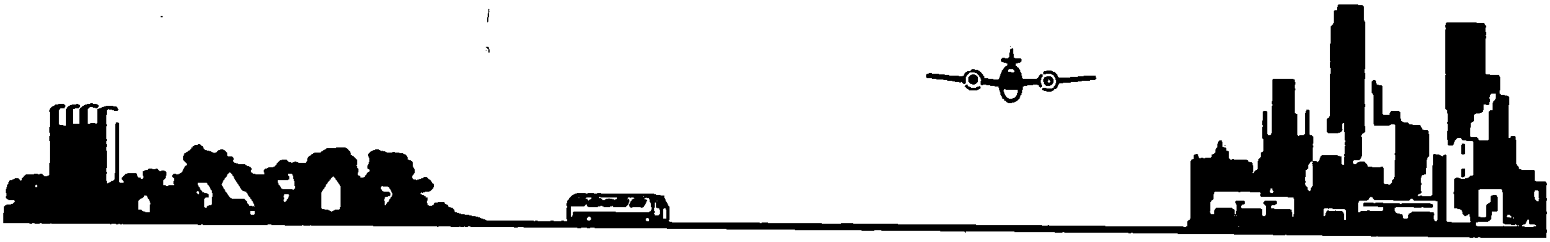
INTERCITY PASSENGER CARRIER IMPROVEMENT STUDY



AUGUST, 1977

FINAL REPORT

PREPARED FOR

IOWA DEPARTMENT OF TRANSPORTATION

ENGINEERING RESEARCH INSTITUTE
IOWA STATE UNIVERSITY
AMES, IOWA 50010 USA

FINAL REPORT

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SUBMITTED TO THE

IOWA DEPARTMENT OF TRANSPORTATION

PROJECT DIRECTOR: R. L. CARSTENS

PRINCIPAL PROJECT STAFF

K. A. BREWER
S. L. RING
J. D. GROVE

GRADUATE RESEARCH ASSISTANTS

WILLIAM CARY

JOHN DYBALSKI

BRUCE THORSON

AUGUST 1977

ENGINEERING RESEARCH INSTITUTE
IOWA STATE UNIVERSITY
AMES, IOWA 50011

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PART I

STUDY BACKGROUND

I. INTRODUCTION

Origins of the Study

The life-style of residents of Iowa is strongly influenced by the predominantly agricultural economic base of the state. Population densities are comparatively low, and there are few major urban centers. Consequently, access to a suitable level of economic, social, and cultural opportunities frequently involves travel between cities. Such travel is essential to sustain the current life-style.

Because of the generally dispersed pattern of development in the state, most intercity travel utilizes private automobiles. The lack of large concentrations of trip origins and destinations precludes extensive use of public transportation for intercity trips. Under such circumstances, automobile travel not only is usually the most convenient but also is often the most economical under current conditions. Public transportation is lightly patronized as evidenced by the fact that over 90 percent of intercity trips utilize private automobiles.

The lack of substantial demand for intercity travel by public carriers has, in turn, been reflected in a reduction of the supply of such services. Rail passenger service has nearly disappeared as a travel mode choice for residents of Iowa. Intercity buses provide service at fewer than one-third of the cities in the state. Only three of the largest cities have fairly extensive service by scheduled air carriers. Eleven other cities have more limited scheduled air passenger service. Chartered or non-scheduled air taxi service may be obtained at about 50 additional airports in the state. Taxicabs, rural transit systems, and other irregular surface carriers also satisfy a relatively minor proportion of the total intercity travel demand. In general, however, for-hire modes are not competitive with private automobiles in terms of convenience and travel time, particularly for intrastate trips.

The current concern with limitations in the supply of energy resources for transportation also provides impetus to a study of intercity travel. Such concerns have been manifested by suggestions to restrict automobile travel either by direct controls to limit the supply of motor fuel or by indirect control through pricing. Implementation of indirect controls would exert a profound effect on the cost, and thereby the attractiveness of automobile travel. Any controls, direct or indirect, inevitably would tend to reduce the high level of mobility enjoyed by citizens in Iowa and exert a concomitant effect on their lifestyles. However, the controls would serve to enhance the relative attractiveness of travel by public transportation carriers.

Unfortunately, events of the recent past raise serious doubts as to whether a suitable basic structure of public transportation service will continue to be available in Iowa. Intercity bus service has continually been reduced but is still marginally profitable, at best. Carriers currently are petitioning public regulatory agencies for relief, both in the form of reductions in service and through increases in fares.

Commercial air service in Iowa also affords limited profit potential. Six cities are served only by a local service air carrier that receives federal subsidies. One city is served only by two subsidized local carriers. Two other cities are served only by a third level (commuter) carrier that receives subsidy from local sources. Intercity rail passenger service and all rural transit systems receive a substantial portion of their revenues from public funds. Diminution of service by all intercity carriers, rather than expansion, may be anticipated as a natural result of economic pressures.

In such a setting, it is appropriate to assess the potential future role of those intercity for-hire carriers that serve significant portions of the statewide demand for interstate and intrastate passenger travel. Certificated air carriers effectively serve longer trips from the largest communities in the state but do not afford a suitable alternative for most short trips. Nor is such service available conveniently for most residents of small communities and rural areas. Rail passenger service is characterized in low-density travel corridors, such as those existing in Iowa, by inflexibility, high costs, and relatively intensive consumption of energy. It cannot be considered to have a significant potential for personal travel to and from communities in Iowa. Hence, the most probable alternatives for intercity travel that will not or cannot utilize private automobiles are buses and third level air carriers. These two passenger travel modes provide the focus for the research reported here.

Objectives of the Study

The goal of this research was to recommend specific changes relating to service by intercity buses and third level air carriers and to propose an appropriate state role in the implementation of these changes. Changes contemplated in this research were to be directed to the increased use of intercity buses and third level air carriers in such manner as to exert a net benefit to users as well as the general public. Specific objectives of this research included the following:

- To analyze the potential for a system of express intercity bus routes in Iowa.
- To estimate the demand for third level air carrier service in cities having populations under 50,000.
- To forecast the relationship between economic costs and benefits from an intercity bus system emphasizing express routes between major population centers and supporting a subsystem of local and intraregional public transportation.
- To estimate the economic feasibility of expanded third level air carrier service with emphasis upon those routes proposed as worthy of further evaluation in the 1976 update of the Iowa State Airport System Plan.
- To provide guidance for establishing the need, if any, for state and local subsidies to institute a system of express intercity buses and to expand third level air carrier service.

In addition to passenger movements, enhancing package freight shipments was also to be considered in the evaluation of proposed improvements.

Research Hypotheses

Although the focus of this research was upon intercity travel by bus and third level air carrier, it was initially hypothesized that demand for passenger travel is not necessarily mode-specific. Considerable latitude in the substitution of one mode for another for a specific trip was assumed. However, distinct limitations in the validity of this assumption were encountered in the course of this research. Although it is true that the private automobile is a suitable alternative for most intercity trips by most persons and that either air travel, rail travel, or bus travel may be substituted for portions of this market, there appears to be little overlap between the market segment for which air travel is an acceptable alternative and that portion likely to utilize intercity buses. These two modes serve distinctly different markets differentiated primarily by characteristics of the trip maker.

A further hypothesis underlying this research was that both intercity buses and third level air carriers have the potential to increase their proportion of the intercity travel market. Such increases would come about through diversion of trip makers from private automobiles. Research results seem to support this hypothesis. Several beneficial effects of this diversion are apparent. Travel by public carrier, particularly by bus, utilizes less fuel per person-trip than travel by automobile, although this varies substantially with type of vehicle, loading, circuitry of routing, and many other factors. Significant diversion of travel from automobiles would also have the beneficial effect of reducing pressures for highway improvements that otherwise would be required so as to afford increased capacity for growing volumes of vehicular traffic. Particularly in view of current limitations in the resources committed for highways and the resultant inability to fund improvements responsive to many critical highway needs, diversion of some travel to other modes will tend to enhance the safety and serviceability of the highway system.

A third hypothesis was that intercity buses and third level air carriers would improve their travel market share only if they afforded favorable tradeoffs as perceived by travelers. Factors of primary concern to individuals include travel time, cost, comfort, convenience, and safety. Additional public conerns, not necessarily important to individual trip makers, include energy consumption, environmental degradation, and the enhancement of opportunities for travel by persons without regular access to an automobile. There are obvious opportunities for a government to assist a carrier to improve factors of individual concern, especially cost. Such a course is desirable when the factors of public concern favor this action so as to exert a net benefit to both users and the general public. Recommendations resulting from this study are based on the expectation that this hypothesis would be borne out by the full-scale testing that would result from implementation of these recommendations.

Acknowledgment

This research was conducted by the Engineering Research Institute, Iowa State University, and was sponsored by the Iowa Department of Transportation, Planning and Research Division. Additional support was made available by the Engineering Research Institute. The conclusions derived from this research, however, are those of the authors and do not necessarily reflect the viewpoint of the Engineering Research Institute or the Iowa Department of Transportation.

Two separate advisory committees were constituted to render advice and assistance to the research staff, one primarily concerned with intercity bus travel and one to deal with commuter air service. Both advisory committees included persons from the relevant industry as well as from the Iowa Department of Transportation. Their considerable contribution and the participation of members of these committees is gratefully acknowledged.

II. ROLE OF INTERCITY BUS TRANSPORTATION

Introduction

On July 4, 1923, the Board of Railroad Commissioners of the State of Iowa adopted regulations governing the operation of motor carriers in Iowa (1)*. This action was in response to legislation enacted by the 40th General Assembly as Chapter 97, Code of Iowa (2). With this, the first regulation of the burgeoning intercity bus passenger carriers appeared on the Iowa transportation scene.

Chapter 97, Code of Iowa, provided for the issuance of a certificate of authorization by the Board of Railroad Commissioners upon proper application and if meeting specific requirements. The question of public necessity, although in the original committee bill, did not appear in the final version that became law. As a consequence the Board of Railroad Commissioners was required to issue certificates of authorization even though it documented its concern for this new form of transportation.

> However we may be convinced in our own minds that there is grave danger to continued service by rail when in competition with bus and truck service, it is manifestly not within our province to prognosticate, and, upon that basis, hold against a proposed bus or truck line. (1)

Section 4 of the new law did require a public hearing and a finding that the service proposed would promote the public convenience. The public convenience was generally served, and a number of certificates were issued, according to the hearings reported in the Board of Railroad Commissioners Annual Reports for 1923 and 1924.

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*Numbers shown in parentheses refer to references listed in Part 5 of this report.

The 41st General Assembly meeting in 1925 changed the Code of Iowa to provide for certification, declaring that public convenience and necessity required such operation (3). Subsequently the 48th Annual Report of the Board of Railroad Commissioners notes the issuance of Certificate of Convenience and Necessity Number 1 (replacing Certificate of Authorization Number 1) issued to O. C. Wright to operate a motor bus carrying passengers between Adel, Redfield, and Dexter (4).

The first reported statistics of passenger motor carrier operations appeared in the Board of Railroad Commissioners Annual Report for 1927. Three classes of carriers were listed: Class A, greater than $50,000 annual revenue, Class B, greater than $10,000 operating revenue, and Class C, under $10,000 operating revenue. The total annual revenue passengers carried by all three classes in 1927 was 1,531,776. In the same annual report the revenue passengers carried in Iowa by the 15 railroads was 9,464,411 (5).

The inexorable downward trend in the railroad's share of passenger travel had commenced. Table II.1 documents the annual revenue passenger volume carried by each mode at the beginning of each decade. Although comparative data is not available for the private passenger auto the total vehicles registered in the state is presented to illustrate the growth trend.

Rapid growth occurred in motor bus passenger travel in Iowa, reaching a maximum annual volume of 26,882,894 in 1946. Following World War II the proliferation of the private auto and the extensive development of good highways caused a massive abandonment of the motor bus mode. From a peak of nearly 27 million in 1946 the annual passenger volume had

Table II.1. Trends in passenger transportation in Iowa

	Revenue passengers carried		
Year	Railroads	Motor bus	Passenger motor vehicles registered
1920	25,197,824	--	407,558
1930	6,689,877	2,590,255	707,398
1940	3,027,387	5,642,465	692,493
1950	4,552,002	19,170,286	880,605
1960	3,209,211	1,683,759	1,068,261
1970	156,772	896,212	1,374,231

Source: Iowa Commerce Commission annual reports and Iowa Department of Transportation records.

stabilized at slightly over one million by 1960, and that trend continues. Table II.2 sets forth the passengers carried annually by motor bus carriers beginning with 1940.

Market Area of the Motor Bus

An intercity bus system came into existence with the advent of the motor vehicle because it was a more convenient mode than trains or horse drawn vehicles. Primarily because of their convenience and flexibility, motor buses have virtually replaced railroads as a passenger transport mode.

The motor bus, however, has now, in turn, become a victim of competition. Inexpensive energy and raw materials, industrial efficiency,

Table II.2. Historical trend in regular face motor bus passengers for operators in Iowa

	Passenger motor carriers	
	Class I	Class II
Year	Revenue passengers carried	Revenue passengers carried
1940	5,642,465	Included with Class I through 1955
1941	6,423,108	
1942	10,547,619	
1943	17,137,343	
1944	19,643,393	
1945	20,782,632	
1946	26,822,894	
1947	26,546,033	
1948	25,142,204	
1949	20,991,314	
1950	19,170,286	
1951	18,279,438	
1952	12,720,590	
1953	8,955,733	
1954	7,451,414	
1955	2,493,976	
1956	NA	
1957	NA	NA
1958	1,356,782	345,927
1959	1,387,705	99,929
1960	1,409,922	273,837
1961	1,163,402	262,390
1962	1,314,851	304,033
1963	1,224,298	176,144
1964	1,251,702	172,772
1965	1,115,646	177,114
1966	1,404,051	44,623
1967	1,543,024	43,789
1968	1,341,779	55,438
1969	1,130,181	71,451
1970	868,509	27,703
1971	1,125,062	32,984
1972	1,160,623	26,195
1973	1,299,982	13,058
1974	1,423,035	4,523
1975	1,949,266	15,314
1976	1,155,655	22,359

Source: Annual reports of Iowa Commerce Commission and Iowa Transportation Regulation Board.

Notes: Data often are incomplete due to delinquent reporting. Definitions of Class I and Class II carriers were changed January 1969 so that data 1970 to 1976 are not comparable with earlier years.
NA-Data not available

Table II.2. (continued)

NA - Data not available

Note: Class I carriers have annual gross operating revenues over $200,000.

Class II carriers have revenues from $50,000 to $200,000.

Specific year data may be incomplete due to delinquent reporting by companies.

Source: Iowa Commerce Commission annual reports.

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and an affluent society have resulted in the proliferation of private autos. This is especially true in Iowa, a state with nearly one private auto for every two persons, an extensive surfaced highway system, and a reasonably affluent populace. In making comparisons on the basis of comfort, convenience, flexibility, and even social status, buses must be rated second to automobiles.

Because of the inherent advantages of private autos for intercity travel, most persons with a freedom of choice have selected this mode of travel. Thus the intercity bus market area currently consists of many captive riders as well as a substantial number of elective riders. The term captive riders infers persons without ready access to private autos. This group includes the handicapped, older citizens, and those with limited financial resources. The elective group might include those who do not care to drive an auto, those who perceive a reduced cost in bus use, those concerned with energy conservation, and those who consider the bus a safer travel mode.

Governmental policies in common carrier regulation, subsidy, and support of the various modes and in energy availability and cost controls have the power to influence intercity bus use. If an increase in intercity bus use is considered desirable, a rational program for attracting the elective group must be developed.

Intercity Bus Efficiency

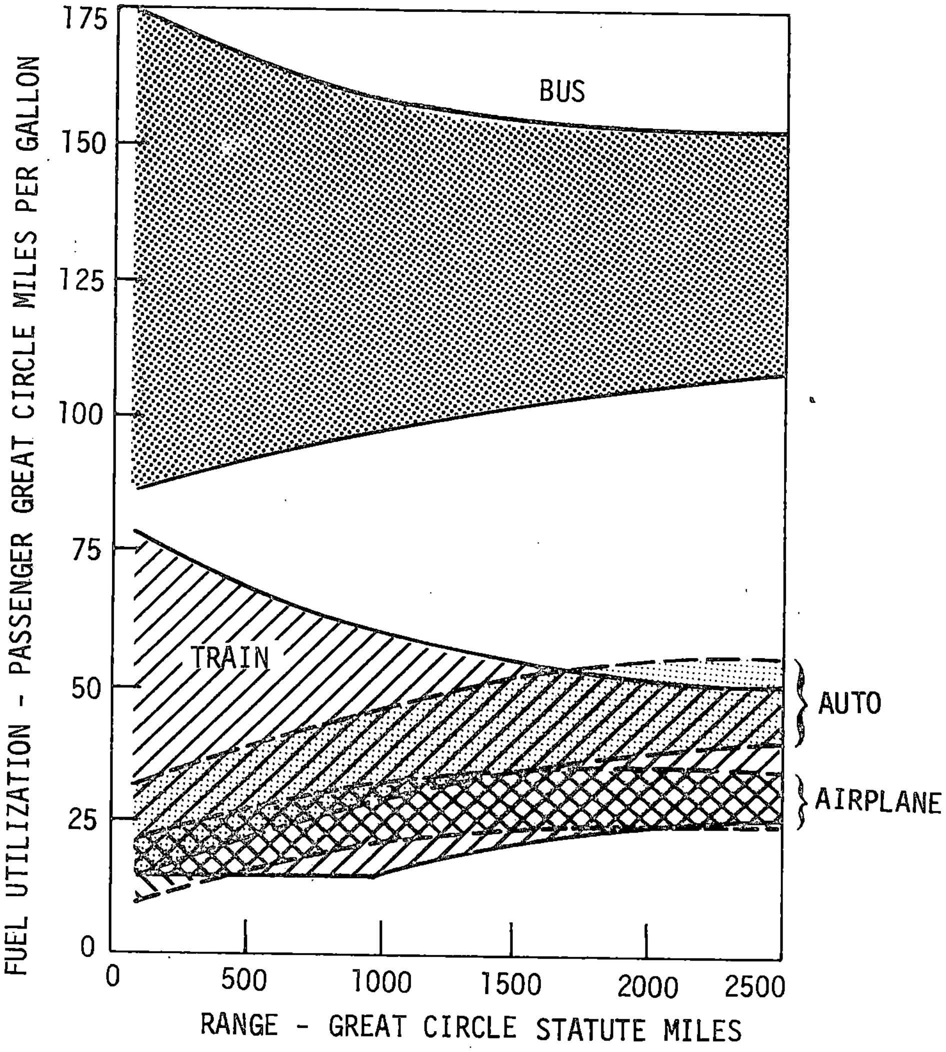
A considerable amount of research has been conducted relative to the energy efficiencies of the various passenger modes. However, due to the many possible variations in assumptions and methodologies, results can be confusing.

