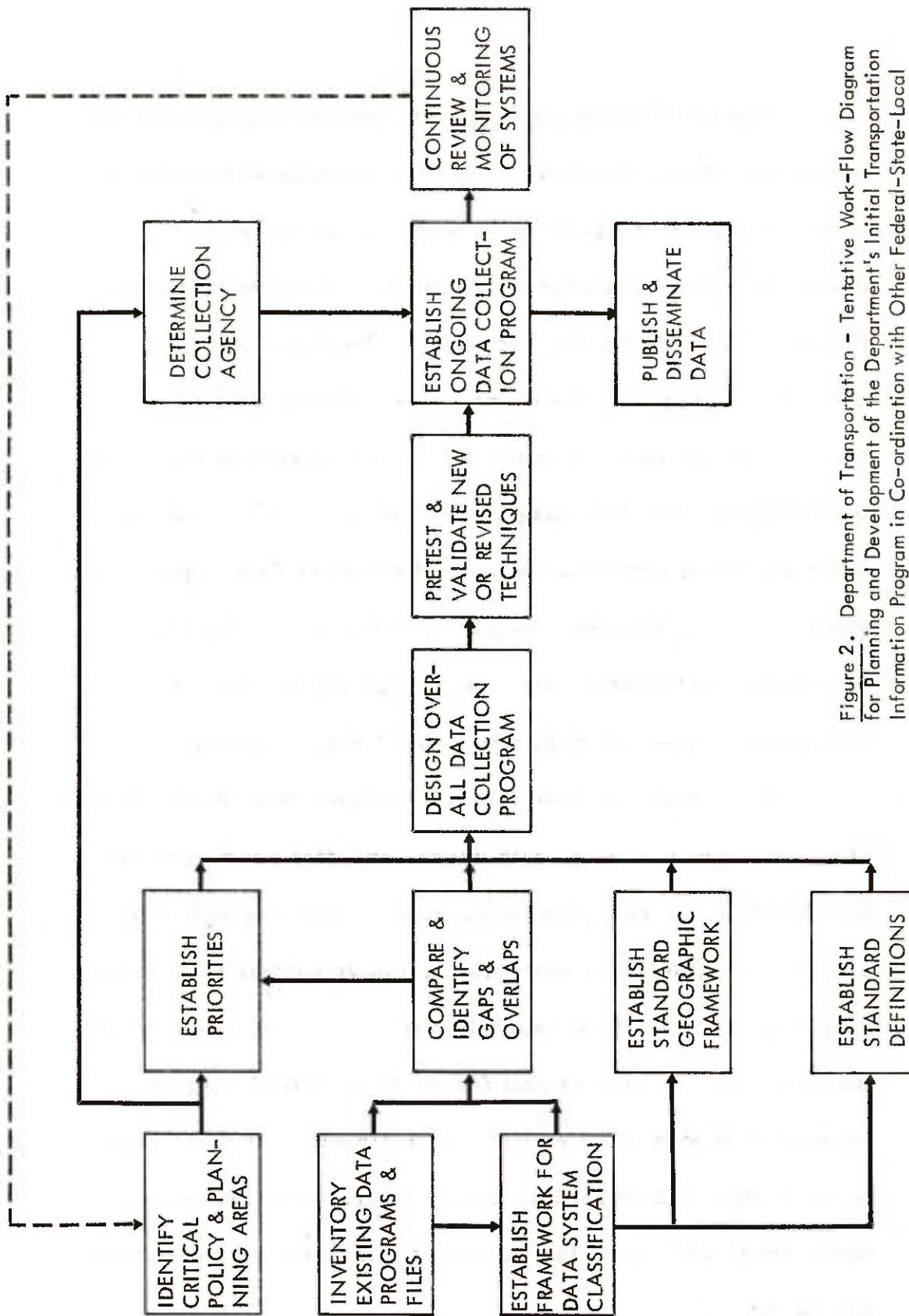


Figure 2. Department of Transportation - Tentative Work-Flow Diagram for Planning and Development of the Department's Initial Transportation Information Program in Co-ordination with Other Federal-State-Local

One of the most important co-ordination problems concerns priorities. There is a need for a continual monitoring of the priorities assigned to the various data projects to ensure that these are changed as changes occur in transportation problems, analysis programs, planning programs, operational programs and so on. Continual monitoring of transportation information priorities is reflected in Figure 2, the tentative work-flow diagram. This must be regarded as a most important aspect of the co-ordination of data requirements since most data projects, require a minimum of 1 to 2 years to produce preliminary data, and changing priorities after data projects are underway will be costly and wasteful.

Co-ordination must achieve a coalescence of the interests of suppliers of raw data, data users, and data producers for both existing and new programs. Often these interests are already combined - for example, an individual railroad company may be a supplier of raw waybill data on the one hand, and on the other hand, a user of rail freight flow statistics produced from waybill data supplied by many railroads. In these cases co-ordination can be easier, but there are many instances where there will be a wide variety of interests and co-ordination will be difficult.

Suppliers of raw data are concerned with the burdens of "reporting" and the confidentiality of some information. Through co-ordination there must be a full understanding of their reporting problems, strict attention to minimum reporting burdens, and careful note of the importance of maintaining confidentiality of certain information. ^{1/}

Data users are concerned with timely data at reasonable costs that will satisfy particular analytic requirements. Again through co-ordination there must be a full understanding of their data requirements and the importance of each of the uses to which the data will be put. Co-ordination in this case will tend to focus on specific data items to be collected, their uses and their priorities; definitions for the data items; geographic identification systems; accuracy requirements; data costs; project phasing; and completion dates.

Data producers are concerned with satisfying data requirements so that maximum information of greatest usefulness is obtained at least cost. Their co-ordination interests

^{1/} Problems in data collection and processing, including the problems of minimizing reporting burden and timeliness of data, are discussed in Appendix F, p. 216.

will tend to focus on: balancing the wide variety of data requirements against uses and priorities to establish a ranking of requirements; clear specification of data items; methodological efficiencies; careful re-structuring of existing program compatibility with other data and information interchange requirements; data systems frameworks; cost estimates; and available funds.

Additionally there are more particular co-ordinative concerns. For example, there is need for co-ordination between the Department and State and local government agencies to determine the proper role of each in transportation information collection and processing (as related to national, state and local transportation planning and policy-making) - including determination of: essential data items; data items to be collected at local, state and national levels; priorities in research on data collection methods; data compatibility; standards and information interchange requirements; and methods of achieving a co-operative restructuring of existing programs.

There is need for co-ordination between the Department, industry associations, carriers, shippers, transportation equipment manufacturers, travel organizations, and Federal transportation agencies to obtain a clear understanding of how

existing programs could be best re-structured to satisfy a wider range of data requirements, and how existing and new programs could be most responsive to users' requirements.

And there is particular need for co-ordination between the Department and other Federal agencies that have programs affecting urban areas, to develop cohesion in the information requirements of each of the many urban area programs so that the establishment of integrated information systems in urban areas is facilitated.

Clearly there exists a variety of inter-related co-ordination requirements rather than a single co-ordination need. This demands an array of co-ordinative arrangements, with inter-connections. The Department is presently studying co-ordination alternatives for transportation information and will present a proposal to interested agencies in the near future. Hopefully an overall transportation information co-ordination plan will be operative within the next year, providing for representation of various Departmental units, Federal-State-local government agencies, private industry, research organizations and others.

Until then, co-ordination will be provided for in a number of ways. For example, as planning work is begun on each project in the initial transportation information program

a co-ordination team will be appointed representing the interests of data suppliers, data users and data producers (particularly those involved in existing programs). This team will review proposals in regard to the project within a cost-effectiveness framework; to ensure that individual interests are satisfied to the greatest extent feasible; to oversee the development of the component data system (or other project); and to monitor continuing data operations. Each project in this way will be provided with a continual "sounding board" to ensure maximum effective use of project funds.

A start along these lines has been made in the case of the project on rail freight flows ("Interurban Goods Movement Data - Rail", project 2.22). In the preliminary planning of this project co-ordination has been effected with the Association of American Railroads, the three railroad traffic associations, the railroads themselves, the Bureau of the Budget, the Interstate Commerce Commission and others; within the Department there has been close co-ordination between the Federal Rail Administration and the Office of the Secretary. This approach needs to be improved upon and formalized, as a basis for co-ordination on each of the other

projects in the initial transportation information program, in order to ensure that the great benefits that can come from government-industry co-operation are fully realized.

Also co-ordination of information requirements for transportation with information requirements in other fields, has been effected through the work of such groups as: the Federal Council for the 1970 Census, the Census Small-Area Data Advisory Committee, the Urban Information Systems Interagency Advisory Committee (USAC), the US American Standards Institute, Bureau of the Budget Committees, and other committees in which the Department has participated actively.

It is recognized that more effective co-ordination of transportation information activities is necessary and can result in large benefits to government and industry. Close co-ordination in the development of the initial transportation information program undoubtedly will provide opportunities for consolidations, improvements, and cost reductions in existing transportation information and statistics functions both within the Department and in other transportation agencies. Full advantage will be taken of these opportunities as they occur. The Department recognizes the need to produce a

co-ordination plan that can be made effective in the near future and will pursue this matter expeditiously.

B. PERFORMANCE OF PROGRAM WORK

The general nature of the total work involved in the initial transportation information program, has been characterized in Section IV of the report as consisting broadly of two types:

- . research and development (estimated to cost a total of \$35.6 million)
- . continuing data acquisition (estimated to cost \$6.5 million annually at peak).

Much of the research and development work will be concerned with technically difficult methodological problems ^{2/}, while typically the continuing data acquisition work will be routinized. There will be some exceptions to these broad generalizations but they are sufficiently accurate for the purposes of considering alternatives for performing the work involved in the initial transportation information program.

^{2/} For a discussion of problems in transportation data collection and processing, refer to Appendix F, p. 216.

Performance of the research and development work will require a relatively large volume of special skills over a relatively short time period. It seems clear that the most efficient way of accomplishing the performance of the research and development work of the initial transportation information program would be through organizations that are already especially equipped to perform this type of work. It should be possible by this means to harness quickly the best available skills for the research and development work involved in each particular work project of the initial transportation information program.

The organizations that have special skills for this type of work could be either government agencies, private firms, universities, research organizations, or combinations of these, and they could undertake to perform work under contracts, interagency agreements or other co-operative arrangements. Government agencies would include such agencies as the Bureau of the Census, Statewide transportation planning agencies, urban transportation planning agencies or other government agencies that have gained experience from previous work or ongoing programs in transportation data collection and processing.

It should also be possible by this means to take full advantage of the existing transportation data that a particular agency may already be collecting and processing under an existing program for their own particular purposes. The skills of their staff in this case may be utilized (and perhaps augmented) to effect a re-structuring of the existing program in order to obtain a more widely useful output. This product could be a set of transportation data that is useful not only to the particular agency conducting the data program but also to a wide group of transportation data users. The needs of the wider group of data users (as well as the general requirements for compatibility between these particular data and other transportation data), would be taken into account in planning the work of re-structuring the existing program.

Accomplishing the performance of the research and development work by hiring special staff in the Department or seeking to establish a special-purpose organization outside of the Department seems to have few real advantages and a number of disadvantages - including the difficulties of quickly re-organizing to meet evolving needs and phasing out of staff with special skills in research and development as the initial

transportation information program moves towards a predominantly continuing data basis.

Performance of the continuing data acquisition work in the initial transportation information program would be significantly different in nature from performance of the research and development work. It would require a steadily increasing volume of skills, with a predominance of lesser skills, due to the routinized nature of the work. This strongly contrasts with the requirements for the research and development work. Maintenance of the data bases of the component data systems in a current state (in the continuing data acquisition stages of projects) would require skills in operating electronic data processing equipment, quality control, data documentation, data management, publication and so on.

It is not clear at this point which one of a number of alternatives would on balance offer the greatest advantages in the performance of the continuing data acquisition work.

Quality of the continuing (time-series) data is most important particularly since the time-series data bases will represent assets of continually increasing value with each succeeding year. It would seem that quality in these data bases

would be best assured by making continuing data acquisition work the responsibility of organizations that have a strong interest in maintaining the data in a current form and in the use of the data in the first instance.

Also there are considerable operational advantages in maintaining large numbers of the basic data files on a decentralized "data network" basis. Information could be called for as needed and could be supplied quickly to co-operating organizations in the data network, and on a less rapid basis to organizations outside the network. In this way in the continuing data acquisition stages of the program, the Department would be able to focus its efforts more on data compatibility, information interchange efficiencies, and advancements in information processing technology, as a basis for continually improving the operation of the data network.

There is a general hierarchy of transportation information concerns ranging from the most detailed information of localized interest for local operations or micro-policy decisions, to broad generalized information of national

interest for national operations and macro-policy decisions. This applies to both government and industry. Desirably at some point in the future continuing data acquisition activities should be so structured that information is maintained at each of the places that it is needed at the level of detail generally appropriate for that place. Then additionally there should be provision for each place to call upon and receive rapidly more detailed information or more generalized information as it is needed from other places. Presumably this would minimize duplication and data costs - even allowing for the costs of transmitting data.

As to alternative arrangements for continuing data acquisition work in the short-term, there will be some cases where because initial research and development work has been accomplished under an interagency agreement, there may be advantages in accomplishing the continuing data acquisition work under an extension of this agreement. Transitional problems in moving from a research and development stage to a continuing data acquisition stage would be minimal. Also the agency that had performed the research and development work may have a bigger stake in the satisfactory

accomplishment of the continuing data acquisition work than an organization starting to undertake this work for the first time. Conversely an organization that knows when it is undertaking the research and development stage, that it will also be performing the continuing data acquisition work; may be more concerned with the longer term implications of the research and development work and thus may have a bigger stake in the satisfactory accomplishment of the research and development work.

There will be other cases where because of the particular nature of the continuing data acquisition work, co-operative arrangements with State governments through the Operating Administrations of the Department would be most appropriate - for example, through the Federal Highway Administration in connection with highway data or motor vehicle accident data.

There will be some cases where continuing data acquisition may be most efficiently performed by private industry. Also a further possibility that deserves consideration is the establishment of a special-purpose non-profit corporation to perform at least some of the continuing data acquisition work

as a service bureau for government and industry - with general direction from a composite group representing data suppliers and data users.

There is a need to carefully study the wide range of alternatives available for the conduct of continuing data activities in order to determine which arrangements are likely to prove most advantageous both to government and industry, particularly with regard to rendering quality service on a timely basis at low cost to a wide variety of data users.

It is felt that these studies of alternatives can best be started during the time in which research and development work is commenced on the earlier projects in the program. This has the advantage that the studies of alternatives can then be based on some real cases. Advance determination of arrangements for the conduct of the continuing data acquisition activities does not seem to offer any significant advantages at this stage, but does have the potential disadvantage that these arrangements may prove unworkable simply because they were not based on real cases.

C. PROGRAM ADMINISTRATION

Successful implementation of the initial transportation information program will depend in large measure on strong leadership on the part of the Department to bring together the numerous separate interest groups and to ensure the execution of the large volume of work that is involved in the program. As the Secretary of Commerce stated in 1965:

"... no one should think that the development of a useful, operational national transportation statistics program is an easy task or one of short duration..." ^{3/}

Besides strong leadership from the Department, successful implementation will depend on the establishment and continued maintenance of viable co-ordinative mechanisms, and improvements in the present allocation of responsibilities for transportation data collection. ^{4/} The key organizational requirements for successful program implementation are:

major strengthening of the Department's present organizational unit for transportation information planning so that it can truly provide leadership on behalf of the Department in the implementation of the initial transportation information program and in the conduct

^{3/} Stated in testimony concerning legislation on a national transportation statistics program. For reference, see Appendix A, p. 131.

^{4/} The present organization of Federal transportation data collection agencies is briefly addressed in Appendix C, p. 162.

of other transportation information activities. (This unit should be strongly equipped with disciplines and techniques related to transportation information, co-ordination of data supply, production and use, program management and research and development of component data systems. Also the unit must have the full support of the heads of the Department and other concerned Federal-State-local and private industry organizations.) ^{5/}

establishment and continued development of efficient co-ordinative mechanisms that effectively represent the interests of the present widely-dispersed suppliers, users, and producers of transportation information. (These co-ordinative arrangements must also be strongly supported by the heads of the various organizational entities involved. In order to perform effectively, they must achieve the active participation and close co-operation of the many organizations interested in transportation information in Federal, State and local government, in private industry, in universities and in other transportation research organizations.)

improvement in the present allocation of responsibilities for transportation data collection so that without compromising the information needs of various agencies, transportation information is collected and processed in the most efficient manner possible. (The present responsibilities for transportation information data collection in most cases were established

^{5/} The Department's present organizational unit for transportation information planning is the Office of Transportation Information Planning under the Assistant Secretary for Policy and International Affairs - in the Office of the Secretary. For further details on the Office of Transportation Information Planning refer to Appendix C, p. 162.

many years ago on what was no doubt the most efficient basis for that time. There is good reason to re-examine these allocations of responsibilities to determine whether significant improvements in the conduct of transportation information activities can be effected by re-assignments of existing responsibilities.)

To provide the necessary leadership on behalf of the Department for the implementation of the initial transportation information program including the accomplishment of the required co-ordination and associated work, will require an increase in the staff of the present organizational unit responsible for transportation information planning - the Office of Transportation Information Planning which is located in the Office of the Secretary, under the Assistant Secretary for Policy and International Affairs.^{6/}

For effective program administration the staffing levels required in relation to the funding levels of the initial transportation information program are as follows:

^{6/} For further details on the Office of Transportation Information Planning, refer to Appendix C, p. 162.

<u>Fiscal Year</u>	<u>Funding Levels for Research and Development Work in the Information Program</u>	<u>Professional Staff Positions Required for Program Administration</u> ^{7/}
	(\$000)	
1969	500	5
1970	2,000	10 to 12
1971	7,400	14 to 17
1972	10,300	20 to 25
1973	10,500	20 to 25
1974	4,900	20 to 25

The lower number in the range of staff positions shown in the rightmost column above, represents the minimum level of staffing required for effective administration of the initial transportation program. The higher number includes additional staff for further study of the total transportation information problem and development of further transportation information programs and plans - either as extensions of the initial program or as new programs (for example, an inter-modal program for transportation safety data).

^{7/} Additionally, supporting non-professional staff positions would be required as follows: fiscal year 1969 - 3; 1970 - 5 to 6; 1971 - 7 to 8; 1972 and beyond - 8 to 10.

In fiscal year 1974 the decrease in the funding level for research and development work would be offset by an increase in the funding level for continuing data acquisition work - thus 20-25 professional staff positions would still be required in fiscal year 1974.

Presently only 5 positions are available to the Office of Transportation Information Planning for professional staff. 8/ In order to have sufficient professional staff to effectively administer the Department's initial transportation information program, an increase of 5 professional positions would be required for fiscal year 1970, a further increase of 4 for fiscal year 1971 and a further increase of 6 for fiscal year 1972 and beyond. Additionally, for the development of new transportation information plans and programs, further increases in professional staff would be required as follows: 2 for fiscal year 1970, 1 for fiscal year 1971, and 2 for fiscal year 1972 and beyond.

If funds are made available at the levels provided for in the program, but staff positions cannot be authorized at the required levels as stated above, it would be preferable to delay project starts thus effecting a "stretch-out" of the transportation information program, rather than to proceed rapidly without effective control of the program. The consequences of delay in the start of projects in the transportation program would be delays in transportation analysis, fore-

8/ At present the Office of Transportation Information Planning has available to it 5 positions for professional staff and 3 positions for supporting non-professional staff, making a total of 8 positions.

casting, planning and policy-making functions which depend on an adequate transportation information base for effective performance.

The Department has been conservative in its estimates of staffing requirements and it is felt that these represent basic minimum levels for adequate administration of the initial transportation information program and development of further programs.

Considering the wide ramifications of the initial transportation information program and the very large benefits to be derived from the program by numerous government and industry organizations, and ultimately by the public in general, it is important that the Department be provided not only with the necessary funds for the program, but also the requisite staffing to effectively administer the program.

D. SUMMARY ON IMPLEMENTATION

Careful co-ordination of the particular transportation information concerns of data suppliers, data users, and data producers (most particularly those administering existing programs) is essential to the successful implementation of the initial transportation information program. The wide variety of industry, government and other interests at national,

state and local levels that would be involved in the implementation of the information program, calls for a structured array of inter-related co-ordinative arrangements rather than a single co-ordinative mechanism. The Department intends to prepare a co-ordination plan to provide for this wide variety of co-ordination needs and hopefully this plan could be made effective within a year.

Meanwhile co-ordination teams will be arranged for each of the projects in the program. A prototype to this approach has already been in use for the interurban rail freight flow data project where co-ordination was maintained with a number of interested government and industry parties. This type of approach needs to be formalized and strengthened. Also the necessary co-ordination of transportation information with other information will be interimly achieved by continued participation in the several groups in which the Department has already played an active role.

The methods of accomplishing performance of the work in the projects of the initial program should take into account the particular nature of the work. Work in the initial program falls into two broad categories - research and development,

and continuing data acquisition. The first category is related to the establishment of component data systems and data methods and requires a large volume of skills over a relatively short time period. This work could be undertaken best by harnessing existing skills outside of the Department in government agencies at Federal, State and local levels, in private industry, universities and other research organizations, through outside contracts, interagency agreements and co-operative arrangements. This would also permit full utilization of data available under existing programs, and re-structuring of existing data programs to serve wider groups of users.

The second category of work (in the continuing data acquisition stages of projects) calls for a steadily increasing volume of skills until all component data systems in the initial program are established on a continuing basis. The work will be routinized in nature. Alternatives for performance of this work need to be carefully considered by the Department in order to ensure that the most advantageous arrangements are ultimately provided for. Study of these alternatives should be undertaken in the research and development stages of some of the earlier projects in the program.

Again because of the wide variety of interests that would be involved in the initial transportation information program, it is essential that the Department furnish strong leadership for the program. This will require increases in the staff of the Department's organizational unit for transportation information planning - from a present total of 5 professional persons to a future total of 25 professional persons, in fiscal year 1972. These increases in staffing requirements have been estimated on a conservative basis and parallel an increase in funding levels from \$0.5 million annually to \$10.5 million annually. Also the increases provide for a small staff for development of additional transportation information programs.

VI. BENEFITS OF THE INITIAL TRANSPORTATION INFORMATION PROGRAM AND FUTURE DEVELOPMENTS

A. BENEFITS

It is difficult if not impossible to place a dollar figure on the benefits to be gained from any information program. Information has such far-reaching consequences, its use can not be controlled and it is difficult to estimate what costly errors would be avoided if a given piece of information were available. But it is clear that information does have a value and can confer sizable benefits that result in real savings.

It is also clear in regard to the initial transportation information program that if transportation information such as is envisaged in the Department's initial program actually existed today, the present state of the art in decision-making on transportation matters would be vastly improved; there would be large real savings as a result of the information made available under the program; ^{1/} and these real savings would have paid for the costs of the program many times over.

^{1/} Parallel development of information, analytic, planning, and decision-making capabilities, are assumed throughout this discussion.

This would be so because it would have been possible for decision-makers to predict the probable future consequences of alternative present transportation decisions with much greater confidence that the real present information and analytic capabilities permit. Transportation decision-makers would have been able to see more clearly the likely future effects of their present decisions, on transportation behavior, transportation markets, and transportation system performance. They would have had available to them an operative cost-effective decision-making process for all modes of transportation.

The types of decisions that would have been improved, would have been like those referred to in Section II of the report, "Critical Transportation Information Needs", and would have included decisions of carriers, shippers, equipment manufacturers, and Federal-State-local government transportation and other agencies in such areas as:

- . location of new highways, reconstruction of existing highways, improvement of highway safety, highway maintenance
- . manufacture of automobiles, buses, trucks, aircraft, rail cars and other conventional transportation equipment; manufacture of new forms of transportation equipment such as the SST, V/STOL, containers, container transports

construction of new mass transit facilities, purchases of new mass transit equipment, location of new public transportation routes, high speed ground transportation

development of potential freight and passenger markets, purchase of new transportation equipment, modernization of terminal and other facilities

expansion of existing airports, new airports, ground-access to airports, improvement of air traffic control systems

rate changes for rail, truck, and air freight; fare structures for air, bus, rail and mass transit passengers; rail, trucking and airline mergers, operating rights, abandonments, routes, etc.

joint development of transportation facilities and adjoining land; integrated urban design of transportation facilities and buildings; and location of warehouses, plants, distribution centers, stores and other buildings

modernization and expansion of port facilities, construction of new pipelines and so on.

The expenditures involved in transportation decisions such as these are enormous - running into billions of dollars. Of perhaps even greater importance is the effect of these decisions on transportation operating costs. These, as noted earlier, are of the order of \$170 billion annually - 20% of the gross national product. ^{2/}

2/ Transportation Association of America, Transportation Facts and Trends, Washington, D. C., April, 1968.

If information as envisaged in the initial transportation information program were available today and could be credited with accomplishing a 1% savings in these transportation operating costs then the return on program costs would exceed 4,000% in a one-year period. An additional return of equal magnitude would result if information from the program could be credited with accomplishing a 1% savings in government-industry investment expenditures on transportation facilities and equipment over a five to ten year period.

These statements of percentage return on investment do not take into account the large and important indirect costs that are involved in transportation investment expenditures - such as social and environmental costs (these should be taken into account in a comprehensive cost-effectiveness decision framework); nor do they indicate the significant impacts of transportation expenditures, and savings in these expenditures, on individual budgets. For example, in some States 70% of capital outlays are for transportation facilities. ^{3/} Also on the average 15% of household expenditures are for transportation items and this share is slated to rise significantly in the future.

3/ U. S. Bureau of the Census, State Government Finances in 1967, GF 67-1, Washington, D. C. 1968.

The percentage returns on the investment in the transportation information program would have been realized as increased value received for transportation expenditures, and avoidance of costly errors in transportation expenditures. As such the benefits would have represented real savings to Federal, State and local governments, transportation carriers, shippers and equipment manufacturers, as well as the traveling public, and the economy in general. Also there would have been substantial savings in administrative costs. Decision-making processes in Congress, Federal, State and local government and private industry would have been made easier and less costly.

To summarize: because of the great magnitudes involved in transportation investment and operating expenditures, it is clear that the benefits to be derived from the implementation of the Department's initial transportation program would be huge - even if the information from the program resulted in only relatively small savings in these expenditures. These savings would constitute a large return on the costs of the transportation information program, paying for its cost many times over. The benefits from the transportation information program would accrue to industry, government, the traveling

public and to the economy in general.

B. FUTURE DEVELOPMENTS

The Department's initial transportation information program provides for critical transportation information needs that will result in high return on the investment involved.

Over a longer term the Department proposes to study other aspects of the overall transportation information problem as a basis for extending the initial program or developing new programs. Provision for these studies is made in the initial transportation information program under project 4. 10, "System Design and Development". ^{4/}

In these studies it will be important to focus on extensions to the initial transportation information program or new information programs which have large potential returns. There is need for an overall structuring of proposals for further developments in transportation information programs - together with costs and benefits, wherever possible, so that these proposals may be considered within a cost-effectiveness framework.