One of the references frequently noted and generally recognized for its reliability is a Boeing study (6). In terms of fuel efficiency, the following quote summarizes the results for intercity bus applicability:

> Buses are the most fuel efficient mode for all city pairs. The ranking of airplanes, automobiles, and trains depends on the city pairs being considered.

Figure II.1 is extracted from the Boeing study to illustrate these findings.

The Iowa Department of Transportation's TransPlan 1977 (7) summarizes the modal fuel economy in moving 200 passengers between two points 1,000 miles apart. The results of their comparisons indicates that the air mode is the most energy inefficient followed by the auto and rail modes and, as the most efficient, the bus mode. In a recent Wisconsin study (8) reference was made to Table II.3, also in support of the Boeing study results.



Source: Reference 6.

Figure II.1. Modal fuel utilization as a function of range

Table II.3. Comparative fuel efficiency of intercity passenger modes

Intercity passenger mode	Passenger miles per gallon	BTU's per passenger mile
Bus	118	1,170
Auto	43	2,902
Rail	39	3,533
Air	16	7,766

Source: U.S. Department of Transportation, A Summary of Opportunities to Conserve Transportation Energy, August 1975.

Services Provided

For many Iowans the only available public transportation service for intercity travel is the bus. A study conducted in 1975 (9) noted that only 367 of the approximately 950 incorporated communities in Iowa had regularly scheduled intercity bus service by common carrier. The number probably has been reduced since that time. For many of Iowa's citizens this situation is of no consequence; for others it creates problems. For the captive rider of public transportation the lack of intercity bus service may in fact dictate where the person lives. For others the lack of service simply reduces that person's independence and may require him or her to depend on the donated services of friends or other concerned individuals.

Another important service provided by the intercity bus is package express. Many businesses depend on this prompt, low-cost service for shipping small items short distances. In fact, the income derived from this service may be of more value to the bus company than passenger service. In localities with marginal passenger service revenues, express revenues may in fact represent the difference between profit and loss for service at that station.

Terminal facilities for ticketing, waiting, and boarding may be owned or leased and operated by a bus company, or the lease arrangement may provide for facilities as well as management of operations. The terminal service is a part of intercity bus merchandising, and its image may determine whether a potential elective user selects the bus mode for his or her trip.

The Financial Situation

As competition from private autos caused a reduction in passenger business, bus companies were forced to initiate changes. A reduction in service on low-volume runs was the usual first step, frequently followed by a petition to drop service. Fare increases were requested that when initiated caused a further loss of traffic, thus eroding the profitability of service. In some cases routes not developing sufficient revenues have been sustained temporarily through cross-subsidization from profitable routes.

In a recent statement to the Interstate Commerce Commission by a vice president of Greyhound Lines (10), the financial predicament of the nation's and Iowa's largest bus carrier was presented. According to this statement the bus company's net income has suffered a serious depletion over the past few years. This plight was triggered by the inflationary impact of the oil embargo and the accompanying economic recession and high levels of unemployment. This depletion of net income is causing bus companies to undertake employee reductions, schedule reductions, and a reduction in new bus purchases.

Many of the smaller bus companies are also in a precarious financial position. If governmental regulation of fare structures results in an inadequate profit margin, the operation will be in jeopardy. The smaller companies are also more sensitive to competition due to the scale of their operations.

Bus companies operate in a very complex mix of private and public sectors. They are very strictly regulated in certain areas, are operated on a public highway system, pay user taxes for the use of this system, and are protected through certification as common careers.

III. ROLE AND FUNCTION OF COMMUTER AIR CARRIERS

Nature of Commuter Air Carriers

A commuter air carrier is an operator that is defined by Civil Aeronautics Board (CAB) Economic Regulations Part 298, Classification and Exemption of Air Taxi Operators, as "those operators which perform, pursuant to published schedules, at least five round trips per week between two or more points or carry mail." Since a commuter air carrier operates service along a route according to a published schedule, it is not an air taxi operation that offers airplanes (and pilots if needed) for hire in a demand-responsive transportation mode. Neither is a commuter air carrier a certificated operator except in the case of two experimental actions by the CAB in approving applications for certification by Air New England and Air Midwest (11,12). Both of these actions by the CAB were very carefully worded so as to be unique and in no case to become any legal precedent in establishing commuter air carriers as eligible for operating subsidies, equipment purchase loan guarantees, or protection of service route from competition. (Local service and trunk carriers receive access to such benefits from their certification.)

With the exception of the two certificated commuter air carriers, all commuter operators are free to enter or leave any route or market as traffic demand and economy of operations fluctuate. This market freedom has created an image of instability and uncertainty in service patterns that is not necessarily accurate, as will be discussed in more detail in Part 3 of this report.

Commuter air carriers operating in this limited regulation market provide a variety of functional services:

1. They provide service between hub[*] airports along high-density demand corridors similar to a shuttle service.
2. They provide service to low-density markets usually to connect these communities into the national air transportation system of certificated carriers at hub airports. These low-density markets are frequently small, isolated or rural communities.
3. They provide replacement service to points at which certificated air carriers have temporarily suspended operations with CAB approval.
4. They provide air mail contract service to the U.S. Postal Service, bringing quick mail delivery to communities which are remote from centralized mail processing centers.
5. They provide scheduled air cargo service to a wide range of city sizes and scales of industries.

The interests of the State of Iowa are considered to be limited to commuter air carriers providing service functions (2) and (3). This research report contains an analysis of the role of commuter air carriers as a component of the total transportation system for Iowa. The focus has been narrowed to passenger services since mail contracts are totally a province of the U.S. Postal Service and since all-cargo operations are basically a priority service to businesses and industries (and, therefore, not of general utility to the broader general public).

Commuter air carriers perform these service functions utilizing relatively small aircraft. The majority of the aircraft registered for such use have 6- to 15-seat capacity (about 57 percent), with about

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[*] A large hub airport, a medium hub airport, and a small hub airport enplane, respectively, one percent or more, 0.25 to 0.99 percent, and 0.05 to 0.24 percent of the national total of air carrier passengers enplaned.

32 percent of the fleet having more than 15 seats, and about 11 percent of the fleet having two to five seats (13). Nationwide, the two most common aircraft are the Beechcraft 99 (about 9 percent of the fleet) and the Cessna 402 (about 7 percent of the fleet), which have seat capacities of 17 to 19 and 9 to 10, respectively. These two aircraft will be the basis of route viability and service analyses with respect to market demand potential in Iowa in Part 3 of this report.

Regulation by the CAB currently limits commuter air carriers to aircraft with a maximum capacity of 30 passengers and a maximum payload of 7,500 pounds on interstate flights unless a specific exemption has been granted the individual carrier for an individual aircraft (14). As of September 1975, there were 88 aircraft out of a commuter air carrier fleet of 954 that had passenger capacities exceeding 30 passengers and were operating under exemption (13). Therefore, except for a limited number of exemptions, commuter air carriers may not use, on interstate flights, the same size aircraft as trunk carriers (United, Braniff, and American, for example) or as regional service carriers (Ozark and North Central, for example). If a commuter air carrier is operating totally intrastate and almost exclusively serving persons commuting within the state (as opposed to persons interlining with a regional or trunk carrier to cross state boundaries), larger aircraft may be used subject to state regulations.

As of August 1974, 20 states regulate commuter air carriers in some manner. A number of states have considered adopting some form of regulatory control on commuter air carriers. Iowa currently does not regulate commuter air carriers as distinct from general aviation. Data presented and discussed in Part 3 of this report will indicate that current Iowa commuter air carrier passenger characteristics identify persons predominately crossing state lines, and, thus, CAB aircraft size restrictions apply to all Iowa operators.

Historical View of Commuter Air Carriers in Iowa

Commuter air carrier operations have historically been portrayed as high risk ventures. Statistical studies of the entry and exit from the market by commuter air carrier operators have implied instable service to the passenger population by noting that about one-third of the operators were new each year (15).

It is true that there is unlimited opportunity to enter the market without CAB regulation in the form of restrictions on routes and fares. This has encouraged persons and companies to seek an air passenger and cargo market where the potential demand was much smaller than the break-even load factor of the aircraft used. It also has encouraged entry into the market in an under-capitalized financial situation, thus, creating an immediate critical need on the part of the commuter air carrier for a high level of cash flow. Consequently, many commuter air carriers have been bankrupt soon after initiating a service route. This has occurred either because they were using aircraft too large for the existing and potential demand or because they did not have adequate financial resources to cover their operating and capital expenditures during an initial service period required to build a clientele (penetrate an existing market or establish new markets).

When a commuter air carrier is the only scheduled air service to a community and that service is terminated, all persons who had depended upon it suffer a loss of some degree of mobility. Thus, a considerable amount of research was put into this study in defining initial service commuter airline demand on specific potential routes and ultimate commuter airline demand in selected community markets. As discussed in Part 3 of this report, these estimates will provide guidance as to what the appropriate maximum size equipment should be in these Iowa markets if, in order to assure continuity of service, public fund participation in the carrier operation is sought.

Past safety records of commuter air carriers have been characterized as poor when compared with trunk and regional service carriers. Safety problems particularly add an element of uncertainty to a small business such as a fledgling commuter airline. A commuter air carrier operator has great difficulty, economically and in terms of its marketing capability, in recovering from the shock of an air crash. In the period 1968 to 1970, there were 141 commuter air carrier accidents, with 35 of these involving fatalities to 47 crew members and 112 passengers (16). Subsequent increased safety regulations by the Federal Aviation Administration (FAA) have lowered the accident patterns such that in 1972 there were 35 accidents of which 15 involved a total of 53 fatalities, and in 1973 there were 37 accidents involving a total of 17 fatalities. It is anticipated that the continued improvement in aircraft safety and navigation requirements in association with state and federal airport development programs will continue to reduce the safety differential between commuter airlines and trunk or regional service airlines.

The history of commuter air carrier service in Iowa is not significantly different from the national pattern. Selected operators have a long history of continuous, reliable, and efficient service. Others were in the market yesterday and are gone today. In 1972, four commuter airlines were serving six Iowa communities (Ames, Davenport, Dubuque, Fort Madison, Muscatine, and Keokuk) with connections to Omaha, Chicago, St. Louis, and Minneapolis-St. Paul (17). During 1972 the Ames-Omaha service was terminated, and by early 1973 the Ames-Chicago service ceased. Also during 1972, the Fort Madison-Keokuk-Macomb-Chicago and Fort Madison-Keokuk-Macomb-St Louis operation was expanded to provide connections from Fort Madison to Des Moines via Burlington. The intent was to serve a perceived Burlington-Des Moines market. After several months of economically unsuccessful operations the Fort Madison-Burlington-Des Moines route was dropped.

The Muscatine-Davenport-Chicago service was a financial success until the single aircraft being operated crashed and was destroyed. No service has been instituted in the intervening five years to replace the operation.

Dubuque's commuter air carrier service was (and is) provided by a carrier with an extensive system of routes focusing on the Minneapolis-St. Paul to Chicago corridor. This same carrier was authorized by CAB as a replacement service for Ozark Air Lines at Clinton, and this was accomplished on October 26, 1975. The commuter air carrier route structure now provides frequent flight schedule service throughout the day from both Dubuque and Clinton to Chicago.

Commuter airline service has existed on two different occasions on a network providing service to Des Moines, Ottumwa, Burlington, Sioux City, Omaha, and Marshalltown. One operator provided service from late 1973 to early 1974. A second operator utilized DC-3 aircraft to provide service from mid-1974 to mid-1975. Both operations were unable to sustain service due to financial difficulties.

On June 1, 1973, a commuter air carrier initiated service connecting Spencer and Pocahontas to Des Moines. This passenger service was an outgrowth of an existing network of U.S. Postal Service mail contracts and air freight/cargo service. It was possible on this route to carry passengers and still provide the necessary mail or cargo capacity. The extent to which the mail contract was subsidizing the fixed costs required to provide the service was not fully appreciated until the mail contract was terminated. At that point (May 1976) the initiating commuter air carrier discontinued passenger service also, and the affected communities negotiated an agreement with another commuter airline operator to resume service to Des Moines with a subsidy guarantee. In October 1976 the service was expanded to connect Spencer and Pocahontas to Minneapolis as well as Des Moines with an increased subsidy guarantee. As of January 1977, the operation has required a subsidy payment every month, although substantial growth in passenger traffic has occurred (18). It appears that, in order to achieve a profitable operation, the commitment to a particular size of aircraft requires passenger traffic levels that are beyond the immediate traffic potential of Spencer and Pocahontas. This will be discussed in more detail in Part 3 of this report as a requisite consideration in the future role of the state relative to commuter air carrier operations.

Several commuter air carriers operate in Iowa for the purpose of carrying mail and/or cargo with no regularly scheduled passenger service.

Since such operations are essentially contract services to serve the needs of an individual industry or agency, these operations are excluded from this planning research and analysis. Such operations do perform a vital and significant role in expediting the movement of mail and cargo to insure that the business activity in Iowa is timely and competitive.

This brief summary of the recent history of commuter air carrier operations in Iowa illustrates that commuter air lines serve the state in all the possible roles that may be assigned to them within the total transportation system as outlined earlier. These airlines that have operated in the past and are currently operating in Iowa also exhibit the spectrum of characteristics previously discussed in this chapter that contribute to an industry's reputation of instability. Several commuter airlines in Iowa have a long history of effective, efficient, reliable service and are worthy models of industry management. Since it is obvious that commuter air line operations in Iowa are not substantially distinct from those in other areas in function and role, the central question to be addressed is what the State of Iowa may appropriately do to assure the highest and best utilization of commuter air carriers as an element of the state's total transportation system. Part 3 of this report presents the basis for establishing what the public responsibility may be in insuring that the transportation service best provided by commuter air lines is made available to appropriate communities in Iowa.

PART 2

INTERCITY BUS CARRIERS

IV. CURRENT INTERCITY BUS OPERATIONS IN IOWA

Although transportation planners have collected a substantial data base concerning motor vehicle traffic movements, little information is available to quantify bus passenger movements. There is no counterpart to highway origin-destination studies, traffic counts, or speed studies in terms of affording data relating to the movement of persons and package express via intercity bus. Moreover, most of the available bus movement data have been aggregated on a statewide basis and cannot be related to specific routes or communities.

Government Reports

Currently the Transportation Regulation Board of the Iowa Department of Transportation is responsible for accumulating data on certificated motor carriers. In previous years the Iowa Commerce Commission and, prior to 1928, the Board of Railroad Commissioners had this responsibility. Such data on intercity bus operations in Iowa are available in the form of annual reports, commencing with the year 1927 (4,19). A profile of intercity bus operations in Iowa can be generated from these reports, as noted in Chapter II, Tables II.1 and II.2, regarding trends in passengers carried in Iowa operations.

Table IV.1 presents an individual bus company profile for the last four years in terms of passengers carried. These data are available for each year commencing with 1927. The volume of passengers carried has increased over 20 percent in the four years noted in the table. Also, it should be noted that the three largest bus companies shared 82 percent of the common carrier intercity bus passenger market in Iowa in 1974.

Table IV.1. Regular fare passengers carried in Iowa by certificated bus carriers

Company	1972	1973	1974	1975	1976
Class I					
Continental Trailways, Inc.	141,965	159,557	252,557	203,717	188,452
Fort Dodge Transportation Co.	5,355	--	5,140	4,379	--
Greyhound Corp.	629,468	700,290	708,045	654,846	611,449
Iowa Coaches, Inc.	61,996	59,811	66,632	--	54,242
Jefferson Lines, Inc.	166,936	201,424	208,793	191,143	161,099
Midwest Coaches, Inc.	23,903	24,406	24,559	23,786	19,868
Missouri Transit Lines, Inc.	34,613	54,412	53,785	49,615	41,972
Scenic-Hawkeye Stage Lines, Inc.	67,157	68,440	75,405	69,176	61,536
Sedalia-Marshall-Booneville Stage Line	20,364	21,988	20,341	17,999	16,687
Class II					
Intercity Airport Transit, Inc.	--	--	2,317	6,340	8,792
Reid Bus Lines	1,290	1,393	1,337	1,033	928
River Trails Transit Lines, Inc.	8,123	9,086	--	7,200	6,964

Source: Annual reports of Iowa Commerce Commission and Iowa Transportation Regulation Board

Note: Annual totals differ from those in Table II.2. Table II.2 includes ridership for carriers with a terminal in Iowa but all operations in another state.

Motor bus carriers consume motor fuel and pay an eight-cent tax on each gallon of diesel fuel or seven cents per gallon on gasoline. Table IV.2 tabulates the motor fuel consumed during the period 1970 through 1974. Total fuel tax charges during this period were in excess of $600,000.

Those bus companies holding common carrier certificates have the right to conduct charter operations. In fact a significant portion of revenue may be derived from other than intercity common carrier bus operations. Table IV.3 identifies bus company revenue sources in Iowa for 1974. Note that even two of the largest companies derive more than 30 percent of their revenue from sources other than passenger revenues.

A profile of intercity bus passenger operations and trends can be obtained from Table IV.4. The average miles traveled per passenger is generally greater for the three large companies than for the smaller companies as could be expected.

In addition to passenger data the revenue and expense profile of each company is of interest. The ratio of expenses to revenue generated is of concern to the company as a measure of profit. Because a number of items are not included, a firm requires a ratio less than 100 percent to maintain a profitable operation. Because most of the companies recorded have operations in other states the total system operating ratio is also appropriate to study. Operating ratio trends are presented in Table IV.5.