^{4/} Refer to Appendix E, p. 201.

Some examples of possible extensions to the initial transportation information program or possible new transportation information programs, are discussed below.

1. Transportation Safety Data

The initial transportation information program provides for information on accident (safety) experience on a link by link basis as part of transportation network data for all modes of transportation. This would permit the pin-pointing of high accident locations - nationally, within States and by small local areas. Also these data could be combined with other transportation facility data to determine characteristics usually present in high-accident locations. Additionally, the initial program provides for a uniform computer-based geocoding system. This would be most useful for **identifying** the locations of highway accidents.

But these items do not by any means represent an integrated transportation safety data program, which is a highly complex undertaking. The Department's Operating Administrations and the National Transportation Safety Board have ongoing safety data programs but these are based on

significantly different concepts and practices and it is very difficult to compare safety in one mode with safety in another mode. The Federal Highway Administration's program for a safety data network - being developed in close co-operation with State governments - is a laudable effort but is confined to highway safety.

A transportation safety data program is needed to bring together the separate transportation safety information activities of the Operating Administrations and the National Transportation Safety Board. Adequate data bases are essential to effective performance in the Department's transportation safety programs. It is important that this additional information program is developed at an early date so that it can provide an effective support to analyses which form the basis for improved programs in transportation safety.

2. Financial Data on Urban Mass Transportation

Regulatory agencies such as the Interstate Commerce Commission and the Civil Aeronautics Board collect extensive financial data on carriers, but they do not cover urban mass transportation activities as such.

The Department's Urban Mass Transportation Administration presently needs such financial data for studies of the urban mass transportation industry, as a basis for

preparing programs for improvement of mass transportation in the Nation's cities. A related requirement is for information on urban mass transportation needs in each city and on the abilities of each of the cities to pay for needed mass transportation.

Both of these requirements have a high priority in view of the need for to effect improvements in urban mass transportation as expeditiously as possible.

3. Transportation System Performance

Measures of the performance of the transportation system (in aspects besides safety) do not exist. There has been recognition recently of the need for national social indicators to parallel the long-established economic indicators.^{4/} Indicators of the performance of the transportation system are a most important element in a general set of social indicators.

An information base will be needed for these indicators. But before this base is developed it will be necessary to discover indicators that describe the state of the transportation system at any time. Research should be undertaken to determine what these indicators are, what they predict and how the

^{4/} U. S. Department of Health, Education and Welfare, Toward A Social Report, January, 1969.

most economical and efficient system of indicators could be developed.

Development of an information base for indicators of performance of the transportation system would provide the means for a continuous monitoring of the state of the transportation system as a whole and its components. Changes in the state of the transportation system could be related to demographic, economic and land development growth patterns. Re-evaluation of programs and plans would be possible, as they are implemented, so that corrections in resource allocation could be made.

4. Other Future Developments

There are many other transportation information programs that should be considered over the longer term for their potential benefits in relation to costs. Among these are:

- . traveler information services
- . transportation technology data system - for existing and proposed technology
- . equipment supply information
- . transportation facility construction data
- . terminal facilities data
- . emergency transportation data systems.

It is clear that the significant potential benefits from the initial transportation information program could be considerably augmented by the development of additional transportation information programs. The Department will, subject to the availability of resources, continue to study the total transportation information problem to determine the potentially most rewarding further developments in transportation information, as a basis for extending the initial transportation information program or developing new transportation information programs.

C. SUMMARY OF BENEFITS AND FUTURE DEVELOPMENTS

Benefits from the initial transportation information program would be in the form of real savings on transportation expenditures made by government and industry, as a result of improvements in the quality of decisions on expenditures, and the avoidance of costly errors. Additionally, the traveling public and the economy in general would benefit both from these savings and from consequent reduced transportation operating costs. Because the transportation expenditures involved run into billions of dollars, a small savings in relative terms would be very large in absolute terms and would pay for the cost of the

initial transportation information program many times over.

The initial transportation information program would result in large returns on the investment cost, but there are other transportation information programs which also have potentially large benefits - for example, an integrated information program for transportation safety, or an information program on transportation system performance.

Additional studies of the total transportation information problem should be made. Measures of costs and benefits of potential additional programs should be developed wherever possible, so that an array of potential new programs can be considered within a cost-effectiveness framework. The Department intends to continue to study additional aspects of the total transportation information problem, within the limits of available resources, as a basis for developing further transportation information plans and programs.

DEFICIENCIES IN EXISTING TRANSPORTATION INFORMATION

There has been a wide recognition of deficiencies in existing transportation information for a number of years. Investigations and reports on transportation information by Congressional committees and national societies have brought together the views of many who are recognized as authorities in this field. Short excerpts from some of these reports follow.

1. HOUSE SUBCOMMITTEE ON CENSUS AND GOVERNMENT STATISTICS

In 1959 the Subcommittee on Census and Government Statistics of the Committee on Post Office and Civil Service of the House of Representatives characterized the general area of transportation statistics as: "One of the most poorly organized of the Federal statistical fields."

2. NATIONAL ACADEMY OF SCIENCES

In 1960 a special panel of experts in a National Academy of Sciences-National Research Council study of transportation research developed a series of questions for the purpose of evaluating the adequacy of current transportation data, as follows:

"Are available data sufficient to describe the performance of the various transportation activities?

Are they sufficient to enable one to understand the interrelationships of the various transport modes with each other, with the economy as a whole, including its international component, and with various regional and industrial sectors of the economy?

Are they adequate to allow understanding of the effects of transportation upon individual welfare, and the character of rural, urban, and metropolitan life?

Are they adequate to allow an informed assessment of the future developments in the transport field of their effects on each of the above mentioned areas?

Are they adequate to permit the formulation and validation of hypotheses which seek to explain the transport operations as a system phenomenon within a socio-economic framework?

Are they adequate to allow for timely and effective planning for defense needs?

Is the data collection system capable of providing information responsive to current and anticipated needs in a timely and efficient manner? "

It was concluded that in important respects, the data now available are inadequate to answer any of the above questions affirmatively. The National Academy of Sciences - National Research Council's panel of experts further concluded that:

".... (transportation) information is not adequate for scientific examination of the transportation system as a whole, nor its relationships to vital economic, social, political, and defense questions. Without such information it is difficult to identify important problems and promising methods for solution. The present aggregation of organizations collecting transport data does not now provide the information required for the satisfactory understanding of the transportation system as a whole and its ramifying effects." ^{1/}

3. FEDERAL STATISTICS USERS' CONFERENCE

In 1961 the Federal Statistics Users' Conference summarized the difficulties in the field of transportation statistics as follows:

"There is no lack of authority for appropriate statistical developments once it is decided what is to be done. The big problem is the reorganization of present statistics to meet modern needs. Statistical producers are criticized as being reluctant to abandon old series. Yet the administrative responsibilities which led to the establishment of these series remain. Until the reasons for establishing the old series disappear, the series themselves are likely to continue. Likewise, the adoption of new techniques that have great potential for reducing and simplifying the collection of data is likely to be slow because of the need to test new techniques carefully before introducing them on a broad scale.

"Modern mathematical developments, plus computer techniques, offer a tremendous potential for the analysis of transportation data. It is now possible to construct mathematical models and feed actual traffic data into a computer and thereby simulate the workings of the existing or planned transportation network or

^{1/} National Academy of Sciences - National Research Council, Conference on Transportation Research, Woods Hole, Massachusetts, August, 1960, Publication 840.

its parts. At an even higher level attempts are being made to simulate the future growth of a region for each of several possible transportation networks and thereby make a rational choice to select the most desirable development. These techniques, for the better planning of transportation facilities, will require much greater detail than is now available." ^{2/}

4. HOUSE REPORT ON TRANSPORTATION STATISTICS

In 1962 the Committee on Post Office and Civil Service of the House of Representatives in a report entitled "Improving Federal Transportation Statistics" declared:

"..... since there is no Federal agency or even a clearinghouse to fit together the many pieces of transportation and travel information, this fragmentary approach has resulted in duplication and excessive trivia in some systems and complete gaps in others. At present, no one can begin to define the statistical dimension of the transportation universe."

The Committee report identified three major deficiencies in currently available transportation information:

"1. It does not cover all commercial transportation -- the principal major gaps are in the intrastate motor carriers and the exempt for-hire and private motor carriage, but there are serious statistical gaps in other modes, also.

2. It does not provide a comprehensive picture. The available data cannot be brought together into a meaningful evaluation of total freight and passenger movement in this country.

^{2/} Federal Statistics Users' Conference, Round-table Discussion on Federal Transportation Statistics, Washington, D. C., September, 1961.

3. It does not present significant detail on the movement of passengers and freight either nationally or in the geographic regions."

The Committee report stated elsewhere:

"....it is a truism that no overall national transportation policy can be intelligently developed until a meaningful body of facts is assembled, nor would one expect the uncoordinated and highly competitive segments of the industry to work together voluntarily to fill the statistical voids which, in fact, handicap the entire industry." ^{3/}

5. CONGRESSIONAL HEARINGS ON TRANSPORTATION STATISTICS PROGRAM

In 1965 the Secretary of Commerce in Congressional hearings stated in regard to a proposed program for the improvement of transportation statistics;

"...it is necessary to acquire knowledge of present transportation patterns and preferences in order to predict future transportation needs and to ascertain the most efficient ways of meeting them. A fundamental requirement in any effort to develop an efficient and productive national transportation system is that the needs of travelers and shippers must be defined and measured. Reason dictates that these tasks must be approached before the Government or private investors commit large amounts of capital.

"Presently, seven Federal agencies carry on major transportation data collection programs. A number of other agencies collect transportation

^{3/} House Report No. 1700, House Committee on Post Office and Civil Service, Subcommittee on Census and Government Statistics, 87th Congress, 2d Session, Improving Federal Transportation Statistics, May 17, 1962.

statistics in some form. These programs are conducted largely to fulfill the regulatory or operating missions of collecting organizations. It is not suggested that they be replaced or duplicated. It should be recognized, however, that in their present form these programs do not meet the requirements of a large number of users, especially those charged with responsibility for public investment policy." 4/

In connection with these Congressional hearings the Secretary of Commerce submitted extensive written testimony on a National Transportation Statistics Program which included the following statements:

"..... The problem under consideration (the transportation information problem) is of a magnitude and complexity such that a considerable expenditure of effort for a number of years will be required to bring about needed improvements.

"..... The Federal Government spends billions of dollars annually in the transportation field. At the present time information on which rational expenditure decisions can be based is frequently inadequate. To begin data collection anew each time a study is required is wasteful both of time and money. To make major expenditures without adequate study can lead to errors costing millions of dollars. Improperly located highways or airports without adequate ground access may be considered examples. Relatively small expenditures on systematically organized and current information can help prevent such errors.

4/ House Report 89-17, House Committee on Interstate and Foreign Commerce, Sub-Committee on Transportation and Aeronautics, 89th Congress, 1st Session, Commerce Department Transportation Research - H. R. 5863, June 30, 1965, and Senate Report 89-22, Senate Committee on Commerce, Sub-Committee on Surface Transportation, 89th Congress, 1st Session, High Speed Ground Transportation - S. 1588, June 16, 1965 - (underlining added).

"No one should think that the development of a useful, operational national transportation statistics program is an easy task or one of short duration. Above all, it must be the objective of such a program to move away from data collection activities that are narrowly oriented to the needs of individual organizations and that have as their end the production of tabular materials and reports of limited usefulness. An effective program must serve the needs of as many agencies and institutions as possible, with the users' needs being the ⁵major determinant of content and of organization."

5/ See footnote 4 on p. 136.

SURVEY OF EXISTING TRANSPORTATION INFORMATION

Appendix A contained broad views of deficiencies in the transportation information field. Appendix B contains a survey in summary form of the major transportation data items that are being collected under current programs together with evaluations of their usefulness for transportation analysis purposes in industry and government.

At present some thirty Federal agencies and hundreds of State and local government and industry organizations gather transportation data. This survey covers only the major transportation data categories collected by the principal Federal, State, and local agencies.

The data categories listed for the Department of Transportation with few exceptions do not include new data items. Almost all of the data items represented in these listings of data categories were collected under programs which were initiated prior to the establishment of the Department. For the most part these programs have continued in being without change.

Many of the evaluations that follow the listings of data categories have been abstracted from written testimony which

was submitted to Congress in 1965 in support of the enactment of legislation that authorized the Secretary of Commerce to develop a national transportation statistics program.

few exceptions these evaluations still apply today. ^{1/}

1. DEPARTMENT OF TRANSPORTATION

Frequency or
Year of Report

a. Federal Aviation Administration

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| - Airfleet listing, including descriptive data for all active civil aircraft by State and county and for registered civil aircraft operated by domestic carriers | Quarterly and Annual |
| - Air traffic and activity data, including aircraft landings and departures, control operations, and instrument approaches on civil airports; airline schedules; airport traffic levels by type of traffic; general aviation hours flown, type of aircraft, etc. | Annual and Semi-Annual |

1/ The written testimony in support of a National Transportation Statistics Program that contains these evaluations of existing transportation data, is included in House Report 89-17, House Committee on Interstate and Foreign Commerce, Subcommittee on Transportation and Aeronautics, 89th Congress, 1st Session, Commerce Department Transportation Research - H. R. 5863, June 30, 1965, and Senate Report 89-22, Senate Committee on Commerce, Subcommittee on Surface Transportation, 89th Congress, 1st Session, High Speed Ground Transportation S. 1588, June 16, 1965.