The importance of charter revenue is apparent from Tables IV.3 and IV.4. Charter service may, in fact, be the major reason for a company's existence. Table IV.6, prepared by the Iowa Transportation

Table IV.2. Motor fuel consumed in Iowa by certificated bus carriers

	Fuel consumed, gallons				
Company	1972	1973	1974	1975	1976
Class I					
Continental Trailways Inc.	322,183	342,183	338,222	284,124	293,438
Fort Dodge Transportation Co.	6,189	--	--	--	--
Greyhound Corp.	809,638	852,232	846,103	810,943	781,376
Iowa Coaches, Inc.	--	--	--	--	--
Jefferson Lines, Inc.	205,056	225,270	245,619	202,174	162,262
Midwest Coaches, Inc.	32,449	31,823	28,530	27,962	24,257
Missouri Transit Lines, Inc.	53,136	51,364	52,366	51,951	50,137
Scenic-Hawkeye Stage Lines, Inc.	90,693	89,178	90,499	91,767	93,197
Sedalia-Marshall-Booneville Stage Line	102,047	95,651	102,259	100,138	106,918
Class II					
Intercity Airport Transit, Inc.	--	--	9,437	17,376	22,704
Reid Bus Lines	--	--	--	--	--
River Trails Transit Lines, Inc.	15,250	18,955	--	16,957	20,973
Total	1,636,821	1,706,656	1,713,035	1,603,422	1,555,262

Note: Charter operations are included.

Source: Annual reports of Iowa Commerce Commission and Iowa Transportation Regulation Board.

Table IV.3. Revenue sources for bus operations in Iowa in 1975

Continental Trailways	Percent	Midwest Coaches	Percent
Passenger revenue	65	Passenger revenue	58
Charter	20	Charter	20
Express	13	Express	22
Other	2		
Fort Dodge Transportation		Missouri Transit Lines	
Passenger revenue	2	Passenger revenue	56
Charter	27	Charter	30
Mail	68	Express	14
Express	1		
Other	2		
Greyhound		Scenic Hawkeye Stages	
Passenger revenue	71	Passenger revenue	42
Charter	8	Charter	48
Express	20	Express	10
Other	1		
Jefferson Lines		S-M-B Lines	
Passenger revenue	64	Passenger revenue	27
Charter	13	Charter	73
Express	22		
Other	1		

Source: Annual report for Iowa Transportation Regulation Board, 1975.

Table IV.4. Passenger data for bus operations in Iowa

		Number of passengers in thousands			
Company	Year	Regular fare passengers	Charter passengers	Total passengers	Average miles traveled per passenger
Continental Trailways	1972	142.0	18.2	160.2	142.1
	1973	159.6	20.0	179.6	139.2
	1974	252.6	22.5	275.1	98.1
	1975	203.7	17.6	221.3	110.0
	1976	188.5	14.5	203.0	119.9
Fort Dodge Transportation	1972	5.4	27.2	32.6	10.6
	1973	NA	NA	NA	NA
	1974	5.1	29.1	34.2	9.6
	1975	4.4	30.5	34.9	NA
	1976	NA	NA	NA	NA
Greyhound	1972	629.5	46.6	676.1	123.8
	1973	700.3	43.0	743.3	121.6
	1974	708.0	43.2	751.2	139.5
	1975	654.8	47.3	702.1	138.4
	1976	611.4	50.4	661.8	132.8
Iowa Coaches	1972	62.0	47.6	109.6	89.2
	1973	59.8	50.1	109.9	50.3
	1974	66.6	48.8	115.4	52.3
	1975	NA	NA	NA	NA
	1976	54.2	NA	NA	NA
Jefferson Lines	1972	166.9	21.9	188.8	102.3
	1973	201.4	13.9	215.3	103.4
	1974	208.8	16.2	225.0	104.0
	1975	191.1	20.7	211.8	98.9
	1976	161.1	22.6	183.7	95.4
Midwest Coaches	1972	23.9	1.7	25.6	78.6
	1973	24.4	0.8	25.2	81.4
	1974	24.6	0.6	25.2	73.2
	1975	23.8	1.8	25.6	66.6
	1976	19.9	2.3	22.2	103.0
Missouri Coaches	1972	34.6	2.7	37.3	80.1
	1973	54.4	2.3	56.7	64.0
	1974	53.8	3.8	57.6	65.0
	1975	49.6	2.4	52.0	NA
	1976	42.0	4.8	46.8	NA

Table IV.4. (continued)

		Number of passengers in thousands			
Company	Year	Regular fare passengers	Charter passengers	Total passengers	Average miles traveled per passenger
Reid Bus Lines	1972	1.3	0	1.3	NA
	1973	11.4	0	1.4	NA
	1974	1.3	0	1.3	NA
	1975	1.0	0	1.0	NA
	1976	0.9	0	0.9	NA
River Trail Transit Line	1972	8.1	4.6	12.7	NA
	1973	9.1	7.9	17.0	NA
	1974	NA	NA	NA	NA
	1975	7.2	10.6	17.8	57.6
	1976	7.0	NA	NA	NA
Scenic Hawkeye Stages	1972	67.2	18.9	86.1	107.3
	1973	68.4	23.4	91.8	99.7
	1974	75.4	16.8	92.2	116.8
	1975	69.2	16.8	86.0	121.4
	1976	61.5	16.5	78.0	133.0
Sedalia-Marshall-Booneville Stage Line	1972	20.4	18.7	39.1	73.2
	1973	22.0	19.1	41.1	70.3
	1974	20.3	21.3	41.6	76.3
	1975	18.0	23.7	41.7	83.8
	1976	16.7	21.7	38.4	91.2

NA - Data not available.

Source: Annual reports of Iowa Commerce Commission and Iowa Transportation Regulation Board.

Table IV.5. A revenue-expense profile for intercity bus companies operating in Iowa

Company	Year	Total transportation revenue (in thousand dollars)	Total operating expenses (in thousand dollars)	Iowa operating ratio (in percent)[a]	Systemwide operating ratio (in percent)
Continental Trailways	1972	1282.5	1026.5	80	95
	1973	1630.1	1272.5	78	93
	1974	1624.3	1293.2	80	94
	1975	1594.9	1356.8	85	100
	1976	1671.1	1445.1	86	101
Fort Dodge Transportation	1972	1245.7	1196.5	96	96
	1973	NA	NA	NA	NA
	1974	1360.3	910.3	67	94
	1975	1251.8	912.5	73	101
	1976	NA	NA	NA	NA
Greyhound	1972	4111.2	4084.0	99	90
	1973	4496.9	4516.3	100	91
	1974	5243.3	5316.3	101	92
	1975	5258.1	5630.4	107	95
	1976	5447.3	5852.2	107	97
Iowa Coaches	1972	550.4	389.5	71	92
	1973	603.8	443.4	73	95
	1974	754.8	551.2	73	91
	1975	NA	NA	NA	NA
	1976	NA	NA	NA	NA
Jefferson Lines	1972	1292.5	1151.1	89	89
	1973	1498.3	1317.9	88	86
	1974	1732.1	1325.9	77	88
	1975	1786.9	1344.0	75	87
	1976	1759.1	1513.3	86	85
Midwest Coaches	1972	106.4	105.2	99	97
	1973	107.4	125.9	117	100
	1974	111.2	112.5	101	99
	1975	139.6	124.4	89	105
	1976	132.4	118.2	89	99
Missouri Transit Lines	1972	191.4	178.0	93	92
	1973	196.6	189.6	96	94
	1974	200.1	193.6	97	99
	1975	254.5	208.4	82	99
	1976	260.2	266.7	102	102

Table IV.5. (continued)

Company	Year	Total transportation revenue (in thousand dollars)	Total operating expenses (in thousand dollars)	Iowa operating ratio (in percent)[a]	Systemwide operating ratio (in percent)
Reid Bus Lines	1972	5.7	NA	NA	NA
	1973	5.7	NA	NA	NA
	1974	9.9	21.8	220	NA
	1975	10.1	19.2	190	88
	1976	12.2	20.7	170	NA
River Trail Transit Lines	1972	49.7	72.6	146	NA
	1973	59.6	94.7	159	NA
	1974	NA	NA	NA	NA
	1975	74.2	102.3	138	97
	1976	71.0	103.4	146	96
Scenic Hawkeye Stages	1972	325.0	281.2	86	95
	1973	352.3	305.4	87	95
	1974	411.6	350.6	85	96
	1975	456.1	358.7	79	95
	1976	404.8	472.3	117	96
Sedalia-Marshall-Boonesville Stage Line	1972	325.5	228.1	70	101
	1973	355.5	269.1	76	97
	1974	403.9	328.6	81	93
	1975	423.4	360.0	85	92
	1976	426.8	372.7	87	101

NA - Data not available.

Source: Annual reports of Iowa Commerce Commission and Iowa Transportation Regulation Board.

[a] Calculated from columns one and two and may not include all applicable expenses and revenue.

Table IV.6. Comparison of average revenue per mile with average cost per mile to operate

Company	Intercity service revenue, $ per mile	Charter service revenue, $ per mile	Average cost, $ per mile
Continental Trailways	0.87	0.98	0.91
Fort Dodge Transportation	0.40	0.80	0.52
Greyhound	1.21	0.97	1.11
Iowa Coaches	0.79	0.83	0.73
Jefferson	1.20	1.02	1.01
Midwest Coaches	0.77	1.35	0.86
Missouri Transit Lines	0.61	0.70	0.64
Scenic Hawkeye Stages	0.56	0.94	0.70

Source: Iowa Department of Transportation, Transportation Regulation Board, 1975.

Regulation Board, illustrates the importance of income from regular passenger service and from charter service as compared with the cost per mile to operate.

The Iowa Transportation Regulation Board administers the statutory requirements regarding motor vehicle common carriers, as discussed in Chapter VI. These requirements are for aggregated data reporting, however, and do not provide individual bus station activity. No other governmental agency is charged with obtaining detailed intercity bus passenger data.

The Highway Division of the Iowa Department of Transportation provided a trip interchange table for the total number of daily trips by auto, van, and pickup among 23 study cities selected as focal points for a statewide bus system. These data, presented in Table IV.7, were determined from an analysis of origin-destination studies for individual cities as well as from statewide studies.

Bus Schedule Guide Books

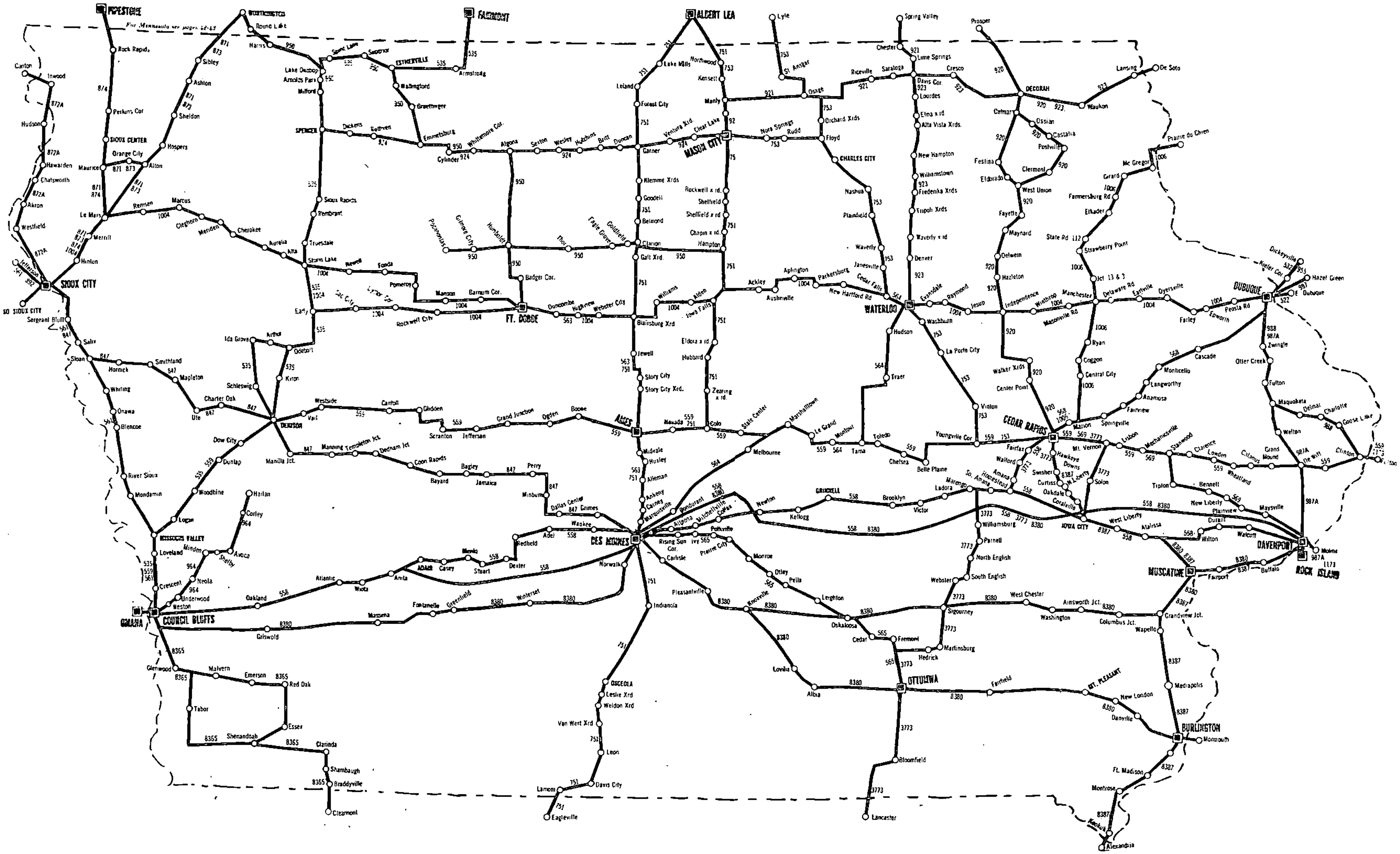
Russell's Official National Motor Coach Guide is a publication used by all bus station agents (20). The bus timetable listing is published monthly with a directory and map supplement published semiannually. The bus timetable listing provides the details regarding each bus schedule of operations. All stops, with arrivals and departure times, are noted.

The intercity bus routes in Iowa are available from Volume 3 of Russell's Guides. Figure IV.1 is the Iowa composite route system as of June 1976. Figures IV.2 through IV.12 identify the individual routes of each company operating between at least two Iowa cities and show the

Table IV.7. 1975 average daily person trip interchanges by auto, pickup, and van among 23 Iowa cities

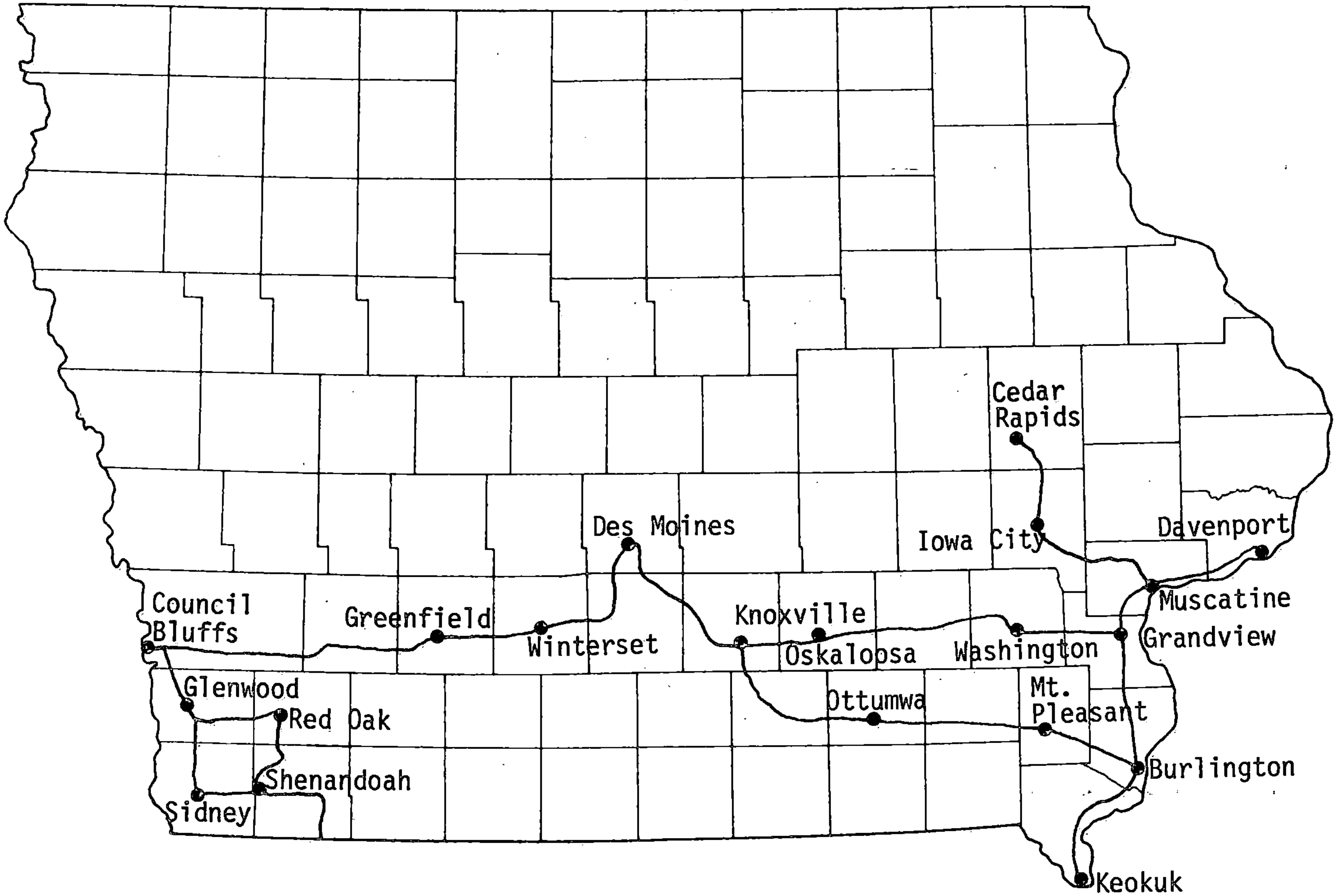
	Ames	Atlantic	Burlington	Carroll	Cedar Rapids	Clarinda	Clinton	Council Bluffs	Davenport	Decorah	Des Moines	Dubuque	Fort Dodge	Iowa City	Marshalltown	Mason City	Muscatine	Osceola	Ottumwa	Sioux City	Spencer	Waterloo	West Union
Ames		84	18	146	114	6	10	120	55	6	5683	9	125	259	783	97	44	64	22	33	22	139	0
Atlantic			0	72	3	65	0	664	1	0	216	6	10	0	4	0	0	7	2	12	2	4	0
Burlington				0	91	0	33	14	348	3	144	18	3	268	6	0	250	3	224	4	0	4	3
Carroll					38	1	1	272	7	0	264	0	166	0	23	0	0	3	0	55	6	13	3
Cedar Rapids						0	304	111	929	84	929	543	64	8266	240	75	256	3	132	22	14	1287	55
Clarinda							0	207	7	0	37	0	6	0	0	0	0	0	3	4	0	0	0
Clinton								8	2776	3	83	313	13	163	7	5	26	0	4	1	0	28	0
Council Bluffs									121	6	1681	31	126	81	55	25	0	19	44	1433	56	69	1
Davenport										7	676	547	34	1825	49	37	3474	7	86	18	5	297	0
Decorah											25	29	0	51	15	63	0	0	1	0	1	163	235
Des Moines												144	769	1090	1597	459	73	989	664	339	154	918	10
Dubuque													16	142	28	19	34	0	11	10	9	411	13
Fort Dodge														37	56	172	15	0	10	115	106	105	0
Iowa City															73	42	856	19	134	35	0	308	0
Marshalltown																61	3	10	16	12	3	302	0
Mason City																	4	0	5	20	57	376	24
Muscatine																		0	42	1	0	43	0
Osceola																			16	3	0	3	0
Ottumwa																				1	0	92	0
Sioux City																					247	21	1
Spencer																						11	0
Waterloo																							153
West Union																							
TOTAL		84	18	218	246	72	348	1376	4244	109	9738	1640	1332	12182	2942	1055	5035	1124	1416	2118	682	4594	498