Frequency or
Year of Report

- | | | |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| - | Airport facilities and air route data including physical characteristics and traffic control facilities of airports, air traffic patterns, air guidance facilities and air lanes | Monthly |
| - | Aircraft accidents data | Annual |
| - | Pilot qualifications and activity data, including number of pilots and other personnel | Annual |

"Data on airport traffic levels by type of traffic, airport physical characteristics, FAA air route facility and services are available and useful for transportation policy and program research.

"There are some air data that would be highly useful additions to those now collected. One important example is the need for more adequate statistical information on general aviation, especially business flying. General aviation is an important factor adding to congestion at air terminals.

"Information about travel patterns, the nature of the companies owning or chartering aircraft, and the purpose for which these are used would be helpful for future terminal

planning. Airport finances and economics are another gap in the existing information. Both operating cost data and sources of revenue would be useful items of information." 2/

Frequency or
Year of Report

b. Federal Highway Administration

- Motor vehicle data including fuel consumed, vehicles registered, operators licensed, and related fees and taxes collected Annual
- Highway mileage data, including length of existing highways and streets and increments of new construction Annual
- Highway use data including estimates of travel, trip frequency and load of various categories of highway vehicles Annual
- Traffic data including the average daily number of vehicles passing points on the highway system, truck weights at weighing stations, and speed trends Monthly and Annual
- Federal-aid highways data including data on mileage, surface, width, traffic volumes, administration, new construction, expenditures, allocations, construction costs, taxes collected, disbursements

2/ See footnote 1 on p. 139.

	<u>Frequency or Year of Report</u>
- made, highway indebtedness and economic impact of new highways for interstate and other Federal-aid highways	Quarterly and Annual
- Regulated motor carrier accident data, including fatalities and injuries by type of accident and type of vehicle	Annual
- Highway and motor vehicle safety data (A safety data network for interrelating safety data from all States is presently being developed.)	Annual

"Bureau of Public Roads reports do not at the present time cover highway freight movement on a comprehensive basis. The utility of Bureau of Public Roads reports is also limited by the difficulty of obtaining information for areas smaller than States.

"The detailed information is generally retained at the State level and must be obtained from State agencies individually. Also gross vehicle flow information published by Bureau of Public Roads cannot be associated with specific

origins and destinations". ^{3/}

Frequency or
Year of Report

c. Federal Railroad Administration

- Railroad safety data for all railroads, including number of accidents; safety data on locomotives, cars, safety appliances; signals; and hours of service Monthly and Annual

d. U. S. Coast Guard

- Merchant vessel certifications and descriptive data Annual
- Certified seamen data Annual
- Recreational boating data, including numbers and types of registered boats; and numbers and apparent causes of accidents Semi-annual
- Commercial vessel accident data Semi-annual

2. OTHER FEDERAL AGENCIES

a. Interstate Commerce Commission

- Carrier data for regulated interstate rail, highway, domestic water and oil pipeline, freight and passenger transportation companies: including revenues,

3/ See footnote 1 on p. 139. The Bureau of Public Roads was made a part of the Federal Highway Administration with the formation of the Department of Transportation. For comment on statistical information collected by metropolitan transportation planning agencies under programs supported by funds from the Bureau of Public Roads, refer to p. 158 in this appendix

Frequency or
Year of Report

expenditures, profits and losses, value of assets and liabilities, investments, depreciation, employees, payrolls, miles of road operated, fuel consumption, equipment owned and leased, equipment utilization, equipment in linehaul or yard use, operating costs, corporate characteristics and summary data on freight and passengers carried	Monthly, Quarterly, and Annual
- Motor carrier operations data, including single-line, interline, bridge traffic splits, pick-up and delivery, peddle trips and platform handling operations	Quarterly and Annual
- Piggyback operations data	Annual
- Rail freight origin-destination (State-to-State) data, including tonnages, ton-miles, types of commodities, freight revenues, types of cars used. <u>4/</u>	Annual

"While the Interstate Commerce Commission has been collecting extensive information germane to its regulatory obligation, the data are of limited usefulness for transportation policy or program studies.

4/ The ICC's rail freight origin-destination program, which was based on a 1% sample of rail waybills, was terminated in 1967. The ICC is continuing to receive the waybills from the railroads but not process them. This holding action is being supported by funding from the Department of Transportation until such time as the Department can establish the interurban rail freight flow data system - described on p. 54.

"From the point of view of transportation policy making and the studies associated with it, additional data are required in the following areas.

1. Most intrastate carriers do not report to the Commission. Among motor carriers alone, those under ICC authority accounted for a little over one-third of all intercity ton miles carried by truck.

2. With the limited exception of the one percent waybill sample, it is virtually impossible to associate ICC information with the actual origins and destinations of passenger and goods movement. 5/

(a) The great majority of all reports to the ICC is made on a company basis. Both financial and operating statistics are usually company totals or averages which cannot be attributed to the specific geographic areas served by the carrier.

(b) The closest that any ICC information comes to providing origin and destination information is the railroad waybill sample. This sample is a measure of commodity flow between States. Even in this instance, problems of

5/ See footnote 4 on p. 144.

geographic and commodity classification as well as the unevenness of reporting procedures tend to limit the value of the data. No adequate information concerning origin and destination and volume of passengers on rail and motor carriers is obtained." 6/

Frequency or
Year of Report

b. Civil Aeronautics Board

- Carrier data for regulated domestic air carriers, including revenues, expenditures, profits, and losses, value of assets and liabilities, investments, depreciation, employees, payrolls, route-miles operated, equipment utilization, operating costs, and summaries of seat-miles, passengers, passenger-miles, and cargo ton-miles Monthly,
Quarterly
and
Annual

- Airport activity data, including number of aircraft departures, and volume of passengers, freight, express, and mail traffic generated at each airport serviced by certificated route carriers Semi-annual

- Air passenger origin-destination data, including numbers of air passengers carried between city pairs, terminal to terminal only Quarterly
and
Annual

6/ See footnote 1 on p. 139.

"There are some important areas that are not currently covered by the (CAB) program. The first of these is the rapidly growing field of aircargo service. Commodity flows and origins and destination statistics will become increasingly important.

"There is need for data on passenger market areas served by major airports. Another area of importance is the need for data on complete user travel time and costs, including those to and from airports." 7/

	<u>Frequency or Year of Report</u>
c. <u>Corps of Engineers, Department of Defense</u>	
- Water freight origin-destination data, including domestic traffic at ports and on inland and coastal waterways, tonnages, ton-miles, types of commodities, freight revenues, types and drafts of vessel used, number of shipments, number of vessel trips	Annual
- Vessel data, including number of vessels, capacity and horsepower by operator, and descriptions of operations for domestic inland and coastal operations	Annual
- Waterways data, including physical characteristics such as depths and areas, and traffic volumes and types, for inland and coastal waterways, canals, ports, and harbors	Annual

7/ See footnote 1 on p. 139.

"These statistics are detailed and comprehensive and are useful for transportation research and policy studies. The geographical and commodity classification systems used are unique and it has been difficult to make the data compatible with those obtained from other sources, such as the ICC.

"Due to the decentralized reporting and timelags in compilation it is frequently necessary for users to request special tabulations in order to obtain timely information." ^{8/}

Frequency or
Year of Report

d. Maritime Administration, Department
of Commerce

- | | | |
|---|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| - | Labor force data, including seafaring, long-shore and shipyard employment, job distribution, and compensation | Monthly
Quarterly,
and Annual |
| - | Vessel inventory data, including type and tonnage for Government-owned, U. S. -Flag and foreign-flag vessels of 1,000 gross tons and over | Quarterly
and
Annual |
| - | Vessel inventory change data, including ship construction, repairs, costs, sales, deliveries, transfers, and scrappings | |

"These statistical programs are limited to the study of merchant fleets, maritime labor, and similar subjects in

^{8/} See footnote 1 on p. 139.

this sector of the economy. Little or no information is available on passenger or goods flows." 9/

Frequency or
Year of Report

- e. Bureau of the Census, Department of Commerce
- Commodity survey data for manufacturing industries, including month of shipment, types of commodity, number of shipments, weight of shipment, mode of transportation, and origin-destination by very broad geographic regions 1963, 1968
 - National travel survey data for intercity and other long trips, including number of trips made, distance of trips, mode of transportation, size of party, socio-economic characteristics of travelers, and origin-destination by very broad geographic regions 1963, 1968
 - Truck fleet data, including number of trucks, body types, capacity, use, miles driven, area of operation and business of owner 1963, 1968
 - Truck, bus, and public warehousing operations data 1963, 1968
 - Foreign trade data, including commodity shipped, net quantity, dollar value, country of origin or destination, and for shipments by vessel the foreign and domestic ports of lading and unloading, and shipping weight Monthly and Annual

9/ See footnote 1 on p. 139.

- Urban transportation data, including origin-destination data for journeys to work together with the principal mode of transportation used; also data by place of residence on number of households, income, automobile availability, family size, family composition, occupation, industry of employment, etc.

1960

The commodity transportation surveys produce information of value for a general overview of shipments outbound from manufacturing plants. They do not cover inbound shipments to manufacturing plants nor shipments of agricultural, mining or other non-manufactured goods. The origin-destination areas for the manufacturing shipments are very broad geographic regions such that the data cannot be used for transportation analyses for policy-making, such as freight demand market analysis, except at very gross national levels. The absence of data on freight revenues or shipping costs and on shipment times also severely limits the usefulness of the data for transportation demand analysis, forecasting, planning and policy-making.

The information produced from the national travel surveys provides a general overview of the national travel market, but does not permit analysis of travel by all modes or analysis of origin-destination patterns except at very gross national levels. Nor does it permit intensive analysis of the national travel market for the purposes of quantifying the determinants of total interurban travel demand, the modal shares of this demand, or the direct and cross elasticities of this demand. These analyses are essential to forecasts of the total interurban travel demand and modal shares of the demand, and for estimating the conditions under which changes are likely to occur in these demands.

The truck inventory and use surveys provide useful information on the total numbers of trucks in each State by truck types, also information on the general usage of the trucks, but they do not provide origin-destination information on truck movements, nor on the commodities carried, freight revenue, distance of shipments, etc.

The foreign trade data provide useful data on exports and imports but they do not contain information on the true origins and destinations of imports and exports, which is important information for planning and market analysis related

to both the port facilities themselves and the networks of transportation facilities that serve the port facilities.

The urban journey to work data available from the 1960 Census of Population were severely limited in their usefulness since the place of work was identified in gross geographic terms (large cities or counties). It is expected that for the 1970 Census of Population and Housing, place-of-work will generally be coded to block or blockface and will be available by small areas within cities and counties, thus greatly enhancing the usefulness of the journey to work data for urban transportation planning and other purposes. Because these data will contain a large number of observations (20% sample rate) they will even be useful for detailed analysis of urban mass transportation requirements.

The most serious shortcoming of the journey to work data and the other urban transportation data available from the censuses of population and housing is due to the ten-year period between censuses. During these periods great changes can and do occur which make it necessary for metropolitan transportation planning agencies to undertake costly and time-consuming inter-censal surveys. Mid-decade censuses of population and housing (in addition to the decennial censuses) would considerably reduce the problem but so far legislation

authorizing mid-decade censuses has not been enacted. 10/

f. Other Federal Transportation Statistics Programs

In addition to the major programs reviewed above, many Federal agencies collect transportation or transportation-related data. Among these are:

- Office of Business Economics, Department of Commerce
- Bureau of International Commerce, Department of Commerce
- Public Health Service, Department of Health, Education and Welfare
- Office of Education, Department of Health, Education and Welfare
- Bureau of Mines, Department of Interior
- Immigration and Naturalization, Department of Justice
- Bureau of Customs, Department of Treasury
- Department of Agriculture
- Department of Labor
- Federal Power Commission

10/ Mid-Decade Census (HR 7659) passed the House in August 1967. The Senate Post Office and Civil Service Committee held hearings but took no further action. The bill provides for a census of population and housing in 1975 and every ten years thereafter. This authority together with the present authority for decennial censuses of population and housing would permit the gathering of important data for urban transportation planning and other purposes at 5-year instead of 10-year intervals.

STATE AGENCIES

	<u>Frequency or Year of Report</u>
a. <u>Departments of Transportation or Highways</u>	
- Highway inventory data, including functional classification, number of lanes and roadways, median type and width, surface and shoulder type and width, right-of-way width, pavement sub-base, year built, hydro-graphic features, adjoining land uses, details of bridges, over-passes and other structures, rail-road grade corssings, etc.	Varies from State to State
- Maintenance, geometric and control data, including surface and other condition ratings, location of culverts, drains, guardrails, delineators, reference posts, illumination, roadside areas, landscaping; vertical and horizontal curves; overhead signs, roadside signs, traffic control devices, sight distances, passing zones, etc.	Varies from State to State
- Traffic data, including speeds, average daily traffic, types of vehicles, sizes, weights, occupancy, directional counts, truck weights at weighing stations	Usually Annual

The above data are usually available by highway segments for Federal-aid highways and non-Federal-aid State highways. The county, city, township or borough in which the highway segment is located is generally indicated in machine-readable forms of the data, but exact locations are seldom referenced (for example, by geographic co-ordinates).

The usefulness of these data is severely impaired for State-to-State comparisons, multi-State and national purposes, since the types of data collected, definitions, and formats vary from State to State, making them difficult, costly, and time-consuming, to reduce to standardized or compatible forms.

Several States have recently established Departments of Transportation. Plans are under way for broadening the data base in these states to include data on modes of transportation other than highways. For example, some are considering obtaining State-wide origin-destination data for travel and goods movement by all modes. ^{11/}

Frequency or
Year of Report

b. Police Departments

- Accident data, mostly involving motor vehicles including fatalities, injuries, property damage, number and type of vehicles involved, weather conditions, road surface visibility, light, time of day, day of week, date, location - such as intersection, county, city, township or borough, etc.