Total trips = 51,071



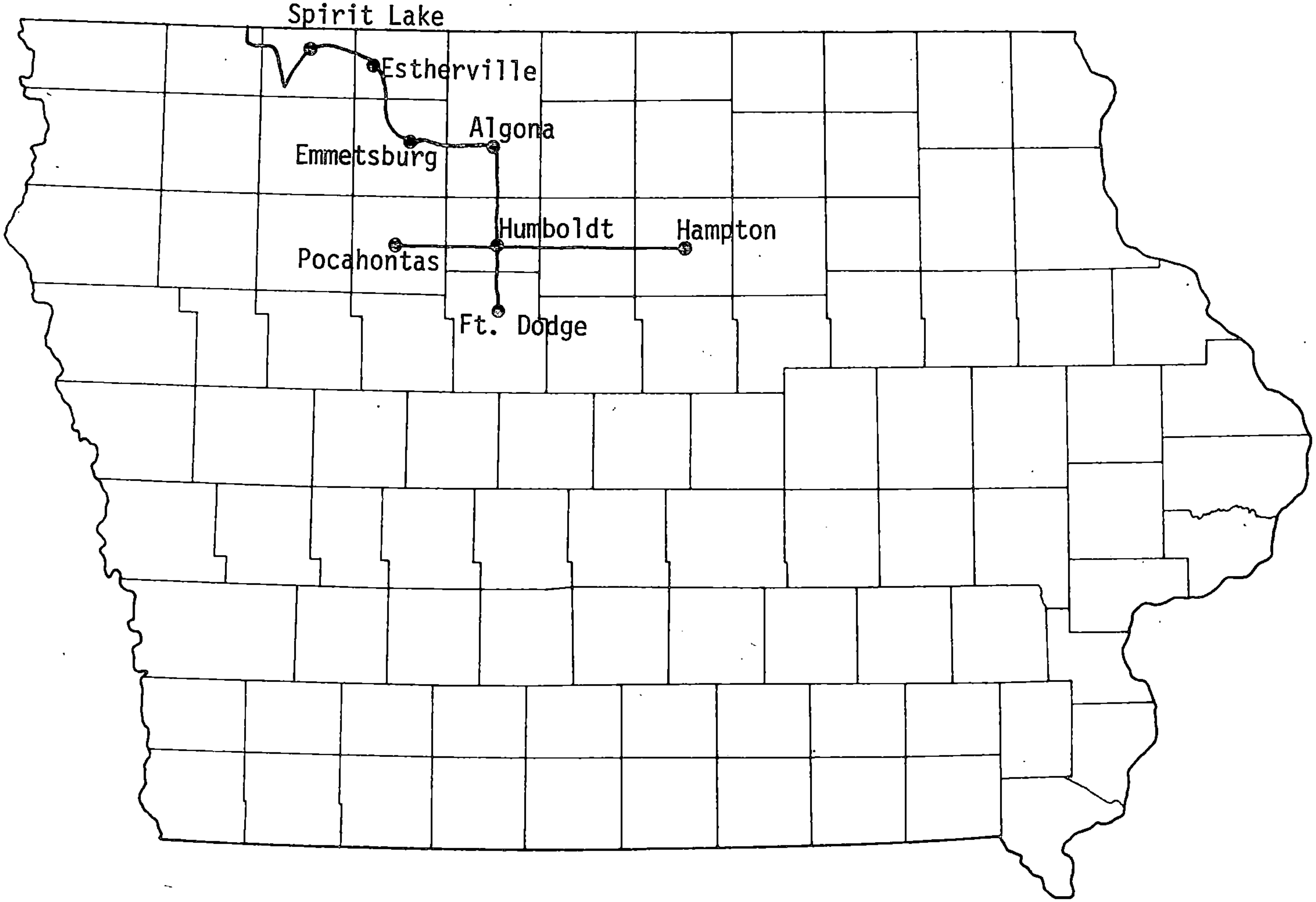
Source: Russell's National Motor Coach Guide, Volume 3, December 1976.

Figure IV.1. Intercity bus routes and communities served in Iowa



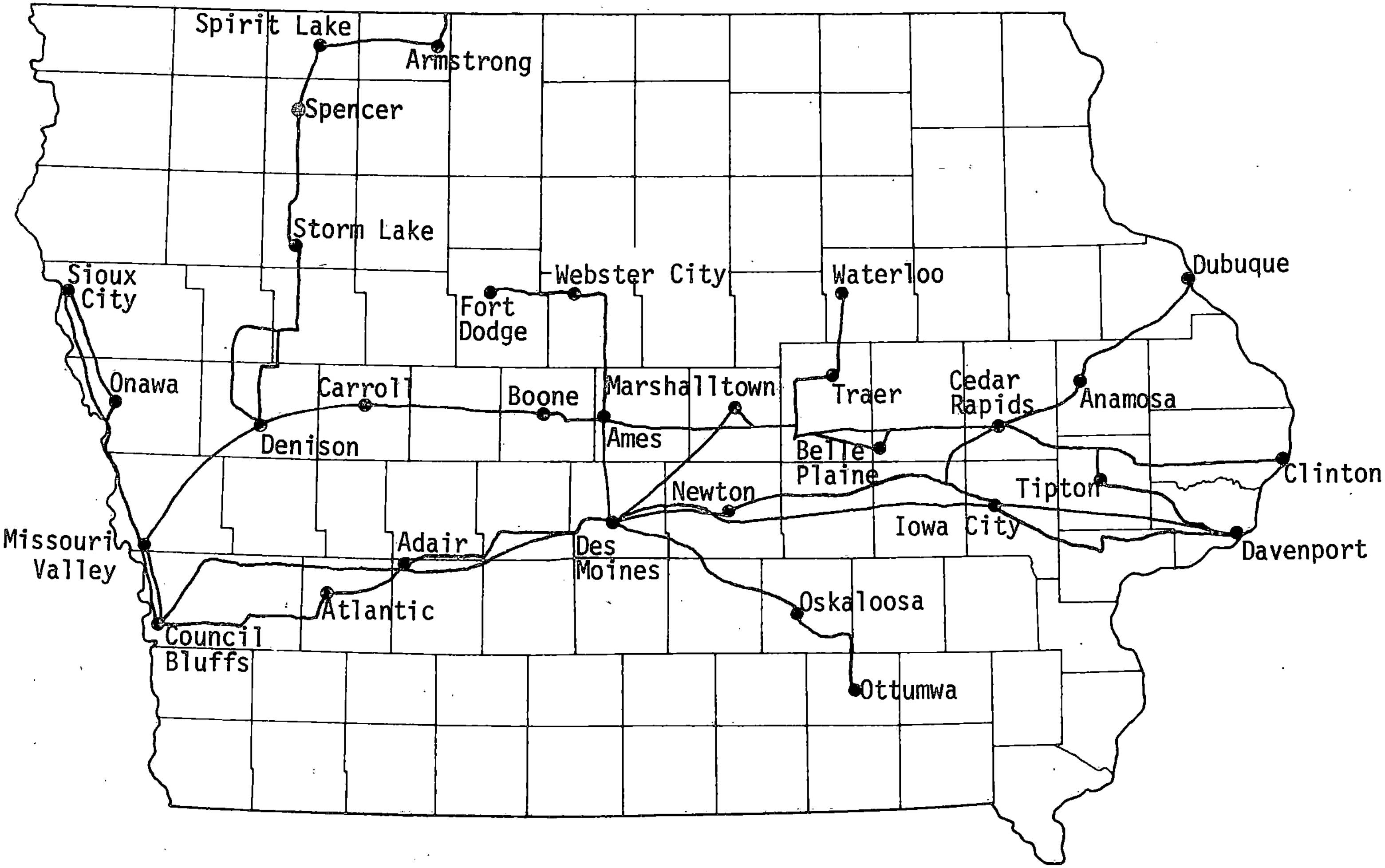
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.2. Continental Trailways route structure in Iowa



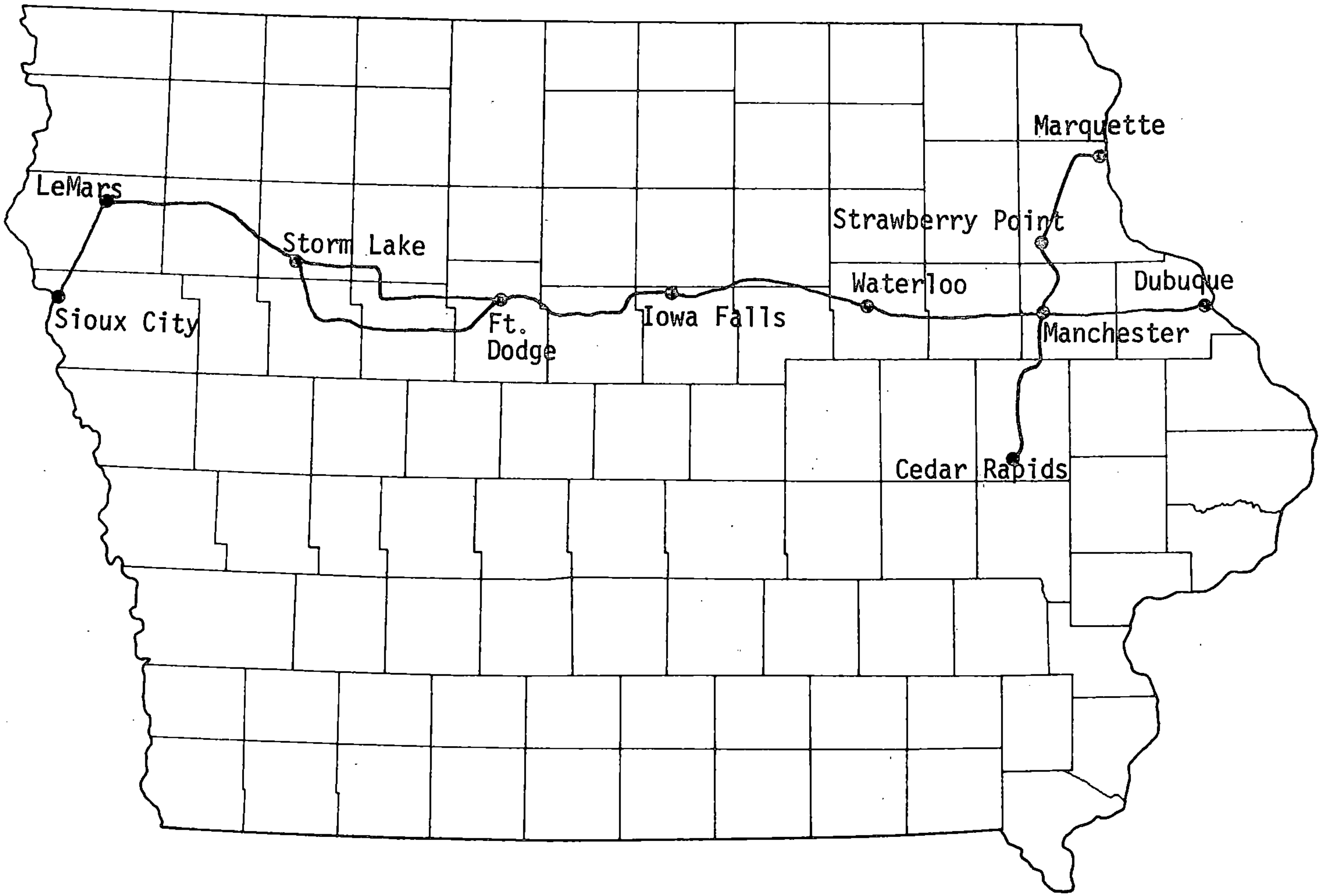
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.3. Fort Dodge Transportation route structure in Iowa



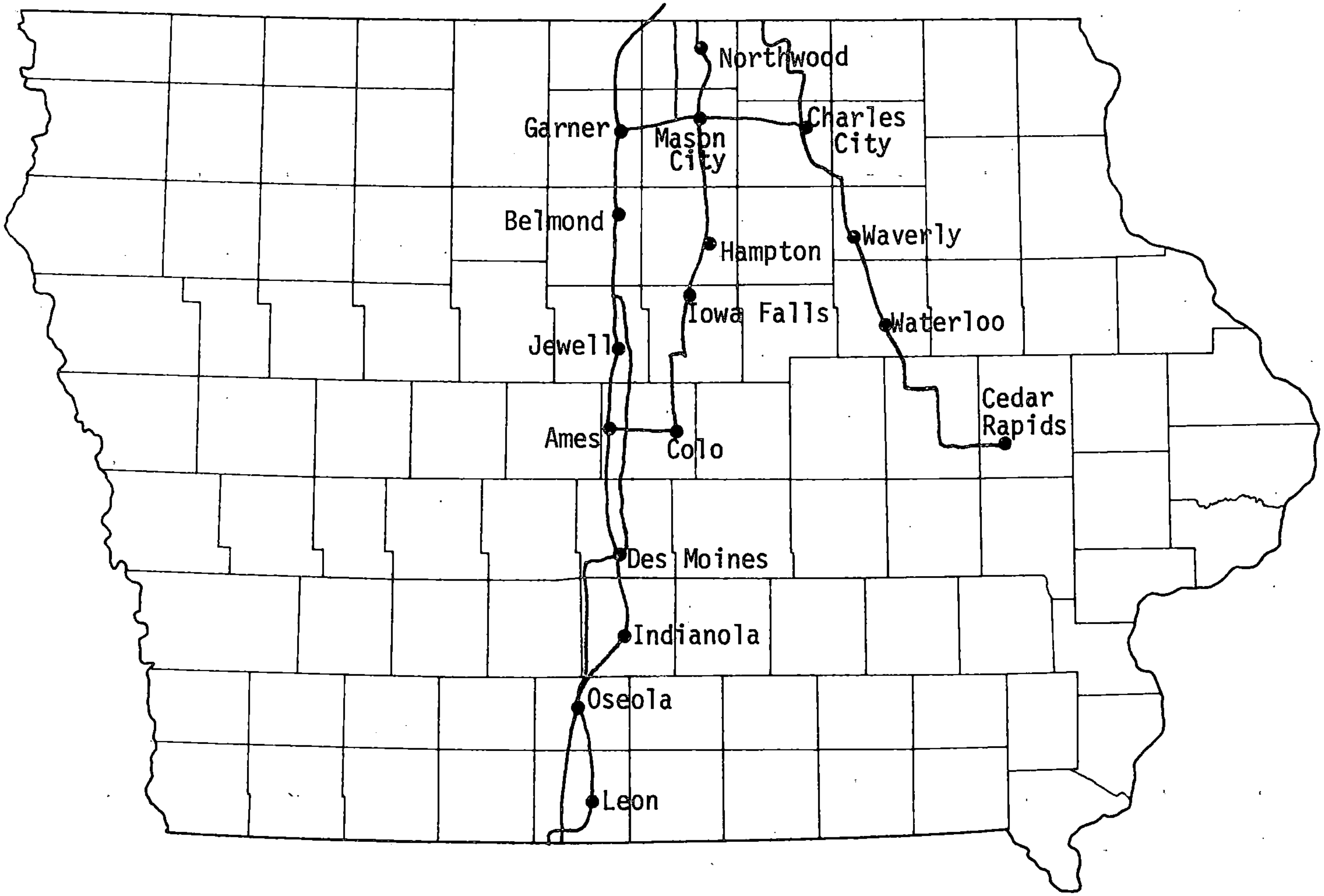
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.4. Greyhound Lines route structure in Iowa



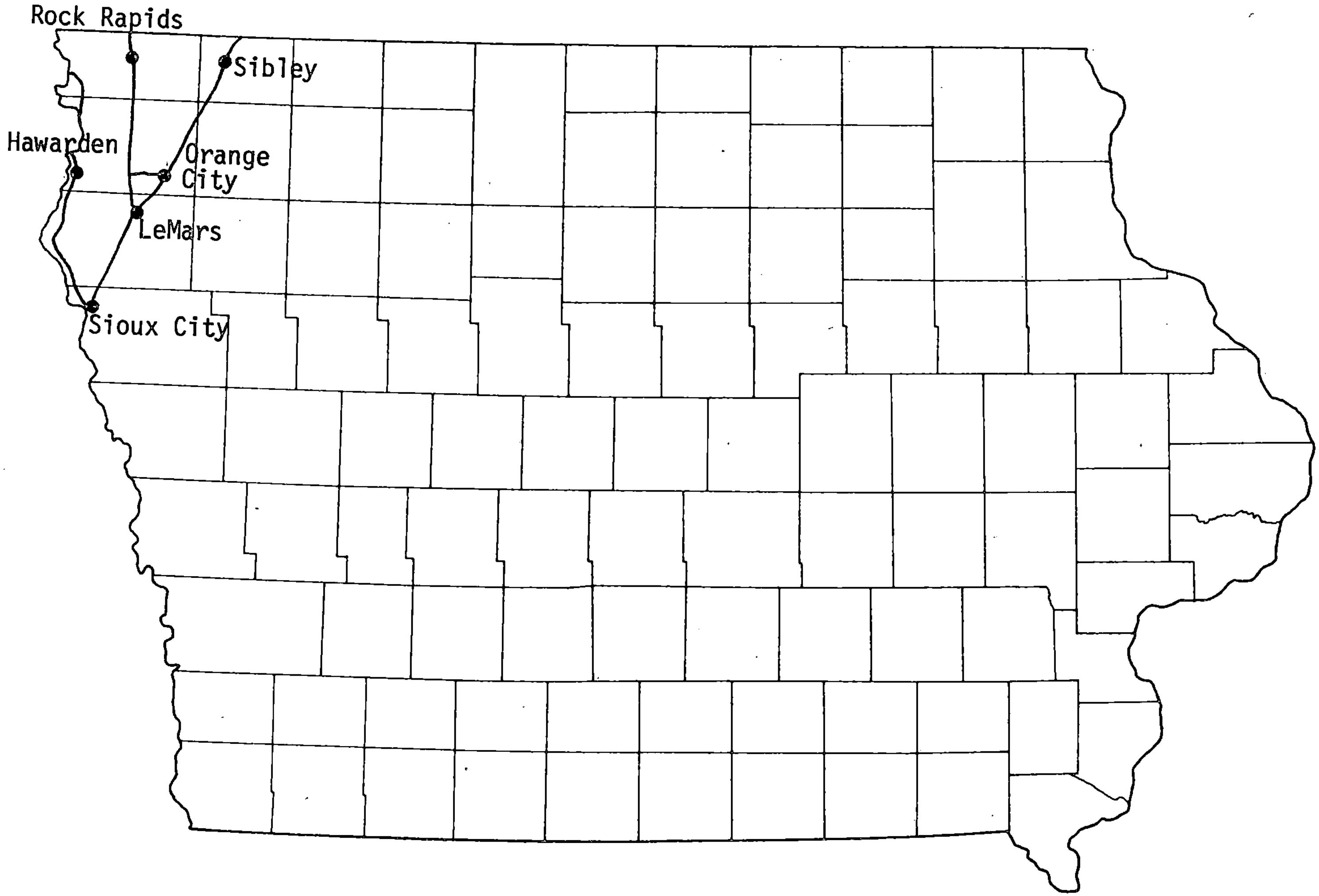
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.5. Iowa Coaches route structure in Iowa



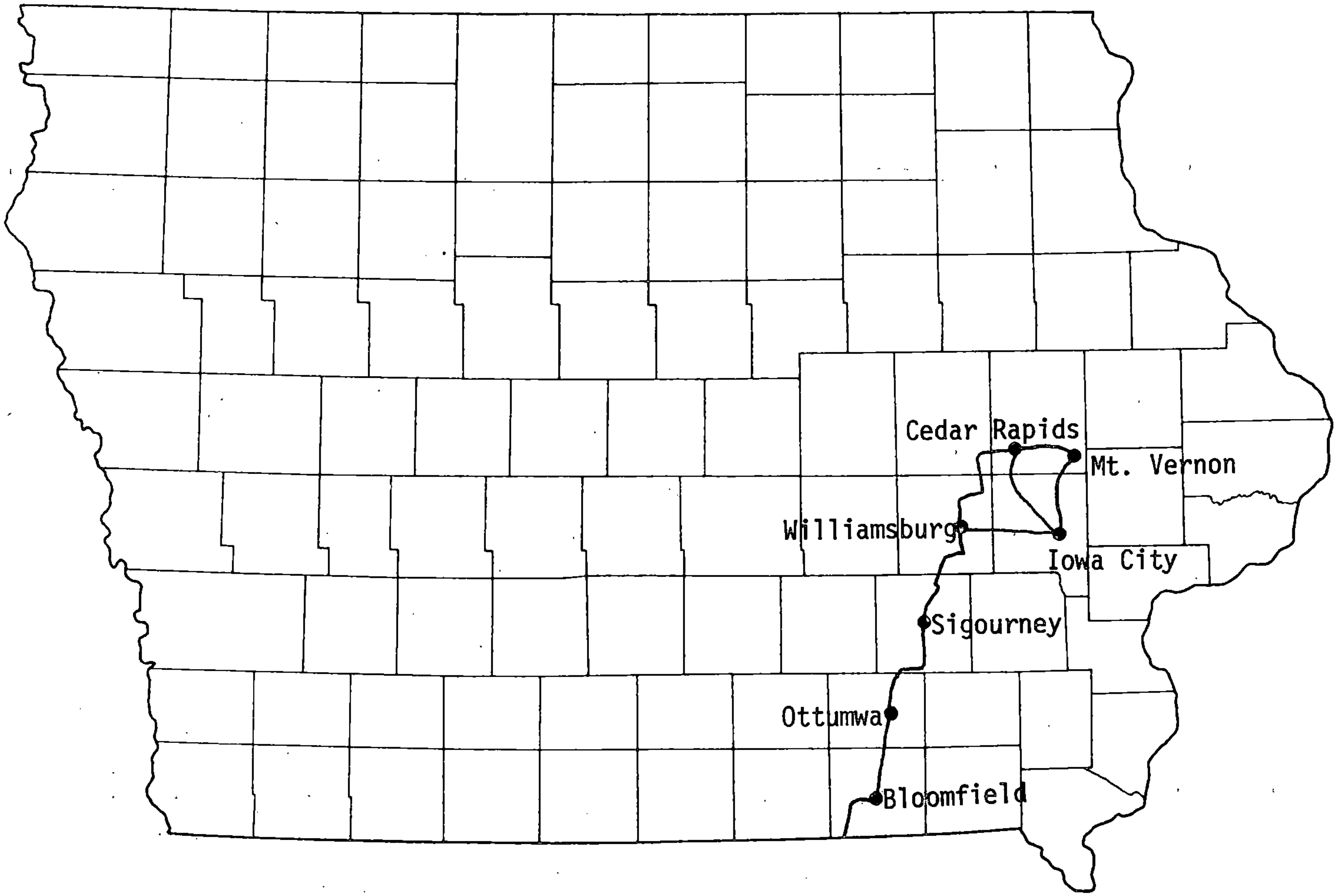
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.6. Jefferson Lines route structure in Iowa



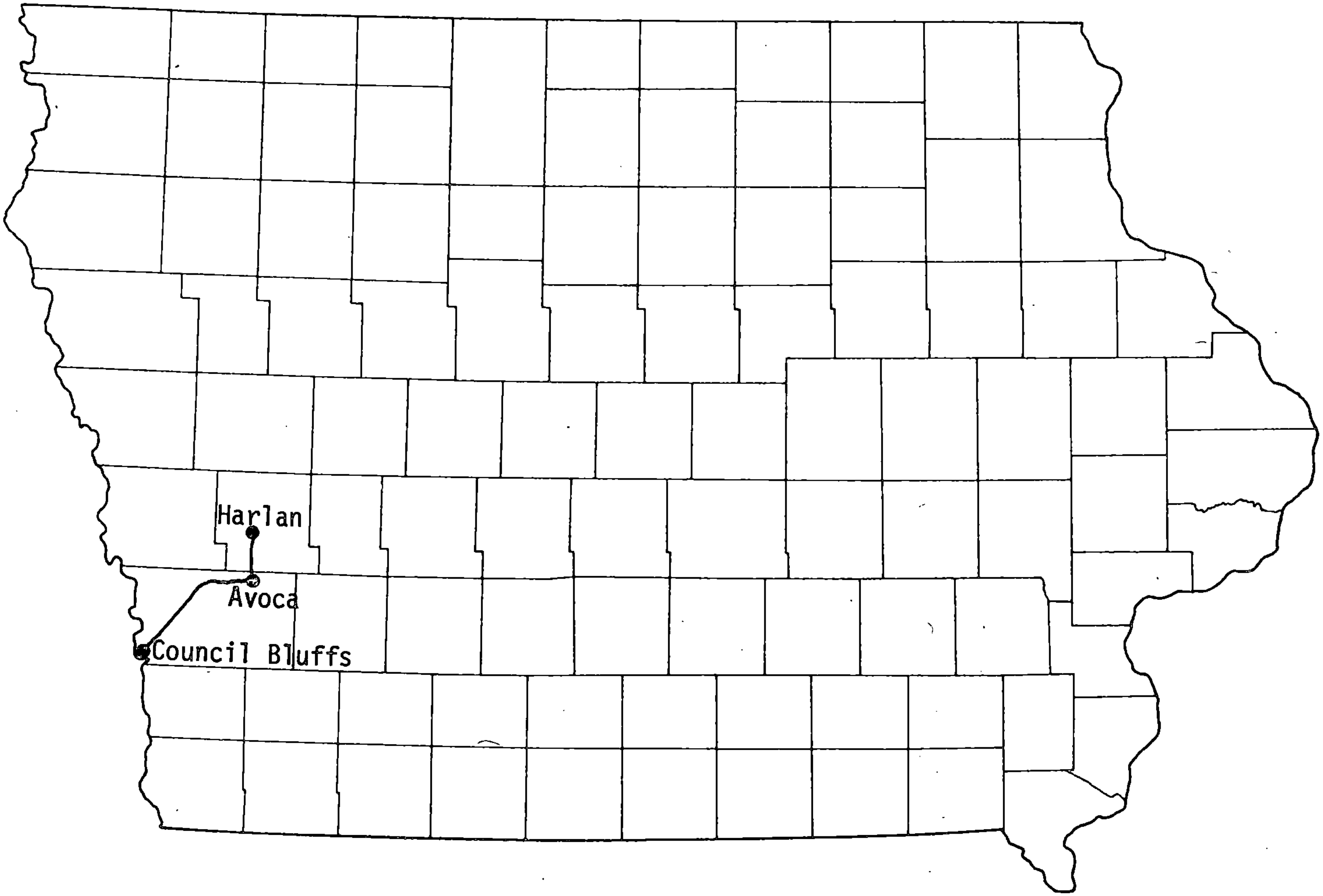
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.7. Midwest Coaches route structure in Iowa



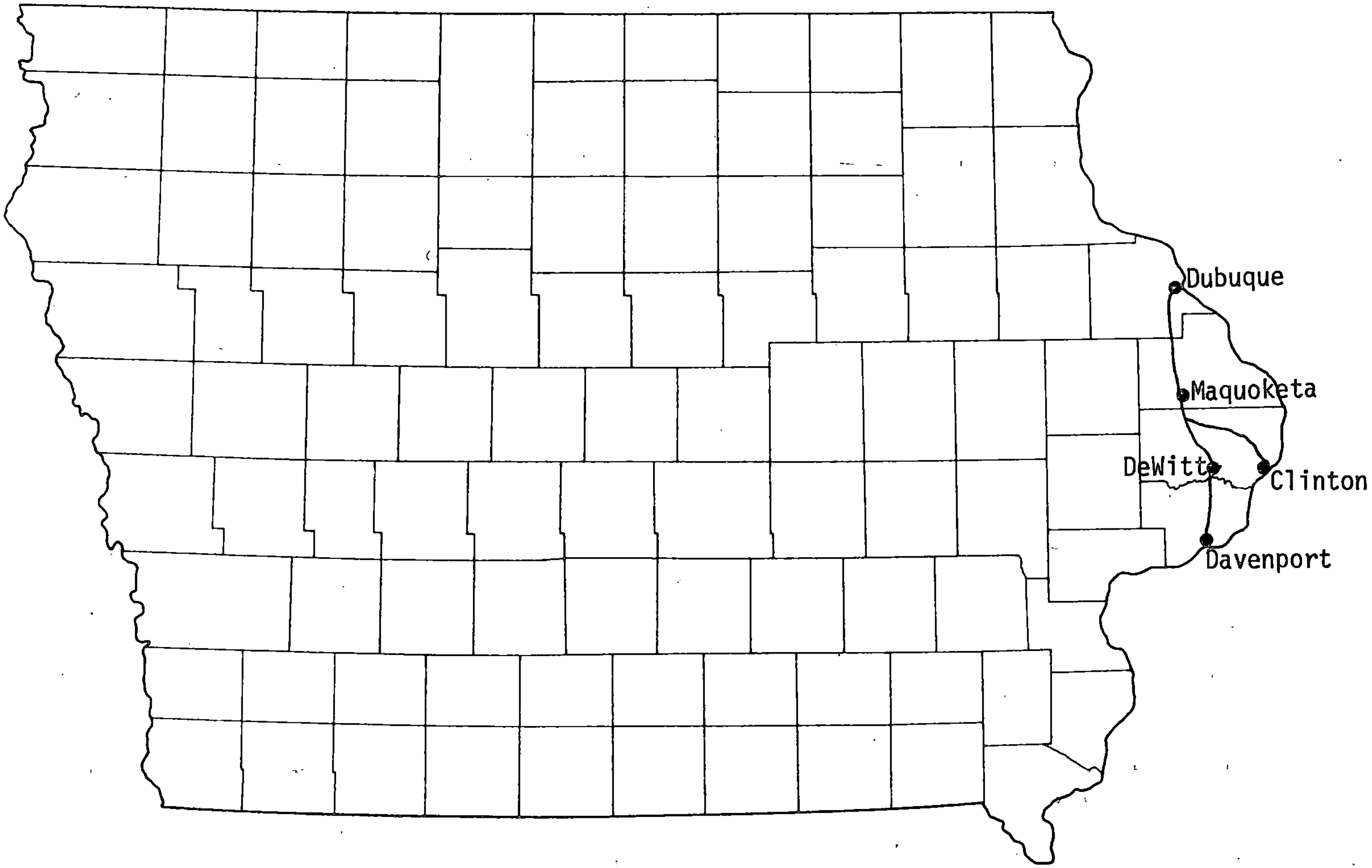
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.8. Missouri Transit Lines route structure in Iowa



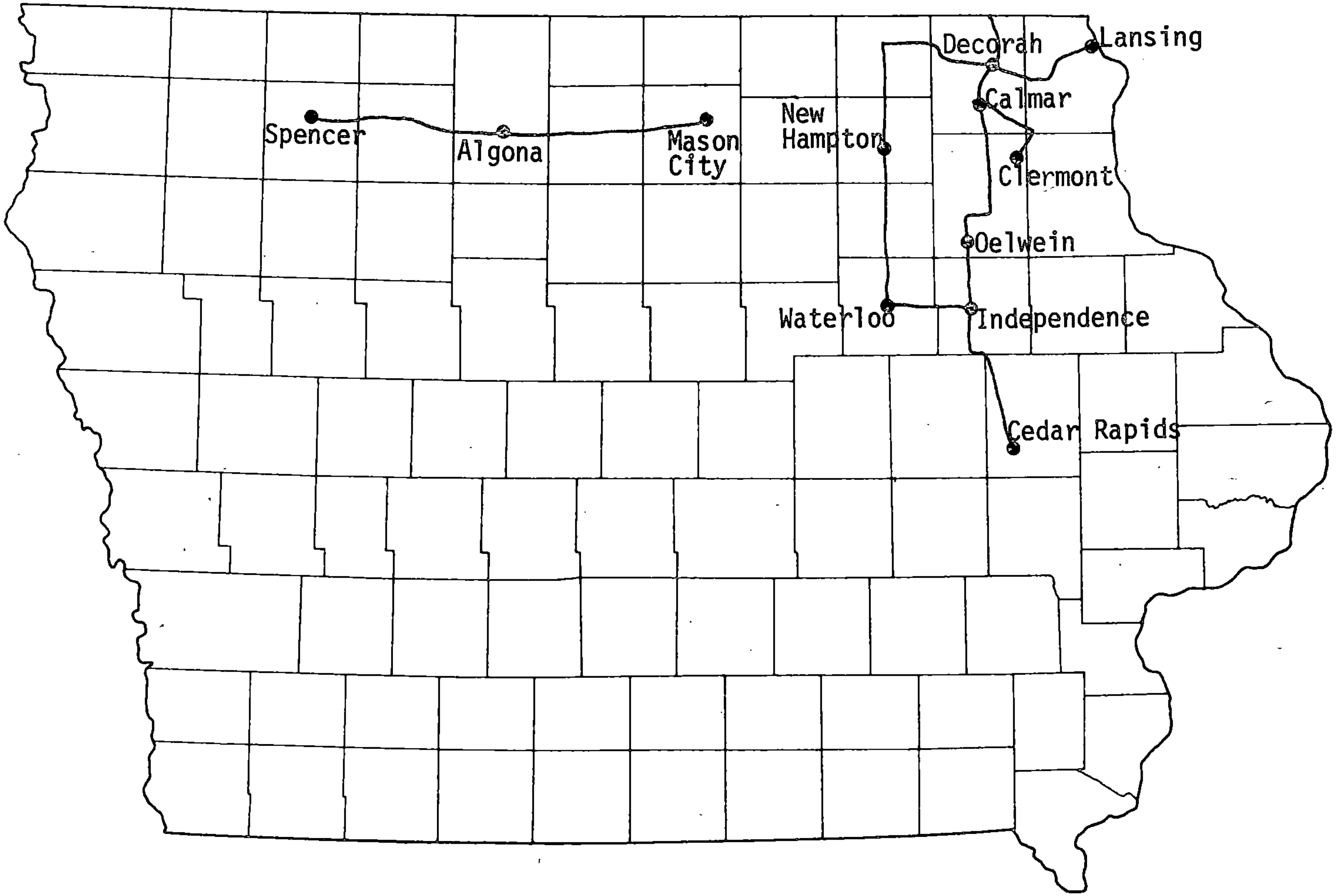
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.9. Reid Bus Lines route structure in Iowa