Varies from
State to State

11/ Papers on Statewide Transportation Planning presented by New York State officials at National Academy of Sciences - National Research Council's Highway Research Board annual meeting, January, 1969.

The usefulness of these data is severely impaired for State-to-State comparisons, multi-State and national purposes since the types of data, definitions, and formats vary from State to State. The Department's National Highway Safety Bureau in the Federal Highway Administration has started a program to effect standardization of important elements of data in motor vehicle accident records.

Frequency or
Year of Report

c. Departments of Motor Vehicles

- Motor vehicle registration data, including types, fees, and addresses of registered owners Annual
- Motor vehicle operator license data, including number, type, fees, and addresses of operators Annual

The Departments of Motor Vehicles also collect data on motor vehicle accidents.

d. Public Service or Utility Commissions

- Carrier financial and operating data for intra-state regulated carriers including profits and losses, revenues, and expenditures, investments, depreciation, employees, routes operated, equipment utilization and operating costs. Varies from State to State

These data vary considerably from State to State.

4. LOCAL GOVERNMENT AGENCIES

Over the past 15 years metropolitan transportation planning agencies in about 200 urban areas have assembled comprehensive transportation planning data - generally of the sorts described below.

The bulk of the funding to support these urban metropolitan transportation planning agencies has come through the States from the Bureau of Public Roads (which is now part of the Department of Transportation's Federal Highway Administration) under programs authorized by Section 134, Title 23, U. S. Code. Some of the funding has come from the Department of Housing and Urban Development's planning programs authorized by Section 701 of the Housing Act. State and local government matching funds approximate one-third of the total funds under these programs.

	<u>Frequency or Year of Report</u>
- Transportation facilities network description data for each link in the primary arterial highway network and the bus-rail-subway mass transit network, including length, capacity, traffic volumes, travel time, impedances to flow and location of link in relationship to other connecting links	Years of Data Varies from Area to Area

Frequency or
Year of Report

- Origin-destination trip data for persons and motor vehicles, including location of origin and destination, start and end time, mode of transportation, trip purpose, land use activity at origin and destination, socio-economic data for traveler such as age, sex, occupation, industry, and household data such as income, residential density, automobile availability, etc. Year of Data
Varies from
Area to Area

- Land use data, including location of site, type of land use (such as residential, commercial, educational, transportation, and vacant), quantity of land area used, and intensity of land use - measured as number of housing units, residents, employees, or floor area Year of Data
Varies from
Area to Area

- Data on population, economic activity, costs and financing of transportation facilities, social and commodity values, goals, objectives and future plans Year of Data
Varies from
Area to Area

"...A good deal of progress has been made toward improving the quality of this information and in standardizing the statistics that are collected.

"These planning-oriented data collection activities among the most valuable of all transportation statistics programs. Information is collected in great detail, including

specific origins and destinations of travel and goods movement. ^{12/}

"This information is now available only from the State and local sources engaged in its collection, and does not at this time contain sufficiently detailed intercity movement data. Making these statistics centrally available would be a very helpful step. Further action also needs to be taken in achieving across-the-board data standardization." ^{13/}

The particular value of these data is that for a given urban area they are comprehensive and inter-relatable. They generally cover all travel and transportation facilities in the urban area regardless of mode. Because they are inter-relatable they permit computer simulation of travel in the networks of transportation facilities, which is a significant aid to analysis of transportation problems and the testing of plans for new facilities. Also they permit quantitative statements of relationships between kinds and quantities of land uses

^{12/} The data on urban goods movement are not comprehensive. Usually they cover truck trips only, and the principal information collected is on origins and destinations and truck type. Information on commodities carried, or freight revenue, for example, is seldom obtained. In a few cases attempts have been made to obtain more comprehensive urban goods movement data.

^{13/} See footnote 1 on p. 139.

and the amounts of transportation required to adequately serve the land uses. This can facilitate closer ties between transportation planning and comprehensive land development planning, as well as integrated urban design of transportation facilities, buildings and other physical facilities.

The principal disadvantage of these data is that they are very difficult to use for planning or comparative analysis at geographic levels beyond the particular urban area for which they were collected, such as for State-wide or multi-State planning. This is because the data are not fully standardized as to definitions or geographic location coding methods, and because they are collected at varying points in time, generally on a "one-shot" basis. Also much better data are required for determining the social and environmental impact of proposed transportation facilities in urban areas.

Recent extensions to the urban transportation planning programs provide for continuing data collection under the "surveillance" element of the continuing planning process. ^{14/} The opportunity exists now to place these data collection programs on a standardized basis in order to start to overcome in the near future in new data collection efforts, the sorts of

^{14/} For details on "Surveillance" and continuing data operations in urban transportation planning, refer to Appendix G, p. 233.

disadvantages that are inherent in the present data. Standardization should be preceded by a determination of the best data collection methods - through research and development studies. These should be undertaken now so that results can be made use of, in metropolitan data collection operations in the near future.

RESPONSIBILITIES AND ORGANIZATION FOR TRANSPORTATION
INFORMATION ACTIVITIES

This appendix contains a discussion of the responsibilities and organization for transportation information activities under the following headings:

- . general organization of transportation information data collection
- . departmental legislative mandates on transportation information
- . establishment and organizational position of the Office of Transportation Information Planning
- . mission and functions of the Office of Transportation Information Planning
- . organization of the Office of Transportation Information Planning
- . policies of the Office of Transportation Information planning

1. GENERAL ORGANIZATION OF FEDERAL TRANSPORTATION DATA COLLECTION AGENCIES

Prior to the establishment of the Department of Transportation in April, 1967, seven Federal agencies conducted major transportation data collection programs ^{1/} and a number of other agencies collected transportation statistics in some form. The transportation information programs of these agencies were conducted largely to fulfill the regulatory or operating missions of the collecting organizations. The total product of these programs was characterized by fragmentation, major gaps and significant data incompatibilities and other deficiencies, as discussed in Appendixes A and B.

With the formation of the Department two of the seven Federal agencies in their entirety, and organizational units of an additional two of the seven agencies, became parts of the Department of Transportation and the National Transportation

^{1/} The seven Federal agencies that conducted major transportation data collection programs were: (a) the Bureau of Public Roads, Department of Commerce; (b) the Corps of Engineers, Department of the Army; (c) the Federal Aviation Agency; (d) the Bureau of the Census, Department of Commerce; (e) the Civil Aeronautics Board; (f) the Interstate Commerce Commission; and (g) the Maritime Administration, Department of Commerce.

Safety Board. ^{2/} But there have been no significant improvements in the transportation information activities of these agencies, nor have there been significant improvements in the transportation information activities of the other major Federal transportation data collection agencies, since the formation of the Department. ^{3/} Thus the problems of fragmentation, major gaps and significant data deficiencies have continued to exist.

The Department has made some efforts to reduce these problems through its Transportation Information Planning activity, which is discussed below, but to date these efforts have not had a noticeable impact on the existing body of transportation information. The principal reason is that the resources applied to the problem have not anywhere near matched the expenditures required to effect any noticeable improvement.

^{2/} Namely the Bureau of Public Roads, and the Federal Aviation Agency; and organizational units of the Interstate Commerce Commission and Civil Aeronautics Board that were concerned with aspects of transportation safety.

^{3/} In fact one important and valuable program that had been operated since 1946 was terminated in December 1967 owing to budgetary cuts - namely the 1% sample of rail waybills - administered by the Interstate Commerce Commission. The Department's project entitled "Interurban Goods Movement Data - Rail" (project 2.22) is intended to replace this program on an improved basis.

The Department's initial transportation information program provides for resources at the level required to bring about the needed improvements. Additionally, to bring about necessary improvements, the Department must be able to provide strong leadership in the implementation of the transportation information program. It can provide this necessary leadership by strengthening the present organizational unit for transportation information planning - the Office of Transportation Information Planning. Organizational requirements of the Office of Transportation Information are discussed below - after the following section on legislative mandates.

2. DEPARTMENTAL LEGISLATIVE MANDATES ON TRANSPORTATION INFORMATION

The Department's authorities in regard to transportation information include two broad legislative mandates.

Under Section 4 of the High Speed Ground Transportation Act, 1965, the Secretary of Commerce was authorized to:

"... collect and collate transportation data, statistics, and other information which he determines will contribute to the improvement of the national transportation system. In carry-out this activity, the Secretary shall utilize the data, statistics, and other information avail-

able from Federal agencies and other sources of the greatest practicable extent. The data, statistics, and other information collected under this section shall be made available to other Federal agencies and to the public insofar as practicable." (PL 89-220, Sec. 4.)

Although this authority was enacted as Section 4 of the High Speed Ground Transportation Act as a matter of legislative convenience, it clearly relates to national transportation data, statistics and other information which will contribute to the improvement of the national transportation system, and it is clearly separate and distinct from all the other provisions of the High Speed Ground Transportation Act. ^{4/}

^{4/} Section 12 of this Act provided that "except for Section 4, this Act shall terminate on June 30, 1969." - extended by recent amendment to June 30, 1971. Thus a time limitation was placed on the authorities provided under the Act relating to high speed ground transportation, but this time limitation was expressly excepted from applying to the authorities provided under the Act in regard to transportation data, statistics and other information (in Section 4 of the Act). Also the oral and written testimony that was presented in support of the enactment of Section 4 clearly indicates that it was intended that this Section 4 authority would apply to national transportation information programs, not high speed ground transportation.

Under the Department of Transportation Act, 1966, this legislative authority pertaining to transportation information (contained in Section 4 of the High Speed Ground Transportation Act) was transferred from the Secretary of Commerce and vested in the Secretary of Transportation.

Also under the Department of Transportation Act the Secretary of Transportation was charged with the responsibility to:

"...promote and undertake development, collection, and dissemination of technological, statistical, economic, and other information relevant to domestic and international transportation..." (PL 89-670, Sec. 4 (a)).

These two legislative provisions provide the Department with a broad statutory basis for the planning and the development of transportation information programs.

3. ESTABLISHMENT AND ORGANIZATIONAL POSITION OF OFFICE OF TRANSPORTATION INFORMATION PLANNING

In recognition of the particular importance accorded the transportation information function in legislative mandates and in view of the particular importance of this function to the achievement of Departmental objectives, the Department has established and maintained a separate transportation information

planning office to provide the requisite leadership on behalf of the Department in the planning development and implementation of transportation information programs.

This office, which is known as the Office of Transportation Information Planning, was established within the Office of the Secretary when the Department was formed in April, 1967.

A predecessor office to the Office of Transportation Information Planning was established in April, 1966, by the Secretary of Commerce to develop and implement a national transportation information program pursuant to the authority provided under Section 4 of the High Speed Ground Transportation Act, 1965. The staff and unexpended balances of funds were transferred from this office to the new office created by the Secretary of Transportation.

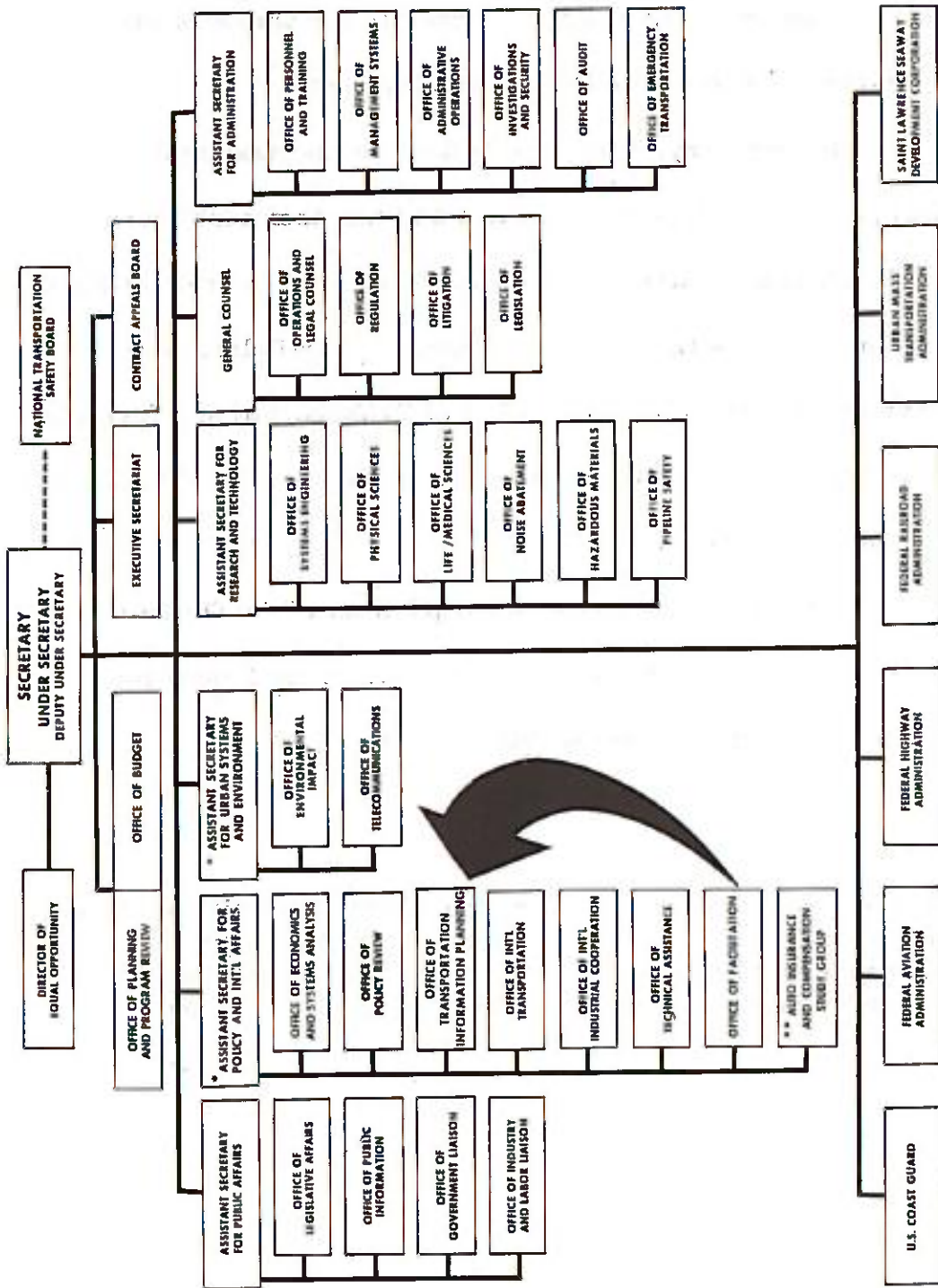
Initially the Office of Transportation Information Planning was located within the Office of the Assistant Secretary for Research and Technology. In September, 1968, the Secretary transferred the responsibility for the transportation information function from the Assistant Secretary for Research and Technology to the Assistant Secretary for

Policy Development and accordingly the Office of Transportation Information Planning was transferred to the Office of the Assistant Secretary for Policy Development. ^{5/}

In February, 1969, the Offices of the Assistant Secretary for Policy Development and the Assistant Secretary for International Affairs and Special Programs were combined into the Office of the Assistant Secretary for Policy and International Affairs. The Office of Transportation Information Planning is now located in the Office of the Assistant Secretary for Policy and International Affairs.