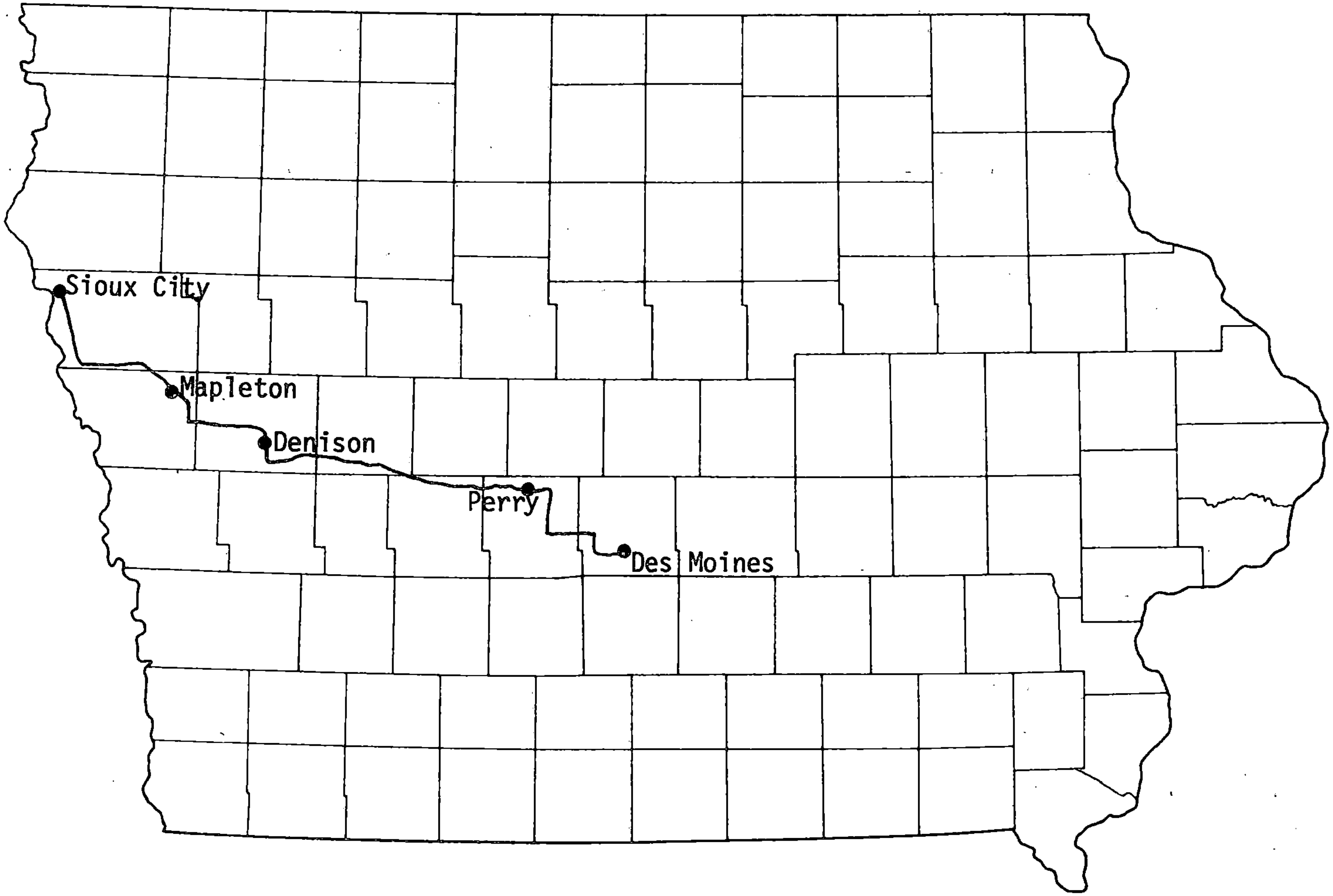
Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.10. River Trails Transit Lines route structure in Iowa



Source: Russell's Official National Motor Coaches Guide, June 1977.

Figure IV.11. Scenic Hawkeye Stages route structure in Iowa



Source: Russell's Official National Motor Coach Guide, June 1977.

Figure IV.12. Sedalia-Marshall-Booneville Stage Lines route structure in Iowa routes within the state. Scenic Stages, Inc., operates between Clinton and Davenport on a route entirely in Illinois. The Intercity Airport Transit, Inc., offers a specialized service connecting Ames with the State Capitol and airport in Des Moines. Because of the unique character of these services, their route structures have not been illustrated.

Intercity express bus routes in Iowa are confined to the I-80 and I-35 highway corridors. This service exists primarily to serve long-distance, large-city markets, with Iowa service being secondary. Kansas City, Minneapolis, Chicago, and Denver are the major generators of travel desire for express operators, with major intermediate cities the benefactors of this service.

Russell's Guides, Inc., maintain a library of past timetables and maps in their Cedar Rapids facilities. If a historical reconstruction of schedules is necessary, this is a readily accessible reference source.

Bus Company Data

Thirteen intercity bus companies serve at least two Iowa communities. The representatives of these intercity bus companies that serve Iowa are included in Appendix A.

Each company representative was contacted regarding the availability of data. The following data were requested:

1. Ticket destinations at each of the 23 study city bus stations for a summer month.
2. Package express volume of business at the same 23 bus stations for each month of a 12-month period.
3. The number of ticket sales at the same 23 bus stations for each month of a 12-month period.

The larger companies do not keep records such that the information requested could be provided at specific bus stations. Generally, the ticket sales slips are forwarded by the station agent to the bus company weekly, semi-monthly, or monthly. These sales slips are thus no longer available after they leave the local station. However, the bus companies granted permission to contact each bus station agent for detailed information. Four companies were able to provide the information requested, seven were cooperative but did not keep records suitable for the needs of this study, and no information could be obtained from two companies.

The role of charter service was emphasized by a number of companies. In some cases a small company viewed charter operations as their principal business, while they provided regular passenger service primarily to maintain a certificate.

Bus Station Information

With the permission of the bus companies, individual bus station agents became a major source for data acquisition. A list of the station agents contacted is provided in Appendix A. The bus companies serving each study city are also indicated in Appendix A.

Patronage Data

Because ticket destinations for a summer month were not available from most of the bus companies, all ticket destinations were obtained from local bus station agents. An exception is West Union, for which data were obtained from the Scenic Hawkeye offices.

A research assistant visited each bus station agent on a day just prior to the mailing of the ticket sales slips to the bus companies.

The destination of every ticket sale was recorded in the field and subsequently summarized in the office. This ticket destination data bank provided the first such knowledge in Iowa of actual bus passenger travel patterns.

Table IV.8 records the results of the 23 study city monthly ticket survey stratified for in-state and out-of-state destinations. Figure IV.13 depicts the same data results in graphic form.

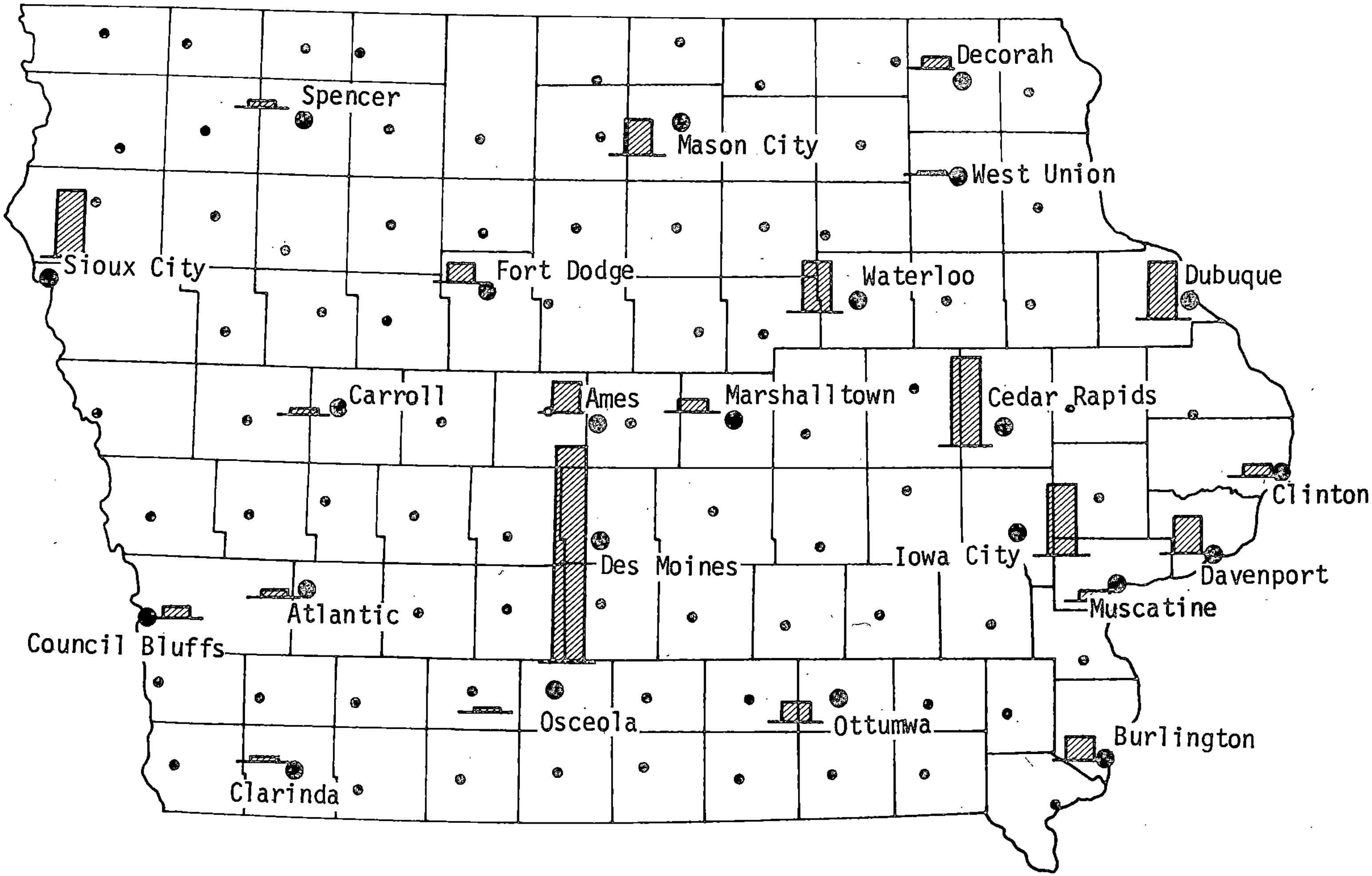
Table IV.9 is included in this report to present the results of previous research on the same subject (21). Including data from this study, monthly ticket sales have been compiled in each of the nine bus stations in central place cities of non-metropolitan regions in Iowa during each of the years 1973 through 1976. Because of the small volume of travel by intercity bus, trends are not readily apparent from the bus stations studied in these smaller cities.

A preliminary tabulation and analysis of the monthly intercity bus ticket sales data was prepared. Table IV.10 is a trip table matrix for the monthly trip interchanges among the 23 study cities. A similar table was prepared tabulating the destination by county of all intrastate trips from each of the 23 study cities.

In addition to the trip interchange data, a trip length frequency table was prepared. Table IV.11 documents the results of this analysis. The results indicate that most trips were less than 400 miles in length and that, with a few exceptions, 50 percent of the trips were for less than 150 miles.

Table IV.8. Bus ticket sales at 23 Iowa cities for a typical summer month, 1976

	Number of tickets		
Study city	Iowa destination	Out of state	Total
Ames	686	431	1,117
Atlantic	112	167	279
Burlington	504	284	788
Carroll	97	78	175
Cedar Rapids	2,302	795	3,097
Clarinda	33	70	103
Clinton	174	271	445
Council Bluffs	370	96	466
Davenport	754	569	1,323
Decorah	149	231	380
Des Moines	3,947	3,479	7,426
Dubuque	877	1,050	1,927
Fort Dodge	392	233	625
Iowa City	1,490	1,003	2,493
Marshalltown	271	143	414
Mason City	651	520	1,171
Muscatine	212	153	365
Osceola	100	68	168
Ottumwa	492	227	719
Sioux City	800	1,510	2,310
Spencer	110	139	249
Waterloo	1,038	740	1,778
West Union	47	9	56
Total	15,608	12,266	27,874



SCALE 1 inch = 5000 TICKETS

Figure IV.13. Monthly intercity bus ticket sales for 23 study cities, summer 1976

Table IV.9. Bus ticket sales at central cities of non-metropolitan regions for a typical summer month

	Number of tickets sold											
	Iowa destinations				Out of state destinations				Total			
Study City	1973	1974	1975	1976	1973	1974	1975	1976	1973	1974	1975	1976
Burlington	577	732	646	504	601	475	421	284	1,178	1,205	1,067	788
Carroll	127	100	100	97	52	72	89	78	179	172	189	175
Creston	70	60	0	0	21	7	0	0	91	67	0	0
Decorah	183	201	208	149	295	222	211	231	478	423	419	380
Fort Dodge	591	662	739	392	474	450	313	233	1,065	1,112	1,052	625
Marshalltown	391	359	370	271	189	128	167	143	580	487	537	414
Mason City	815	1,024	889	651	744	700	656	520	1,559	1,724	1,545	1,171
Ottumwa	572	562	553	492	285	334	278	227	857	896	831	719
Spencer	151	138	178	110	127	126	137	139	278	264	315	249
Total	3,477	3,838	3,683	2,666	2,788	2,514	2,272	1,855	6,265	6,350	5,955	4,521

Table IV.10. Monthly bus trip interchanges among 23 Iowa cities, 1976

	Ames	Atlantic	Burlington	Carroll	Cedar Rapids	Clarinda	Clinton	Council Bluffs	Davenport	Decorah	Des Moines	Dubuque	Fort Dodge	Iowa City	Marshalltown	Mason City	Muscatine	Osceola	Ottumwa	Sioux City	Spencer	Waterloo	West Union
Ames		5	5	24	159	0	12	14	14	3	395	27	47	59	37	61	0	3	12	18	6	41	0
Atlantic			0	0	8	0	0	13	6	0	290	0	5	14	4	5	0	0	0	0	0	3	0
Burlington				0	54	1	7	3	114	0	220	9	10	108	5	6	26	0	36	27	0	15	2
Carroll					32	0	0	8	2	1	40	6	4	7	4	3	0	0	4	2	2	6	0
Cedar Rapids						0	63	16	147	51	523	187	37	504	90	80	23	3	65	5	9	171	21
Clarinda							0	35	1	0	12	0	1	0	0	0	0	0	0	0	0	0	0
Clinton								5	24	1	59	5	3	30	7	1	2	0	2	1	0	5	0
Council Bluffs									3	2	159	0	1	18	8	1	2	2	5	19	13	11	0
Davenport										2	504	127	8	327	7	23	90	0	35	4	0	53	0
Decorah											14	8	2	18	0	19	0	0	1	0	0	20	1
Des Moines												119	350	752	155	336	58	95	319	263	26	491	5
Dubuque													21	77	7	26	3	0	13	50	4	241	2
Fort Dodge														42	7	9	0	2	0	66	7	46	3
Iowa City															15	61	30	2	64	37	5	127	5
Marshalltown																7	3	2	3	3	3	53	0
Mason City																	8	13	5	17	30	70	0
Muscatine																		0	5	0	0	7	1
Osceola																			0	0	0	1	0
Ottumwa																				6	1	8	0
Sioux City																					3	25	0
Spencer																						4	0
Waterloo																							17
West Union																							
TOTAL		5	5	24	253	1	82	94	311	60	2216	488	489	1956	346	638	245	122	569	518	109	1398	57

Total bus trips = 9986

Table IV.11. Trip length frequency analysis for intercity bus trips, 1976

Study city	50 percent of the tickets sold were for travel less than x miles.	Percent of tickets sold with destinations greater than		
		150 miles	200 miles	400 miles
Ames	110	44	30	7
Atlantic	110	40	29	18
Burlington	110	44	24	10
Carroll	120	41	23	14
Cedar Rapids	110	29	23	6
Clarinda	130	45	44	18
Clinton	140	41	29	13
Council Bluffs	120	35	28	9
Davenport	150	46	21	11
Decorah	120	45	16	6
Des Moines	140	47	34	12
Dubuque	140	47	19	8
Fort Dodge	130	48	36	14
Iowa City	130	48	42	9
Marshalltown	90	38	27	10
Mason City	140	42	36	26
Muscatine	180	52	39	12
Osceola	160	51	38	11
Ottumwa	90	28	23	9
Sioux City	150	50	38	18
Spencer	190	67	23	10
Waterloo	110	42	33	9
West Union	100	25	9	5

Terminal Facilities

As each bus station was visited to obtain ticket destination data, detailed information regarding the physical facilities was also obtained. A four-page form was completed that recorded the number of parking spaces, access to the terminal area, type of neighborhood, transit service, building size, services provided, and other areas of interest. A city map was obtained, and photographs were taken. These data were tabulated on a standard form, a copy of which is included in Appendix A.

It must be kept in mind that bus stations have different roles in cities of different sizes. Smaller cities generate and attract small volumes of bus passenger business, and consequently the terminals have a multipurpose use. Revenues generated from ticket and package express may not warrant separate facilities. Revenues may in fact be so small that the percentage received by the bus station operator under his lease agreement may only support minimal facilities.

Special Des Moines Union Bus Depot Study

The one-month survey of tickets sold at 23 study cities provided invaluable information. There are, however, other characteristics of intercity bus passenger travel that are needed. The variation in travel during June, July, and August, for example, may be substantial, so that there might not be a "typical" summer month.

Mr. R. L. Turpin, Greyhound District Manager at Des Moines, made available a record of each bus entering or departing the Union Bus Depot during an entire year. The numbers of persons arriving on the bus, continuing through, debarking, and boarding at Des Moines, as well as the times of arrival and departure were tabulated.

An analysis of these data provided a number of valuable travel characteristics. For example, Table IV.12 displays a summary of the relationship between daily and weekly travel and between monthly and annual travel. On the basis of this analysis, it was possible to adjust June total ticket sales such that they could be related to those in July and August to yield the data displayed in Table IV.8.

These same data from Des Moines were analyzed regarding on-time arrivals and departures, and the results are presented in Table IV.13. The definition of "on-time" was arbitrarily selected as being not more than 10 minutes later than the published schedule. It is interesting to note that for the entire year, 83 percent of the arriving buses and 73 percent of the departing buses were on time. A more detailed analysis and on-time classification appears in Appendix A.

Many of the data in this chapter represent output from this research project and afford information not previously available. These data provide the basis for much of the analysis and many of the recommendations included in subsequent chapters.

Table IV.12. Temporal variation in intercity bus usage

Daily travel as a percentage of the total weekly travel

(Average for one year)

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
15.9	14.4	12.4	12.7	13.3	17.4	13.8

Monthly travel as a percentage of the total yearly travel

J	F	M	A	M	J	J	A	S	O	N	D
7.26	6.42	7.72	7.39	7.43	9.15	10.45	10.34	7.43	8.28	8.27	9.87

Notes: See Appendix A for detailed summary.

Numbers may not total 100 percent due to rounding.

Table IV.13. Analysis of on-time bus arrivals and departures

	Percentage of on-time arrivals and departures by month												
	J	F	M	A	M	J	J	A	S	O	N	D	Average
Arrivals	82.3	86.8	85.2	90.2	83.2	80.4	80.0	85.2	88.2	85.4	76.1	73.8	83.1
Departures	78.3	78.9	75.3	79.7	73.6	69.7	68.2	71.4	76.2	74.4	65.4	59.8	72.9

	Percentage of on-time arrivals and departures by day							
	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Average
Arrivals	87.7	86.4	83.8	82.5	80.9	77.9	80.0	82.7
Departures	76.9	78.1	72.6	73.5	71.1	67.0	67.9	72.5

Notes: On-time is defined as not more than 10 minutes late for the purpose of this summarization.

For detailed presentation see Appendix A.

Because these data result from one 12-month sample, they may incorporate the effects of unusual weather conditions or other atypical factors.

V. INTERCITY BUS USER PROFILE

Introduction

A number of studies have been conducted, both on a national scale and by individual states, to investigate the characteristics of intercity bus users. One such report indicates that

> ...passengers are predominantly people who do not have an auto at their disposal, e.g., the poor, the student, the elderly, and the infirm. Consequently, for an even-increasing percentage of the population, intercity bus transportation is considered to be a low status form of transportation to be relied upon only when planes cannot fly or when the family car is not available. In addition to its negative sociopsychological aspects, bus transportation has a number of specific drawbacks such as inadequate, if any, toilet facilities, meals, drinks, on-board entertainment, etc. (22)

This national description was not entirely representative of the Oregon user as surveyed in 1974 (23). In Oregon only 17 percent chose the bus because they had no access to automobiles.

An extensive 1977 survey in Wisconsin (24) was somewhat more supportive of the national report finding in that 38 percent did not have access to an automobile. Also, 48 percent had less than $10,000 income, and 34 percent of all riders were students.

Iowa User Characteristics

No previous studies regarding Iowa intercity bus user characteristics had been conducted. However, during the summer of 1976 the Office of Research of the Iowa Department of Transportation conducted interviews at the same 23 bus stations selected for study in this research. A copy of the survey instrument is included in Appendix B.

The following statements summarize responses to the pertinent questions asked in the survey:

73.0 percent of the bus travelers arrived at the terminal via automobile.

50.1 percent of the trips were to visit friends or relatives.

43.9 percent traveled by bus once a year or less.

35.6 percent traveled by bus up to six times a year.

66.7 percent would not have made the trip if a bus were not available.

51.4 percent indicated that an express bus service would have served them better.

66.1 percent had a valid driver's license.

39.6 percent stated that a family car was available for this trip.

70.0 percent were alone.

8.6 percent had children under 12 with them.

70.9 percent were female.

22.8 percent were over 65 years of age.

25.8 percent had an annual income less than $5,000.

47.2 percent had an annual income less than $10,000.

15.1 percent had an annual income greater than $20,000.

47.1 percent were single.

23.5 percent were students.

19.1 percent were professional or technical.

17.5 percent were retired.

21.1 percent had attended college.

No detailed cross tabulations was conducted between bus stations and the various characteristics noted. Aggregated responses to each question are included in Appendix D.

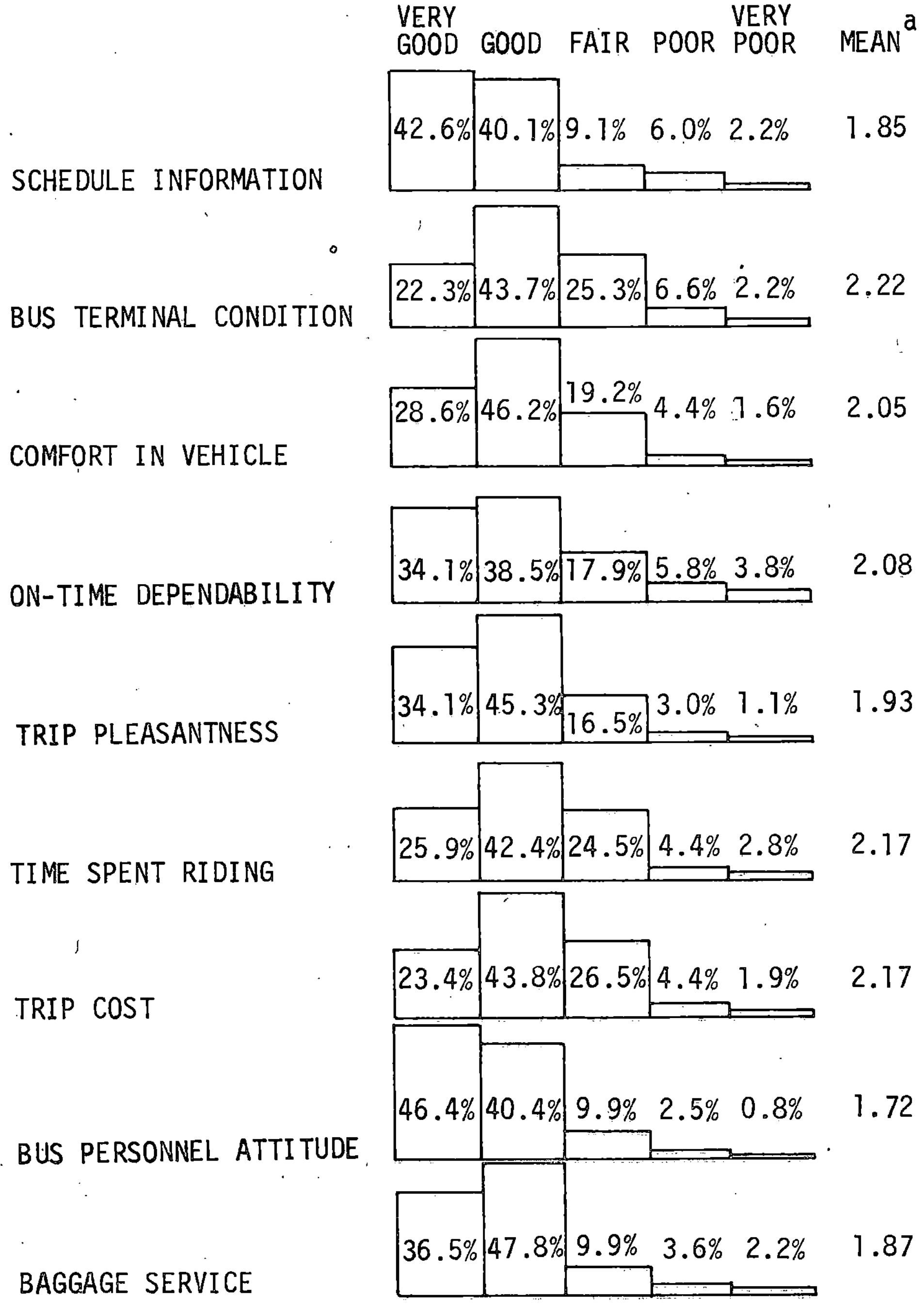
The response summary statements noted above provide a profile of those using intercity bus service in Iowa. The stereotyped image of the national bus rider (previously quoted) does not entirely fit these data. Iowa bus users are <u>not</u> predominantly people without access to an auto, are <u>not</u> the poor, the student, and the <u>infirm</u>. There are a significant number of these categories in Iowa, but they are predominant. It would seem that the bus companies have tapped the elective ridership market to a significant extent, in many cases against the competition of an available automobile.

An additional question asked regards the user's perceived degree of satisfaction with the service provided. The results are graphically illustrated in Figure V.1. Very few users rated the service poor or very poor, and a relatively small number rated service as fair. The preponderance of ratings were in the very good and the good range. The bus terminal condition, comfort in vehicle, on-time dependability, time spent riding, and trip cost received the lowest ratings.

<u>"Potential" Iowa User's Survey</u>

Questions regarding intercity bus travel were developed for a survey of certain air carrier patrons and a survey of selected households in Iowa. The details of survey locations and sample size selection are discussed elsewhere in this report (Chapter X, Part 3).

One category of questions involved the suitability of an express bus service as a substitute for air carrier users. Responses to these questions are reported in Table XIII.1. About 80 percent of the respondents would not have used an express bus primarily because travel time was too important to them.



[a] MEAN BASIS: (1) = VERY GOOD, (2) = GOOD, (3) = FAIR,
(4) = POOR, (5) = VERY POOR

Figure V.1. Intercity bus user's degree of satisfaction

A question regarding the acceptable delay for an intermediate stop was asked of all three groups with responses as summarized below:

Airport lounge survey

> If you were riding an express bus for the trip you are now preparing to make on a scheduled airline, and the bus route followed the most direct highway route between this city and the city where you will depart this airline, if the bus were to make one stop at an intermediate city, how many minutes total time to leave the direct highway route, handle passengers and baggage, and return to the direct highway route would you consider allowable and still regard the service as an express route? (Check the value most nearly representing your judgment.)

(16.0%) 31 No stop
(2.6%) 5 0-4 min.
(14.4%) 28 5-9 min.
(26.8%) 52 10-14 min.
(14.9%) 29 15-19 min.
(9.8%) 19 20-29 min.
(5.7%) 11 30-39 min.
(2.6%) 5 40-49 min.
(1.5%) 3 50-59 min.
(4.1%) 8 60+ min.

Aircraft on-board survey

> If you were riding an express bus for the trip you are now making on a commuter airline, and the bus route followed the most direct highway route between the city at which you boarded the commuter airline and the city where you will depart the commuter airline, if the bus were to make one stop at an intermediate city, how many minutes total time to leave the direct highway route, handle passengers and baggage and return to the direct highway route would you consider allowable and still regard the service as an express bus route? (Check the value most nearly representing your judgment.)

(15.9%) 32 No stop
(4.5%) 9 0-4 min.
(14.9%) 30 5-9 min.
(29.9%) 60 10-14 min.
(15.4%) 31 15-19 min.
(7.5%) 15 20-29 min.
(4.0%) 8 30-39 min.
(1.0%) 2 40-49 min.
— 50-59 min.
(5.0%) 10 60+ min.

Household Survey

If you were making a trip on an express bus route from your city to some other community to which you needed to travel, and the bus was scheduled to deviate from the most direct highway route between your home community and your destination city to make one intermediate stop, how much time would you be willing to accept for this intermediate stop before you would no longer consider the route as "express service"? The intermediate stop would require time to leave the direct route, drive to the terminal, drop off and pick up passengers and baggage, and return to the direct highway route to your destination. Check the time interval in the table below which includes the amount of time you would accept for each listed length of trip from your home city. For example, if for a trip of less than 50 miles you would not want any intermediate stop you should place a check under "No stop" for the 0-49 miles trip; if for all other trip lengths you would accept a stop requiring something between 5 and 10 minutes, you should place a check under the "5-9 min." column for all other trip lengths.

TRIP LENGTH FROM YOUR HOME CITY TO YOUR DESTINATION	TIME FOR ONE INTERMEDIATE STOP THAT I WOULD ACCEPT AND STILL FEEL THAT I WAS RIDING ON AN EXPRESS BUS SERVICE ROUTE:									
	No stop	0-4 min.	5-9 min.	10-14 min.	15-19 min.	20-29 min.	30-39 min.	40-49 min.	50-59 min.	60+ min.
0-49 miles	71.2% 882	10.9% 135	9.8% 122	5.0% 62	1.6% 20	0.8% 10	0.2% 3		0.2% 3	0.1% 1
50-99 miles	30.2% 372	11.2% 138	30.2% 372	18.0% 221	6.9% 85	1.8% 22	1.0% 12	0.1% 1	0.3% 4	0.2% 3
100-149 mi.	10.7% 131	5.7% 70	27.4% 335	28.6% 350	16.6% 203	6.5% 79	3.4% 42	0.4% 5	0.3% 4	0.4% 5
150-199 mi.	6.0% 73	2.6% 31	16.1% 195	30.0% 364	22.3% 271	12.6% 153	8.2% 99	1.2% 15	0.6% 7	0.4% 5
200-299 mi.	4.8% 58	1.2% 14	7.9% 96	18.1% 220	25.3% 307	18.3% 222	17.4% 211	3.7% 45	2.0% 24	1.5% 18
300+ miles	4.7% 57	0.7% 9	5.4% 66	10.4% 127	18.7% 228	19.9% 243	23.4% 286	6.2% 76	4.8% 58	5.7% 70

Most of those using the air service would accept delays up to 14 minutes at an intermediate stop. Those contacted at home would accept up to a 10-minute stop for a 50- or 100-mile trip, and an increasing delay as trip length increased. These results seem logical and may be of value in determining express schedules.

A question regarding the use of public transportation funds to support express bus service was asked of all three groups. Responses to this question are summarized in Table XIII.2. The results are similar for all three groups surveyed. Approximately half of the air carrier users and the households surveyed were opposed to using state taxes to support express bus service. Furthermore, the use of local taxes for subsidy is opposed by 55 to 60 percent of air transportation users and 73 percent of the householders surveyed. The stronger opposition by householder respondents probably may be attributed to the lower average income level of this group. Note that more than half of the households surveyed would be favorable (or neutral) regarding the use of state tax money to support express bus service.

Another question asked on the household survey regards the preferred destination of an express bus service. Responses to this question are summarized in Table XIII.3. The responses indicate a focus on Des Moines as well as Minneapolis and Chicago, routes on which some express service now exists.

The Iowa Department of Transportation intercity bus user characteristics survey and the air carrier user and household survey provided information that was essential to the analyses and recommendations regarding intercity bus travel for this study.

VI. THE ROLE OF GOVERNMENT IN INTERCITY BUS TRANSPORT

The intercity bus passenger industry operates under a complex arrangement of private ownership on public highways, with governmental regulation. Beginning in 1935, the industry has been regulated as a common carrier at both the state and national levels. The basis for regulation is manifested by legislation intended to foster public "convenience and necessity." It assumes the following forms:

1. Control of entry into the market and continuation of service through the issuance of certificates of public convenience and necessity.
2. Regulation of routes, schedules, and fares.
3. Required annual reporting of motor carrier's operational statistics and finances.
4. Protection of the public through safety regulations and insurance requirements.

The Federal Role

The basic laws regulating interstate bus passenger carriers are in the Interstate Commerce Act - Part II (Title 49 of the U.S. Code and Title 49 of the Code of Federal Regulations). Thus, those carriers involved in interstate bus passenger operations must obtain Interstate Commerce Commission (ICC) operating authority. If the movement begins and ends in another state but operates in Iowa, the State of Iowa will require registration of the ICC operating authority and compliance with certain standards. Registration requirements are established in Public Law 89-170 (25).

Federal regulation, as well as state regulation, came into existence because of concern for the multi-modal competition that existed between railroads and motor vehicles. Regulation attempts to assure service to less lucrative markets as well as on more profitable routes while protecting the more lucrative routes from cutthroat competition. By regulating routes and fares, a certain amount of cross-subsidization develops so that losses from some routes balance more profitable routes that are protected by certificated operating authority. Close monitoring of the carriers' business operations is required by a regulatory agency in order for them to rationalize the resultant rate structure.

In addition to the traditional regulation by certification, regulation of routes, service, and fares, required reporting, and safety and insurance requirements, the federal government has expressed an interest in the quality of service. In 1975 the ICC issued a notice of proposed rule making identified as Ex Parte No. MC.95. These proposed rules purportedly were responsive to expressions of passenger dissatisfaction. The proposed regulations focused on:

1. Improved ticketing and information to passengers.
2. Improved baggage service.
3. Minimum terminal facilities.
4. Improved scheduling, seating, and reservation systems.
5. Improved bus accomodations.
6. Accommodations for the handicapped.

Obviously, these proposed regulations were of concern to the motor bus industry.

The intercity bus passenger industry as well as many individuals in government are also concerned with the complexity of the current regulatory structure. Federal action in the form of motor carrier regulatory reform has been initiated but has not received congressional support. Recommendations for "de-regulation" will continue in the future and, if enacted, may have far-reaching ramifications.

Although carriers are concerned with government regulation of routes, fares, equipment, and, especially, Ex Parte MC.95, they generally would support preventing their competitors from entering certain markets. They also are concerned with the proliferation of rural special service types of transportation that are developing in Iowa.

Efforts to deregulate the intercity bus industry will continue to be presented to Congress. However, complete deregulation of motor bus carriers is not likely to receive serious consideration.