The present organizational position of the Office of Transportation Information Planning within the Department is shown in Figure 3 on the following page.

^{5/} Shortly before the transfer, the office was retitled "Office of Transportation Data Research" but the title "Office of Transportation Information Planning" is to be retained in future - hence the use of this title throughout the report.



* THESE ASSISTANT SECRETARIES WERE DESIGNATED ON 2/7/1969 AND THEIR ORGANIZATIONS ARE IN THE DEVELOPMENTAL STAGE
 **EXPIRES MAY, 1970

Figure 3: Organization Chart Showing the Position of the Office of Transportation Information Planning in the Department.

4. MISSION AND FUNCTIONS OF OFFICE OF TRANSPORTATION INFORMATION PLANNING

The stated mission of the Office of Transportation Information Planning is to "provide leadership on behalf of the Department in the planning and development of a comprehensive program to improve the accuracy, compatibility, relevance and cost effectiveness of data collected and information developed therefrom relating to the Nation's transportation system and its safety."

In carrying out this mission the Office of Transportation Information Planning is required to undertake a wide range of functions including those listed below. Many of these functions must be undertaken in close co-ordination with numerous agencies within and outside the Department.

- a. Provision of leadership in the planning, development and implementation of transportation information programs to meet the needs of users both within and outside the Department
- b. Co-ordination of the transportation information needs of users in industry, government, universities and other research organizations to identify transportation and transportation-related data required to support transportation analysis, forecasting, planning, policy-making and other transportation functions in industry and government.

- c. Provision of an overview to ensure that the transportation information collection and processing activities of the various modes of transportation are balanced.
- d. Development of recommendations for co-ordination and consolidation of transportation information activities within the Department to achieve more relevant, more compatible and more timely transportation and safety data at lesser cost.
- e. Co-ordination of transportation information activities of the Department with related information activities of other agencies of the Federal, State and local government, private industry, industry associations and other organizations.
- f. Development of systems and techniques for the collection, processing and dissemination of required transportation and transportation-related data; formulation of methods for measuring different elements of the transportation process, including the movement of people and goods, the networks of transportation arteries, the rates of flow along arteries, and the activities located at trip origins and destinations.
- g. Providing for the synthesis and merging of transportation and transportation-related data for greater usefulness.
- h. Development, testing and initial implementation of collection and processing of data until component data systems can be taken over by designated operational agencies for regular collection and maintenance of data.
- i. Provision of overview and technical guidance on collection, processing, and analysis of transportation and transportation-related data to elements of the Department and other transportation agencies.

- j. Development of statistical treatment of transportation and transportation-related data to provide an improved information base and transportation indicators for transportation planning, policy making and other functions of the Department and other transportation agencies.
- k. Dissemination of transportation and transportation-related data in the form of publications, computer tapes, tabulations, and maps; provision of a clearinghouse for transportation data; publication of an annual index to transportation data.

5. ORGANIZATION OF THE OFFICE OF TRANSPORTATION INFORMATION PLANNING

The organization of the Office of Transportation

Information Planning is discussed under the following headings:

- (a) major activities of the Office of Transportation Information Planning, (b) staffing of the Office of Transportation Information planning, and (c) co-ordinative arrangements.

a. Major Activities of the Office of Transportation Information Planning

The functions of the Office of Transportation Information Planning will be carried out through three major activities as follows:

- . Planning - dealing with the establishment of transportation information programs; co-ordination of data users needs; determination and specification of data requirements; determination of format of computer files and unit records; determination of required accuracy of data; standardization of common data elements and codes; determination of operational agencies for regular collection and updating of data, etc.

- . Research - concerning "best" ways and means of satisfying specified transportation information requirements; design and development of sampling methods; devising of new data collection techniques; keeping abreast of new developments and improvements in information technology, etc.

- . Development - providing for development and implementation of the systems and procedures for furnishing the required data; publication and dissemination of initial data; transfer of developed and operational component data systems to designated operational agencies; monitoring of continuing data acquisition activities in operational agencies, etc.

b. Staffing of the Office of Transportation Information Planning

Considering that the bulk of the research and development work in the initial transportation information program will be performed under outside contracts, interagency agreements or other co-operative arrangements, the professional staff of the Office of Transportation Information Planning will be principally engaged in such tasks as co-

ordination of data users' requirements, specification of data items to be collected, determination of measurements to be used, formulation of accuracy requirements, etc. Decisions on these matters will form the basis for the development of specifications of research and development tasks to be performed under outside contracts, interagency agreements, or other co-operative arrangements.

The organization chart for the Office of Transportation Information Planning, Figure 4, on the following page indicates the types of professional staff that would be required to carry out this work most efficiently. These staff are organized in three divisions that correspond to the main types of activities in which the Office of Transportation Information Planning would be engaged - namely, planning, research and development.

The organization chart, Figure 4, shows peak staffing levels. As noted in Section V of the report these staffing requirements have been developed on a conservative basis and are considered the basic minimum for effective program administration, and development of new programs.

Staffing levels by fiscal year are shown below for each fiscal year based on program funding levels as follows:

PROGRAM FUNDING LEVEL

(\$000)

1969	500
1970	2,000
1971	7,400
1972	10,300
1973	10,500
1974	10,500
	4,900 (continuing data funding would reach \$6.5 million in this year)

	<u>Professional Positions Required</u>	<u>Nonprofessional Positions Required</u>	<u>Total Positions Required</u> ^{6/}
'69	5	3	8
'70	10 to 12	5 to 6	15 to 18
'71	14 to 17	7 to 8	21 to 25
'72	20 to 25	8 to 10	28 to 35
'73	20 to 25	8 to 10	28 to 35
'74	20 to 25	8 to 10	28 to 35

As noted in Section V of the report, the lower number in each range represents the minimum level of staffing required for administration of the initial transportation information program. The higher number in the range provides for additional staff study of further aspects of the total transportation problem in order to provide for expansion of the initial transportation information program to meet additional data needs or for the further development of new transportation information programs - for example, for transportation safety data.

OFFICE OF TRANSPORTATION INFORMATION PLANNING

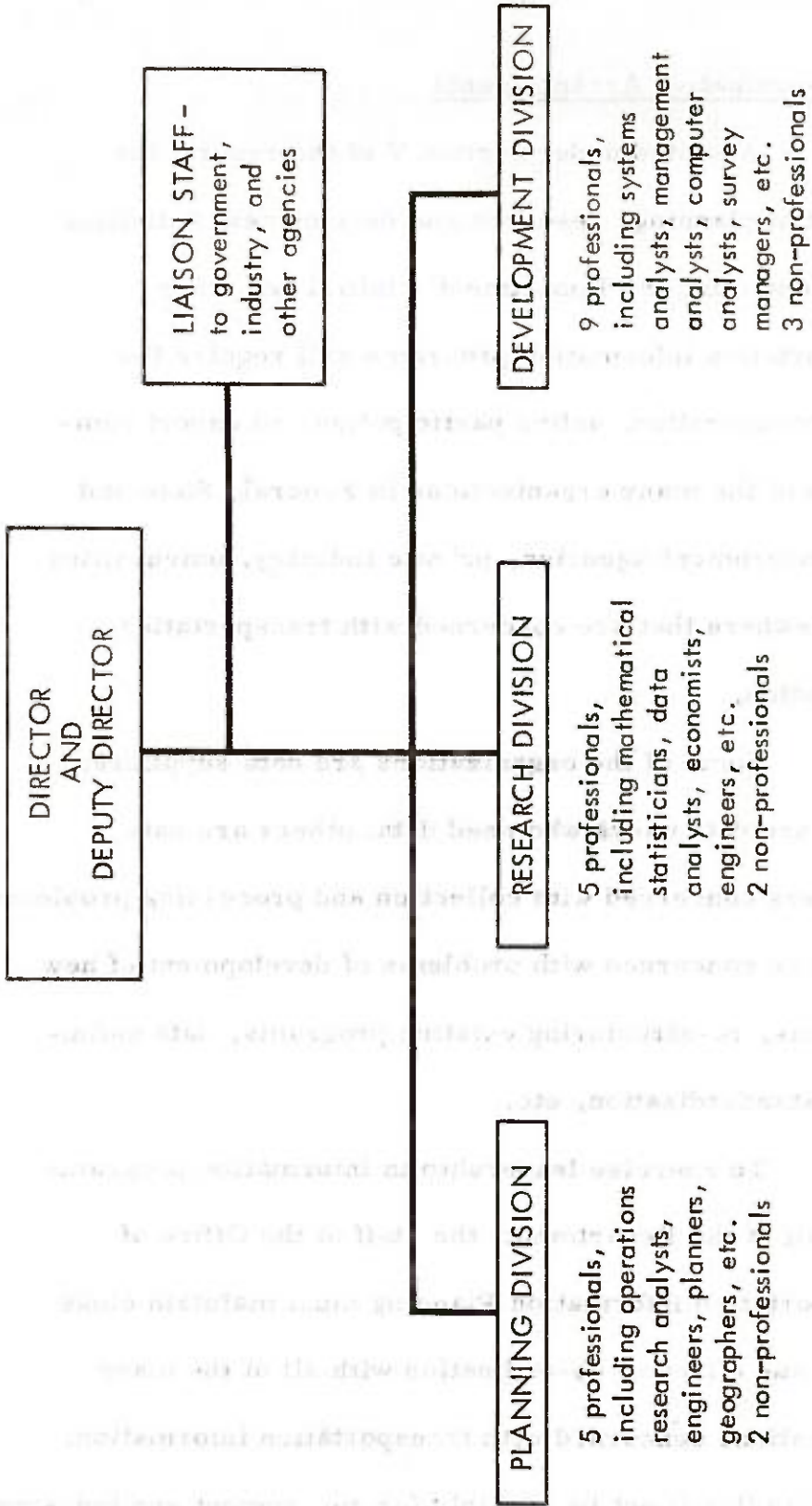


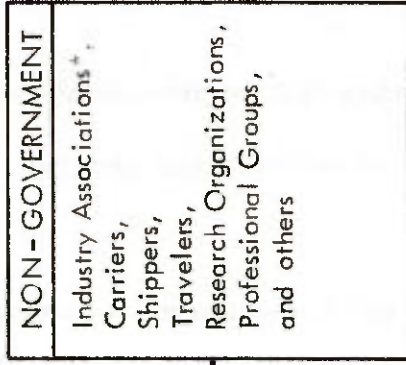
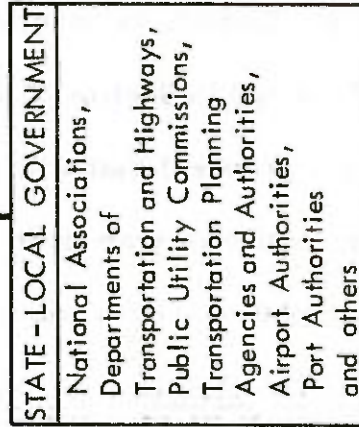
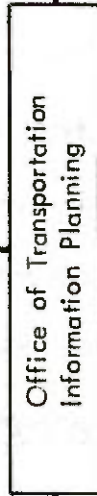
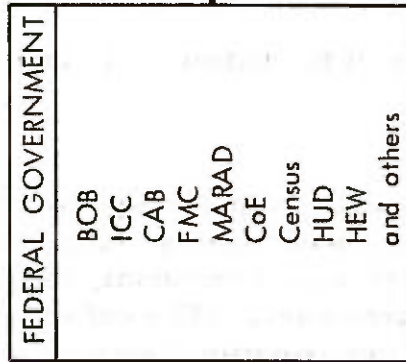
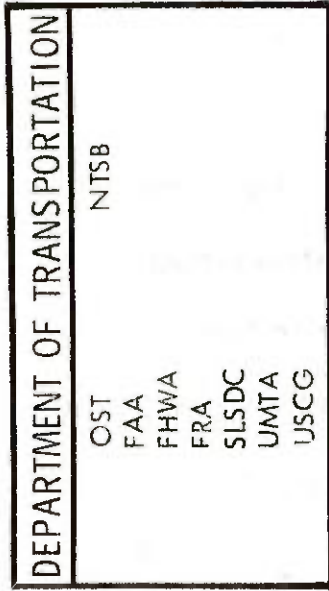
Figure 4: Office of Transportation Information Planning - Organization Chart for Administration of Initial and Development of Other Transportation

c. Co-ordinative Arrangements

As noted under Section V of the report, the conduct of planning, research and development activities in implementing the Department's initial and other transportation information programs will require the close-co-operation, active participation and expert competence of the many organizations in Federal, State and local government agencies, private industry, universities and elsewhere that are concerned with transportation information.

Some of the organizations are data suppliers; others are data users who need data; others are data producers concerned with collection and processing problems; all will be concerned with problems of development of new programs, re-structuring existing programs, data definitions, standardization, etc.

To exercise leadership in information programs on behalf of the Department, the staff of the Office of Transportation Information Planning must maintain close liaison and effective co-ordination with all of the many organizations concerned with transportation information. Otherwise it will not be possible for government and industry



*e.g. Association of American Railroads, American Transit Association, American Trucking Association, Air Transport Association of America, National Association of Motor Bus Operators, American Waterways Operators, Transportation Association of America, Transportation Data Co-ordinating Committee and others

to enjoy the maximum of benefits that implementation of the Department's transportation information program can provide.

Figure 5 indicates the liaison and co-ordinative relationships that should be maintained by the Office of Transportation Information Planning. Many of these relationships can exist on an informal basis, but some should be formalized to be most effective.

As noted in Section V of the report, the Department is preparing a proposal that will provide for the structuring of the co-ordination of transportation information so that a co-ordination plan can be made effective in the near future.

6. POLICIES OF THE OFFICE OF TRANSPORTATION INFORMATION PLANNING

To guide the conduct of transportation information activities, the Office of Transportation Information has developed and adopted a number of policies, examples of which follow. It is a policy of the Office of Transportation Information Planning to:

- provide for the collection of only those data whose uses have been clearly defined and justified - whether governmental, industry or other research uses. (The Office of Transportation Information Planning is

strongly opposed to the collection of data for which a program of analysis or use has yet to be defined).

- . seek to minimize reporting burden and develop programs on the basis of reasonable requests for information after full consideration of the problems of suppliers of data - with data collection tests and cost-effectiveness studies which take into account the full costs of suppliers of data
- . provide for minimum information processing time so that there is a minimum of elapsed time between receipt of source data and release of processed information. (Timely statistics and current information have much greater usefulness than "old" data. Quick turnaround of data can be achieved by close attention to the requirement for timeliness of statistics, in the initial design of component data systems)
- . provide for research, development and testing of data collection and processing techniques to establish efficient new means of obtaining data
- . encourage those government agencies and private industries that have the requisite skills and are most likely to maintain the data and to use it in the first instance, to undertake continuing data acquisition work - also research and development work if they have the required skills (including Operating Administrations within the Department, line agencies such as the Bureau of the Census, State governments, urban transportation planning agencies, industry, and research organizations)

- . make recommendations for effecting co-ordinated collection and processing of transportation data by Federal, State and local government transportation agencies, private industry and others, so as to improve the compatibility between transportation data files at various levels of government and in industry. (Data compatibility among data files definitionally and geographically, permits comparative analysis and research both historical as well as geographical. Also it permits the combination of data files to make them more useful. For example, the combining of files on accident data with files on highway traffic volume counts, can provide enriched data for analysis to determine the characteristics usually present in high-accident locations.)
- . eliminate duplication of data collected, through co-ordination of the data programs of the various transportation agencies in government and industry. (Because the several modes are interrelated, it is inevitable that data collection programs centered on a particular mode will collect data relevant to other modes of transportation. Careful co-ordination of these programs can provide for the elimination of duplication of data collected).
- . develop and utilize measures of cost effectiveness in data collection programs, wherever feasible. (Moreover the Office of Transportation Information Planning will encourage users of data to structure their use of the data in a cost-effectiveness framework as far as practicable.)

The Office of Transportation Information Planning will continue to develop policies such as these in order to improve efficiency in transportation information activities.

STRUCTURE FOR INITIAL TRANSPORTATION INFORMATION PROGRAM

The purpose of this appendix is to describe the "data structure" that the Department developed as a basis for formulating the initial transportation information program, to discuss the requirement of compatibility in the data, and to present illustrations of data requirements.

1. TRANSPORTATION DATA STRUCTURE

The Department of Transportation developed a "data structure" as a comprehensive framework for identifying, inter-relating and integrating the critical data requirements of government, industry, and research organizations for transportation analysis, forecasting, planning and policy-making purposes. This data structure has provided the basis for formulating the Department's initial transportation information program, and will provide the basis for the subsequent detailed specification and development of the initial transportation information program. Figure 6 on the following page illustrates the structure in its three dimensions, Geographic, Data Category, and Mode.

TRANSPORTATION DATA STRUCTURE

PERSONS - GOODS

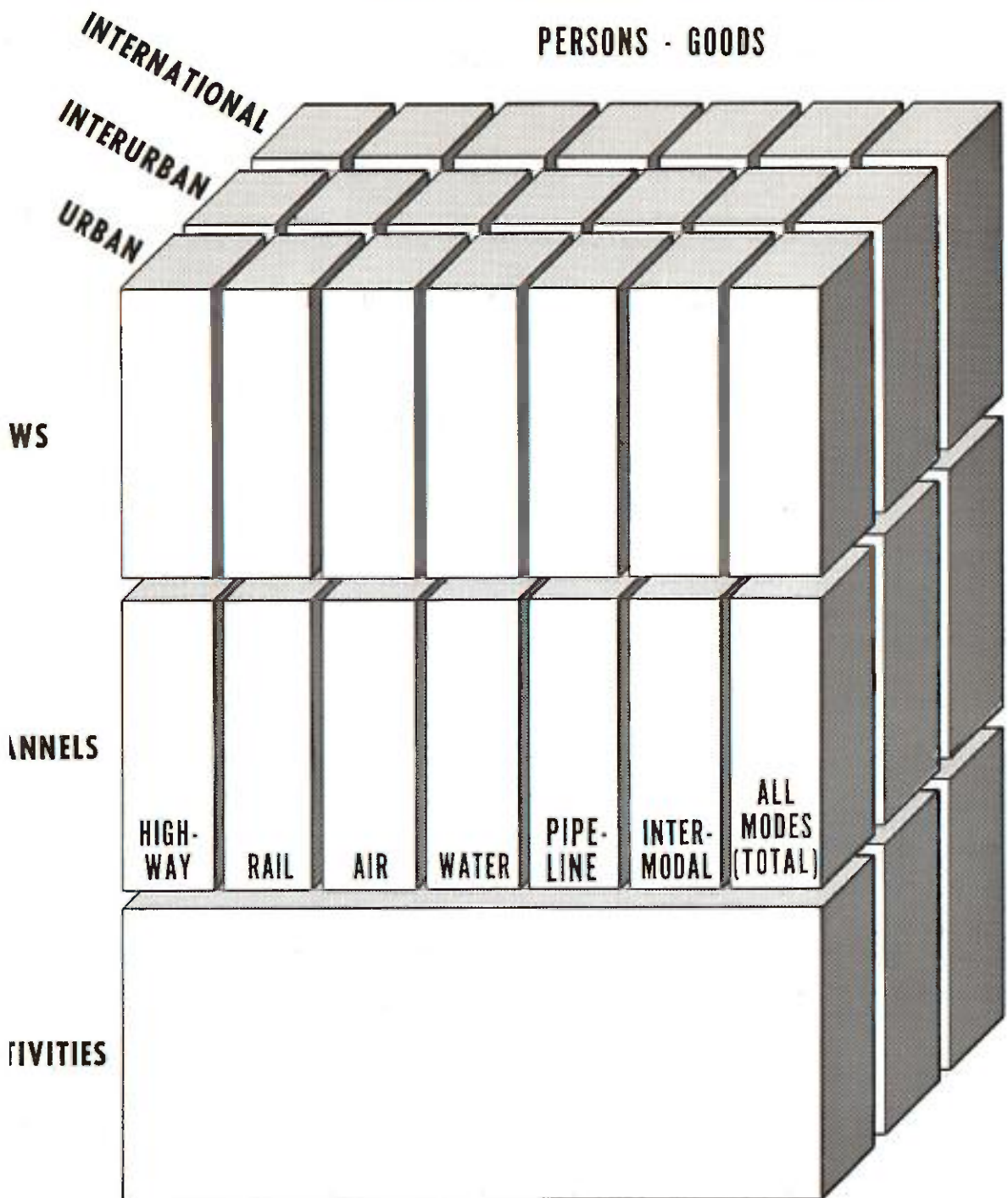


Figure 6: The transportation analysis, forecasting, planning and policy making concerns of government and industry embrace urban, interurban and international transportation by all modes. Needed activities, channels and flows data must be inter-relatable among themselves, between geographic levels (urban, interurban, international), and across all modes of transportation, for the transportation of persons and goods.

- a. The Geographic Dimension: Transportation of persons and goods ranges from very short trips between the grocery store and home to inter-continental movements of freight. While the length of the trips is a continuum, it is convenient for analytic purposes to classify the transportation markets, facilities requirements, etc. into the following general groups:
- Urban
 - Interurban
 - International
- b. The Data Category Dimension: Transportation results from the interplay of specialized activities in different geographic locations. There are three distinct aspects of the total transportation process which are important to a sound understanding of transportation:
- Activities: the kind, size and location of activities such as residences, warehouses, factories, shopping centers, etc. People and goods move between these activities and the character of these movements is intimately related to the character of these activities.
 - Flows: the actual movements of persons and goods between activities. It is these flows which the Department, other transportation agencies and the public, wish to speed-up, make more safe, more economical and more reliable.
 - Channels: the actual networks of facilities, including terminals and transfer points which carry the flows of persons and goods and which inter-connect activities. Improvements to the transportation system are usually thought of as improvements to these physical channels.

c. The Mode Dimension: The mode of the movement is the third important dimension. Actual movements may be confined to one mode or may involve several modes. A major problem in understanding and administering transportation in the past has been the tendency to deal with a single mode instead of considering all modes and inter-modal transfers simultaneously. The major divisions under mode are:

- Highway
- Rail
- Air
- Water
- Pipeline
- Inter-modal
- All modes (or transportation as a whole)

2. COMPATIBILITY OF THE DATA

Transportation data must be compatible, that is to say, they must be easily inter-relatable in all of the dimensions represented in the transportation data structure. Channels, flows and activities data must be inter-relatable so that, for example, the sizes of flows can be related to the sizes of the activities that generate the flows; or the sizes of the flows can be related to the capacities of the channels which accommodate the flows.

Relatability must extended across modes so that (a) travel or goods flow data for highways, rail, air, water and pipelines

can be combined to give data on total person travel or total goods flows; or (b) data on inter-modal transfers can be brought together with the data on the individual modes involved, etc.

Data for different geographic levels must be inter-relatable so that various data at the urban, interurban and international levels for specified locations can be brought together.

Also the data must be inter-relatable temporally and definitionally, for example in terms of types of commodities, types of activities, etc.

None of these requirements of inter-relatability are portrayed explicitly in the diagram of the transportation data structure (Figure 6) but nevertheless they are implied and they are an essential characteristic throughout all dimensions of the data structure.

The diagram of the transportation data structure (Figure 6) provides for a number of "data cells". In concept, when the initial transportation information program is completed, each of the data cells would be "filled" with data, and the data contained in any given cell of the transportation data structure would be easily inter-relatable to data in any other cell. Data items in the various data files within each of the data cells would be compatible, permitting numerous combi-

nations of the data files for a large variety of comparative studies, essential for transportation analysis and policy making.

This data compatibility would facilitate the co-ordination of transportation analysis and policy making at different levels of government and in private industry. Inter-urban and international transportation data located and used in the Department would be relatable to data located and used in other transportation agencies in Federal, State and local government, private industry, universities, etc. Urban transportation data located and used in urban areas (or at the State level, depending upon local and State policies) would be relatable to data for other urban areas within the State and in other States. Data at urban, interurban and in some cases international levels, located and used in a particular State, would be relatable to data in adjoining States and so on.

Inter-relatability of the data is important to efficient use of the data in analysis and forecasting; and in the development and testing of plans and policies. For example computer simulations of the transportation system, or parts of it are really only feasible when inter-relatable data of the types provided for in the transportation data structure are available; also computer simulations of the effect of the transportation system on other systems (for example, effects on regional

population, economic growth, or land development) are only really feasible when the input data are inter-relatable.

Computer simulation methods are most helpful to transportation analysis, forecasting and planning processes. Simulation of existing flows in existing networks can highlight areas of present over-capacity and under-capacity. Simulations of existing or estimated future flows in networks to which new links have been added, can test the efficacy of proposed improvements before they are built. Simulations can be used in many ways to determine the answers to "what-if" questions, to aid transportation planning and policy making.

The same computer simulation capabilities can also serve emergency transportation planning and defense needs. In the event of a natural disaster or military attack, computer simulation would permit, for example, the rapid computation of details of damage to the transportation network as well as the quick determination of alternative best routing for traffic.

But the greatest obstacle to the establishment and operation of computer simulation capabilities in these areas is undoubtedly the availability of satisfactory data on activities, flows, and channels that are inter-relatable and ready for use in computers.

Computer simulation, is just one of many examples that could have been cited to substantiate the importance of data compatibility. The ability to rapidly inter-relate transportation information affects even the smallest of analytical tasks and in these tasks compatibility of the data may be the single factor that determines whether or not the analysis can proceed.

The costs of making incompatible information compatible, are frequently prohibitive and wasteful when considered on an individual-study basis. Often these costs represent the largest part of the total cost of making studies. If incompatibilities in existing data are perpetuated, or the extra efforts required in new data collection to effect compatibilities are avoided the real consequences will be small short-term savings at the expense of very great long-term costs.

As compatibility is increased in data files, the opportunities for analysis increase geometrically because the possible combinations of data increase geometrically. Similarly, the feasibility of making a wide variety of studies is greatly increased because the data costs for these studies will be reduced.

3. ILLUSTRATION OF DATA REQUIREMENTS

The particular data items contained in the data files, represented by each of the cells of the transportation data structure, are indicated under the three data category headings of "flows", "channels", and "activities" - in Tables 6, 7 and 8 below.

The data items contained in the tables are generalized and are to be regarded as illustrative of the type of data items needed to meet requirements. The tables thus contain a tentative specification of data needs. Exact specification will precede data collection and will have to be closely co-ordinated with data users.

Differentiation from the generalizations on data items contained in the tables will be required for the different geographic levels represented by the data structure (urban, inter-urban and international); for the different modes (highway, rail, air, water, pipeline, etc.); and to accommodate new requirements. Differentiations, however, must be of a form that will still permit inter-relatability of the data.

The essential feature of inter-relatability of the data is emphasized throughout the tables of data items. For example, geographic locations of (a) origins and destinations of flows, (b) places where activities take place, and (c) nodes

and links of channels, are specified in the tables as requiring common geographic identifications - State, county and geographic co-ordinates - so that these data will all be inter-relatable in terms of geographic locations.

Some of the data items indicated in the following tables may not be obtained when the initial component data system, that is supposed to contain these items, is first developed. This could occur for example, because of collection difficulties. Such data items would be retained as "targets" to be added to the component data system at the earliest opportunity in the continuing data acquisition stage of the project.

TABLE 6

FLows DATA ITEMS

A. Flows Data Items for Entire Trip or Shipment

Person Travel Data	Goods Movement Data
<ol style="list-style-type: none"> 1. Traveler Information <ol style="list-style-type: none"> a. Residence location (State, county and geographic co-ordinates) b. Income (family income for previous year) c. Industry of employment (SIC code) d. Occupation e. Age f. Sex g. Driver's license 2. Traveler evaluation of transportation service used (for example, desired versus actual time of arrival) and reasons for choice 3. Origin Information (for ultimate origin) <ol style="list-style-type: none"> a. Origin of trip (State, county and geographic co-ordinates) b. Land use (activity) at origin c. Time of departure (date and hour) 4. Destination Information (for ultimate destinations) <ol style="list-style-type: none"> a. Destination of trip (State, county and geographic co-ordinates) b. Land use (activity) at destination c. Time of arrival (date and hour) 	<ol style="list-style-type: none"> 1. Shipper Information (for ultimate origin) <ol style="list-style-type: none"> a. SIC code for shipper b. Size of firm or plant c. Origin of shipment (State, county and geographic co-ordinates) d. Time shipped (date and hour) e. Shipper evaluation of transportation service used (for example, desired versus actual time of shipment) and reasons for choice 2. Receiver Information (for ultimate destination) <ol style="list-style-type: none"> a. SIC code of receiver b. Size of firm or plant c. Destination of shipment (State, county and geographic co-ordinates) d. Time received (date and hour) e. Receiver evaluation of transportation service used (for example, preferred versus actual time received) f. Damage or loss 3. Commodity Name and Code 4. Shipment Type 5. Shipment Value (where available) 6. Shipment Weight, Density and Cube

TABLE 6 (continued)

FLOWS DATA ITEMS (continued)

A. Flows Data Items for Entire Trip or Shipment (continued)	
Person Travel Data	Goods Movement Data
. Trip Purpose	7. Total Shipment Distance a. airline distance b. route distance
. Travel Party Size	
. Total Trip Distance a. airline distance b. route distance	8. Total Shipment Time a. moving b. transfer c. delay
. Total Trip Time a. moving b. transfer c. delay	9. Total Shipment Cost
. Total Trip Cost	10. Modes of Transportation Used
. Modes of Transportation Used	

FLOWS DATA ITEMS (continued)

B. Flows Data Items For Each Trip or Shipment Leg ^{1/}	
Person Travel Data	Goods Movement Data
1. Origin location (State, county, and geographic co-ordinates)	1. Origin location (State, county, and geographic co-ordinates)
2. Destination location (State, county, and geographic co-ordinates)	2. Destination location (State, county, and geographic co-ordinates)
3. Distance a. airline b. route	3. Distance a. airline b. route
4. Origin time (date and hour)	4. Origin time (date and hour)
5. Destination time (date and hour)	5. Destination time (date and hour)
6. Transportation time a. moving b. delay c. transfer	6. Transportation time a. moving b. delay c. transfer
7. Travel cost	7. Transportation cost
8. Mode of Transportation	8. Mode of Transportation
9. Vehicle or craft type	9. Vehicle or craft type
10. Name of carrier	10. Name of carrier
	11. Routing

^{1/} "Leg" - a portion of a trip made continuously in a single vehicle.

TABLE 7

CHANNELS DATA ITEMS ^{2/}

A. Node and Link Data	
Node Data	Link Data
. Node Number	1. Link Number
. Node Type (mode, intermodal transfer - which modes, etc.)	2. Link Type (highway, air, rail, etc.)
. Node Location (State, county, and geographic co-ordinates)	3. Link Location (State, county, and geographic co-ordinates - of nodes at each end of link)
. Node Through-Time	4. Link Travel or Transport Time
a. moving (average and peak)	a. moving (average and peak)
b. waiting (" " ")	b. waiting (" " ")
c. delay (" " ")	c. delay (" " ")
. Node Through-Cost Variables	5. Link Travel or Transport Cost Variables
. Node Through-Volume (by vehicle or craft type)	6. Link Traffic Volume (by vehicle or craft types)
a. daily (average and peak)	a. daily (average and peak)
b. seasonal (" " ")	b. seasonal (" " ")
c. annual (" " ")	c. annual (" " ")
. Node Through-Capacity Variables	7. Link Capacity Variables

^{1/} "Channels" refers to the networks of transportation facilities, described by a series of links or segments, each of which is identified by node numbers at each end of the link. When two links meet, they will have the same node number at the point of junction. Thus, nodes identify intersections of links (points where a transfer can be made from one link to another for the same mode of transportation, points where transfers can be made from one mode of transportation to another); also terminals. Channels data also includes data on accidents, investments, scheduled carrier services, operating rights and carrier equipment.

TABLE 7 (contin

CHANNELS DATA ITEMS (continued)

A. Node and Link Data (continued)	
Node Data	Link Data
8. Accident Experience at Node (by type, date and hour) a. number b. direct costs c. indirect costs	8. Accident Experience on Link (by type, date and hour) a. number b. direct costs c. indirect costs
9. Year Built (or year of last major improvement)	9. Year Built (or year of last major improvement)
10. Replacement Value	10. Replacement Value
11. Improvement Expenditures (by year)	11. Improvement Expenditures (by year)
12. Maintenance Expenditures (by year)	12. Maintenance Expenditures (by year)
13. Link	13. Link Direction of Travel
	14. Link Length
	15. Link Speeds a. average b. peak

TABLE 7 (continued)

CHANNELS DATA ITEMS (continued)

B. Data on Schedules, Operating Rights and Equipment	
Schedule and Operating Rights Data (by carriers) ^{3/}	Equipment Data (by carriers or operators, and types of equipment)
. Section Number	1. Numbers
. Section Type (bus, truck, rail, air, water, pipeline)	2. Capacity Limits
. Section Location (State, county and geographic co-ordinates of terminals at each end of section)	3. Average Utilization
. Section Direction of Travel	4. Year Manufactured
. Section Travel Time a. average b. peak	5. Replacement Value
. Section Departure Times	6. Name of Carrier or Operator
. Section Capacity (seat-miles, ton-miles)	
. Name of Carrier	

^{3/} Although these data pertain to carriers they must be inter-relatable node-link data on channels.

TABLE 8

ACTIVITIES DATA ITEMS

A. Population and Industry Data	
Population Data	Industry Data
<ol style="list-style-type: none"> 1. Number of Households by <ol style="list-style-type: none"> a. Income (annual median family income) b. Automobile ownership c. Residential density 2. Number of Individuals by <ol style="list-style-type: none"> a. Age b. Sex c. Race d. Industry of employment (SIC code) e. Occupation f. Place of employment g. Mode of travel to work 3. Location (State, county, and geographic co-ordinates) 4. Time (year of census or survey) 	<ol style="list-style-type: none"> 1. Number of establishments by SIC code 2. Number of employees by SIC code 3. Annual value added, sales, etc. by SIC code 4. Annual tons and value shipped by commodity 5. Annual tons and value received by commodity 6. Location (State, county, and geographic co-ordinates) 7. Time (year of census or survey)

ACTIVITIES DATA ITEMS (continued)

B. Land Use Data

1. Land area occupied by principal classes of land use, for example:
 - a. Residential
 - b. Manufacturing (by SIC codes significant to transportation)
 - c. Warehouses and wholesaling
 - d. Transportation, communications, and utilities
 - e. Offices
 - f. Retail and other commercial services
 - g. Educational and other community services
 - h. Cultural and entertainment
 - i. Recreational
 - j. Undeveloped land (potential for development)
 - k. Mining and forestry
 - l. Agricultural (potential for urban type development)
2. Intensity of land use by principal classes of land use as above
 - a. Floor area
 - b. Number of housing units
 - c. Number of employees
3. Location (State, county, geographic co-ordinates)
4. Time (year of survey or update)

PROJECT DESCRIPTIONS - INITIAL
TRANSPORTATION INFORMATION PROGRAM ^{1/}

This appendix contains summary descriptions of all major work projects in the Department's initial transportation information program under the following headings:

- . urban transportation
- . interurban transportation
- . international transportation
- . system development

1. URBAN TRANSPORTATION (1.00)

Urban Person
Travel Data
Methods
(project 1.10)

Improvement of methods of obtaining origin-destination data in urban travel surveys, including consideration of: better information on interurban travel, increased standardization, coordination with other urban information sub-systems, use of Census journey to work data and proxies for non-work trips, use of photographing of license plates, standardized geographic coding, periodicity in surveys, small-scale continuous surveys, updating-surveillance, etc.

Urban Goods
Movement Data
Methods
(project 1.20)

Development of methods for obtaining data on urban goods movement including consideration of use of: interurban goods movement

^{1/} For an illustrative listing of data items to be obtained under these projects, refer to Appendix D, p. 193.

data on truck, air, rail and water; roadside cordon surveys, truck license plate samples, photographing of truck license plates, standardized commodity codes, coordination with urban information systems, periodicity of surveys, updating-surveillance, etc.

Urban Transportation
Facilities Data
Methods
(project 1.30)

Improvement of methods of obtaining data on urban highway-rail-bus-subway transportation networks and on passenger and goods terminals and transfer facilities, including consideration of: use of coordinate readers, automatic plotting, standardized geographic identification, combining of accident (safety) and network data, coordination with interurban data and urban information systems, terminal surveys, short-count surveys, photographing of license plates, periodicity of surveys, updating-surveillance, etc.

Urban Activities
Distribution Data
Methods
(project 1.40)

Improvement of methods of obtaining urban population, employment, land use and floor area data, including consideration of: use of Census of Population and Housing (especially 1970 Census place of work data), Census of Manufactures, Business, etc., standardized tabulations of Census data, State employment data, private data sources, tax assessor's and utility records, standardized building permits, aerial photography, remote sensing, coordination with urban information systems, periodicity of surveys, updating-surveillance, etc.

2. INTERURBAN TRANSPORTATION (2.00)

a. Person Travel Data (2.10)

Interurban Person Travel Data - Auto (project 2.111)

Origin-destination data for interurban travel by automobile, principally in the Nation's densely-developed regional corridors where the worst congestion and delays are generally to be found. Methods already developed for the Northeast Corridor Project will be used insofar as feasible. Usefulness of data obtained for Northeast Corridor project for estimation of travel will also be taken into account. Continuing data acquisition provided for. NOTE: Concurrent surveys of all modes of interurban person travel (auto, bus, rail, air) will be made in each corridor as provided for under projects 2.112, 2.13 and 2.1 below.

Interurban Person Travel Data - Bus (project 2.112)

Origin-destination data for major interurban travel by bus. As noted under project 2.111 above, these data will be obtained principally for travel in regional corridors and will be obtained concurrently with data on interurban person travel by other modes. Data will cover door-to-door movements. Line-haul data will also be obtained for control purposes. Continuing data acquisition provided for.

Interurban Person Travel Data - Rail (project 2.12)

Origin-destination data on major interurban rail passenger travel. As noted under project 2.111 above

these data will be obtained principally for travel in regional corridors and will be obtained concurrently with data on interurban person travel by other modes. Data will cover door-to-door movements. Line-haul data will also be obtained for control purposes. Continuing data acquisition provided for.

Interurban Person
Travel Data - Air
project 2.13)

Origin-destination data (including door-to-door) for travel by air taxi, other non-scheduled carriers and general aviation. Also airport access-egress data to augment Civil Aeronautics Board's origin-destination data from 10% sample of passenger tickets of scheduled air carriers. (Civil Aeronautics Board's data are terminal-to-terminal; door-to-door origin-destination data are essential for ground access to airport, airport location, air travel market problems, etc.) These data in combination are intended to provide a comprehensive picture of all interurban person travel by air. Data on air travel in regional corridors can then be selected from the overall data for combined use with data on travel by other modes in regional corridors, as noted under projects 2.111, 2.112 and 2.12 above. Continuing data acquisition provided for, including expansion to cover significant movements between the United States and border countries.