Role of the State of Iowa

The authority allowing an intercity bus passenger carrier to operate in intrastate commerce in Iowa is granted by a certificate of public convenience and necessity. The Transportation Regulation Board of the Iowa Department of Transportation issues certificates as mandated by Chapter 325, Code of Iowa. According to Section 325.6, whenever passengers are transported for compensation over a regular route or between fixed termini between any two places in Iowa, a certificate is required. Chapter 325 is included in Appendix C.

The Transportation Regulation Board is vested, under Chapter 325, with the power, authority, and duty to:

1. Fix or approve fares with appropriate rules and regulations.
2. Prescribe rules and regulations regarding safety and require periodic inspections of vehicles.

3. Regulate and supervise the schedules and services.
4. Prescribe a uniform accounting procedure and require annual reports.
5. Require proof of liability insurance.

The Transportation Regulation Board also promulgates rules and regulations under the Iowa Administrative Code, Chapter 4. These rules supplement the legislative intent as set forth in Chapter 325, Code of Iowa. Chapter 4 is included in Appendix C.

The certificate of convenience and necessity for passenger service also allows a carrier to conduct charter operations. In some cases this may be more lucrative than regular passenger service. The carrier elects to retain the passenger certificate because an application for charter certificate only might be contested. As long as a minimum level of regular scheduled service is provided such that no complaints are generated, the passenger certificate will remain valid.

An abstract of the operating authority is on file with the Transportation Regulation Board. Copies of the abstracts of the 13 intercity bus passenger carriers certificated for Iowa intrastate operations are included in Appendix C.

The carrier holding a passenger certificate may carry a limited amount of freight (package express). The abstract of operating authority identifies the limitations on the package express allowed. If not specifically allowed, no package express may be transported with passengers.

The provision of package express service by intercity bus passenger carriers is a valuable service to the communities. Transport of small packages may be accomplished (over short distances) within a few hours at comparatively low cost if the sender and receiver are willing to deliver and pick up packages at the terminal. At some stations the revenue from package express operations provides a sufficient margin of profit to sustain bus service.

The abstract of operating authority identifies the points to be served by the carrier. This is unlike the ICC operating authority that identifies routes over which the carrier may travel.

The Transportation Regulation Board receives tariffs from each carrier and periodically acts on requests for rate increases. The Rate Analysis Division analyzes the current rates in terms of operating ratio, return on net investment including working capital provision, and after tax return to the equity owners as input into their decision. A copy of the rates in effect during fall 1976 is included in Appendix C.

The function of passenger motor carrier vehicle safety inspection was handled by Iowa Commerce Commission inspectors prior to the transfer of this jurisdiction to Iowa Department of Transportation weight officers and the Department of Public Safety. Currently, buses are not required to stop at weigh stations and are seldom monitored in other ways. This aspect is important because a new generation of very small certificated operators may develop from the rural special service bus systems now operating in most areas of the state. Once a certificate of public convenience or necessity is issued, it remains active as long as adequate service is provided by the carrier. Certificates may be transferred to other owners, and they may remain in an inactive status for many years.

Each carrier must file certain annual reports, tariffs, and insurance liability certification. The financial and operating statistics have been reported since 1927 in the annual reports of the boards or commissions responsible for administering the requirements of Chapter 325. These data do not provide individual route or station statistics, but the aggregated data have been useful in establishing trends. The Transportation Regulation Board has elected not to publish an annual report for 1975. However, data will be retained on file.

State Support of the Intercity Bus System

The Iowa Department of Transportation is mandated by Chapter 307, Code of Iowa, to promote the coordinated and efficient use of all available modes of transportation for the benefit of the state and its citizens. The intercity bus system is specifically mentioned along with consideration of energy and the environment, and the state development of passenger terminal facilities if necessary.

The Transportation Research Regulation Board, along with other elements of the Department, functions as an advocate of intercity bus transportation when needed. For example, in 1976 at a hearing before the ICC relative to Ex Parte MC.95, the Iowa Transportation Regulation Board filed a statement regarding the impact of the proposed rulemaking. Concern for the intercity bus industry is a part of the Department's multi-modal function as mandated by the legislature.

The proliferation of rural public special service transit operations in Iowa is of concern to the Iowa Department of Transportation. In an annual report (26) it was estimated that $3.5 million of public funds were expended for rural transit services in 1976. The Planning and Research Division is developing a state transit plan and has prepared guidelines for regional transit development programs (27). Coordination between these public transit operations and the privately owned intercity bus operations is essential.

A number of these public funded rural special service transit organizations have applied for certificates of public convenience and necessity as common carriers of passengers. Certificate number 1091 was issued July 8, 1976, to Jones Economy Transport System, Inc., to operate between all points in Jones County and Cedar Rapids. A number of other similar applications will have been completed and certificates issued by the time this report is published. One application has requested permission to operate between Des Moines and all points in a 10-county area and Des Moines. Obviously, certain of these operations may be in direct competition with intercity bus carriers. Certificates of public convenience and necessity being issued will not limit the type of passengers to be served, i.e., handicapped, or aged. The certificate of convenience and necessity may be transferred in the future, sold, or may even remain inactive for a period of time to be reactivated in the future.

Representatives of the Department of Transportation in the past have advised rural public transit service organizations to apply for operating authority as common carriers. This course of action does assure better monitoring of operations. Requirements regarding insurance, safety regulations, fares, route structures, and annual reporting may be monitored more readily following certification. However, other long-range implications of this action must be analyzed carefully to assure that such publicly supported services are not permitted to compete unfairly with private carriers.

It is possible that assistance to intercity bus passenger carriers may be necessary to maintain the most efficient multi-modal transportation system for the state. As an example of one possible course of action, the legislation creating the Department of Transportation directs the Commission to consider development of multi-modal public transfer facilities if carriers fail to develop such facilities. Other states, such as Michigan, have programs for providing operating assistance to intercity bus carriers. Thus, although Iowa is not currently providing financial assistance to intercity passenger bus carriers, the public interest may suggest the desirability of doing so in the future.

VII. MODELING CURRENT BUS USAGE

Introduction

An initial activity in this research, reported in Chapter IV, involved a detailed inventory and established a knowledge of the current intercity bus structure in Iowa. The survey of monthly boardings at 23 selected bus stations and the descriptive inventory of bus terminals at these same stations made such information available for the first time. In addition to this new data base, records of local community characteristics and of bus routes and schedules were available from secondary sources.

This knowledge of existing conditions in the intercity bus industry provides the tools for analysis and problem-solving. Mathematical modeling may then be utilized to identify rational procedures, map strategy, and better define the basis for decision making.

A model has been defined as something that resembles or describes the structure and/or behavior of a real counterpart. Thus, through symbolic modeling the variables that are perceived to represent the propensity of people to travel by intercity bus may be expressed mathematically. Such a model might serve two useful purposes: first, it may identify those variables that have a causal relationship in reproducing bus travel, and, second, it may suggest modifications in bus travel behavior that could be expected to result from changes in values of different variables.

The objective of modeling intercity bus travel in this research was not to develop a sophisticated technique for use in estimating the volume of travel that might be generated at a given station at a given time.

Rather, it was to create a first generation model that would best reproduce existing travel data so that those variables of concern could be isolated as an aid to the analysis and problem-solving function. The independent variable selected for this purpose was the number of bus ticket sales at a given station during a typical summer month. The model was then developed so as to help identify those factors that exerted an apparent effect on the generation of bus trips from a community.

Variables of Concern

The purpose of modeling intercity bus passenger travel was to provide estimates for the number of bus trips generated at a given location for a specific time period. In this study the independent variable selected was the number of bus ticket sales at a given station during a typical summer month.

In selecting parameters expected to bear a functional relationship to the amount of bus travel, a correlation between the population of a community and bus ticket sales from that community was anticipated. Data on ticket sales per 1,000 population for the 23 study cities are tabulated in Table VII.1. (Note that the ticket sales in Table VII.1 differ in some cases from those in Table IV.8. This reflects the adjustment to a common base for a typical summer month using the factors displayed in Figure IV.12.) Figure VII.1 also indicates that these rates are widely variable among communities. From the variability in these factors, it was apparent that other parameters, in addition to population, influence the propensity of a community to generate intercity bus trips.

Table VII.1. Ticket sales per thousand population

Study City	Adjusted monthly ticket sales	Population (thousands)[a]	Ticket sales per thousand population
Ames	1,273	43.6	29.2
Atlantic	279	7.3	38.2
Burlington	788	32.4	24.3
Carroll	200	8.7	23.0
Cedar Rapids	3,421	109.0	31.4
Clarinda	103	5.4	19.1
Clinton	445	34.7	12.8
Council Bluffs	466	60.3	7.7
Davenport	1,477	99.8	14.8
Decorah	380	7.7	49.4
Des Moines	7,426	201.4	36.9
Dubuque	1,927	62.3	30.9
Fort Dodge	625	31.3	20.2
Iowa City	2,493	47.7	52.3
Marshalltown	472	26.5	17.8
Mason City	1,171	31.8	36.8
Muscatine	391	23.2	16.9
Osceola	168	3.1	54.2
Ottumwa	772	30.2	25.6
Sioux City	2,310	85.9	26.9
Spencer	349	10.4	33.6
Waterloo	1,178	75.5	23.5
West Union	56	2.6	21.5

[a] Source: Iowa Department of Transportation, 1970 census or, if available, a later special census.

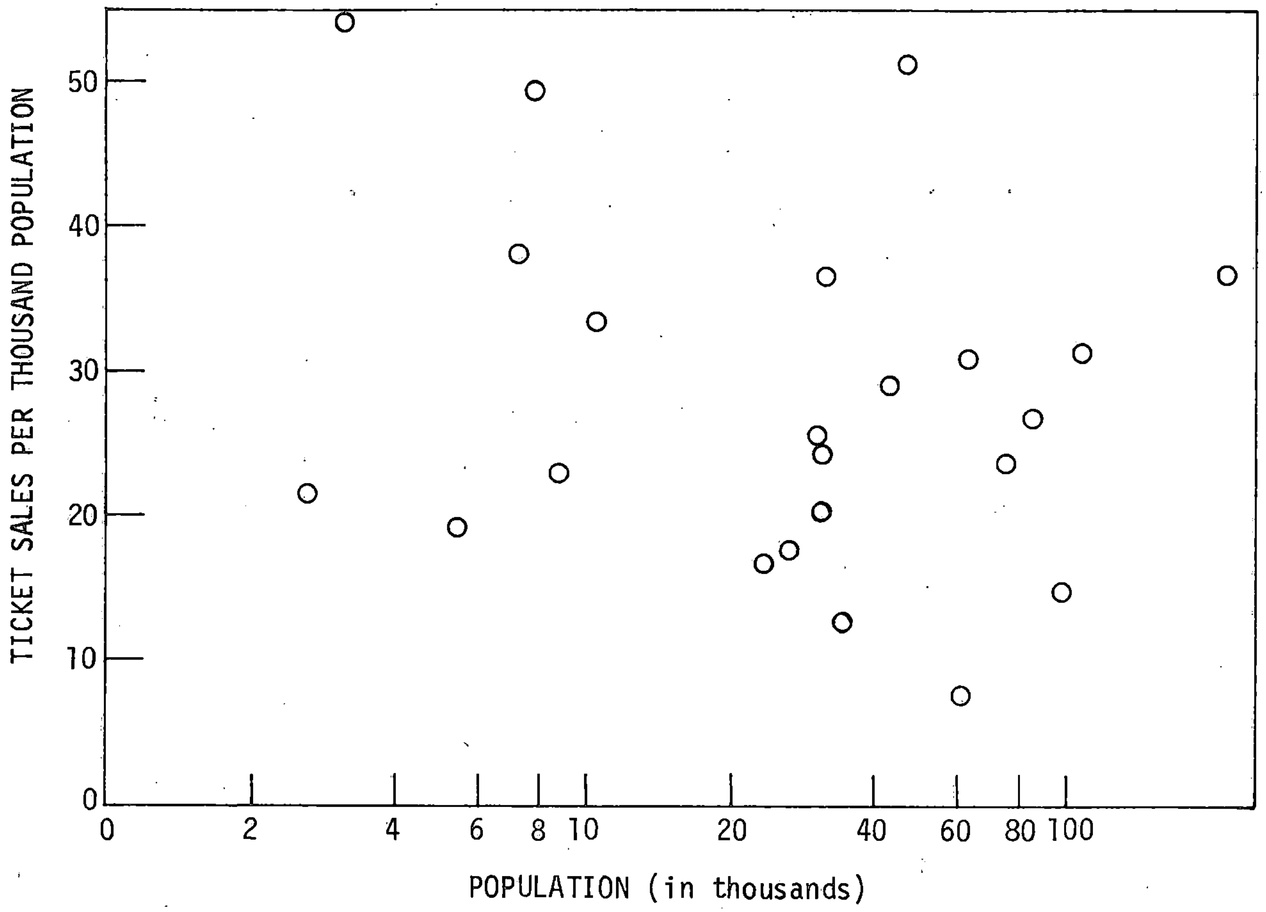


Figure VII.1. Ticket sales per thousand population

Therefore, 12 variables that were readily available from secondary data sources were selected as representative of the social, cultural, and economic characteristics of a community. These are listed in Table VII.2, and the values used for each variable at each community are shown in Appendix D.

Table VII.2. Social, cultural, and economic characteristics of a community influencing bus travel generation

Characteristic	Source
1. Population	U.S. Census
2. Gross retail sales	Iowa Department of Revenue
3. Civilian labor force	Iowa Labor Market Information
4. Percent in professional and management	U.S. Census
5. Percent unemployment	Iowa Labor Market Information
6. Number enrolled in college	U.S. Census
7. Number of college graduates	U.S. Census
8. Median income	U.S. Census
9. Percent of families with less than $15,000 income	U.S. Census
10. Percent of familes with income below poverty level	U.S. Census
11. Number of hospital beds	American Hospital Association Guide to the Health Care Field
12. Number of physicians and doctors	Data from Iowa Office for Planning and Programming

In addition to demographic characteristics, variables that quantified the level of service and the terminal facility quality were developed for inclusion in the model.

A terminal facilities rating for the dependent variable (X_{13}) was developed from the information obtained in the detailed survey at each station in the 23 study cities. As was noted in Chapter IV, a number of characteristics were measured and documented for this purpose.

The general categories that were selected for rating each bus station facility included patron parking provisions, patron waiting and servicing facilities, and general convenience and appearance of the terminal. Table VII.3 identifies the elements in each category and the point value assigned to each element.

There do not appear to be published criteria for designing bus terminals. Thus, persons involved in development of terminals and those involved in their operation were interviewed in order to develop a terminal rating scheme.

Terminals in Iowa may either be company operated or operated by commission agent's agreement. Company operated facilities occur only in larger cities, and usually only the larger city terminals are designed by a company architect. Conversations with Greyhound Company architects verified that there are no commonly used texts, curves, or charts available to establish parking area size, number of patron seats, and all of the other variables of concern. Instead, each person involved in design will evaluate the land available, local zoning and subdivision requirements, the potential volume of users, and any other aspects of importance. Thus, the design procedure involves the application of considerable personal judgment.

Table VII.3. Terminal facilities rating variables

1. Patron parking (25 points maximum)	
Parking spaces	
off-street	-20 points
on-street metered	-10 points
on-street non-metered	-15 points
adjacent lot	-15 points
Surface	- 5 points
2. Waiting and service facilities (40 points maximum)	
Size	- 5 points
Number of seats	-10 points
Patron services	-10 points
Restrooms	- 5 points
Attractiveness	-10 points
3. Terminal convenience and appearance (35 points maximum)	
Location	-10 points
Identification and access	- 5 points
Neighborhood environment	- 5 points
Public transit service	-15 points
100 points maximum	

Specific curves were developed for this project based on a survey of adequacy at selected terminals. These curves and the rating procedure are presented in Appendix E. The individual rating of each terminal is also included in Appendix E. The final results revealed a range from 46 to 92 points in the X_{13} variable.

The level of service (variable X_{14}) determination could have included many factors. However, guidance was provided by a 1975 study by Oregon that quantified level of service as a function of the number of weekday arrivals, choice of competing carriers, through service to major cities, directional choice of travel, and other factors (23). In order to simplify calculations for the level of service rating and still retain those relationships considered important to the user, a three-level rating scheme was developed. Table VII.4 lists the variables utilized in the calculations. Appendix F contains the criteria for rating level of service and the final values for X_{14}. The range of values varied from 7 to 90.

Table VII.4. Level of service rating variables

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1. Weekday departure opportunities

    Daytime departures
    Night departures

2. Competing carrier service

    Number of carriers available

3. Travel time

    Ratio of bus travel time to auto travel time

Note: See Appendix F for point values.

Modeling Using Multiple Linear Regression Analysis

Data for the 14 independent variables and the dependent variable for each of the 23 study cities were analyzed using a statistical regression package with four techniques for analysis: forward, backward, stepwise, and maximum R selection. Table VII.5 summarizes the multivariate equation form and the variables used.

The statistical analysis output included the R^2 value (coefficient of multiple determination), the r value (coefficient of simple correlation), the intercept, the beta value, the t-test value, and other statistics. Table VII.6 is a simple correlation matrix for all 14 independent variables and the dependent variable Y. This matrix provides a useful tool in evaluating variables by indicating the correlation for each pair of variables. If the correlation between two independent variables is high, and especially if it is higher than the correlation with the dependent variable, an unacceptably high degree of collinearity is present. Two such variables may in fact measure the same characteristic and be redundant if included in the same equation. The largest values of r between independent variables have been circled in Table VII.6.

In the forward selection process, variables are added one at a time with statistical information provided at each step. The variable yielding the highest R^2 value is introduced first, and the R^2 value for each additional variable is an indicator of the "improvement" accomplished. The R^2 statistic is a measure of the amount of variance explained by the independent variables. Table VII.7 tabulates the statistics for this procedure. The equation constants (intercept and β values) as well as the t-test values are listed. The t-test is a measure of the probability

Table VII.5. Intercity bus travel model

Form: $Y = \alpha_o + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots \beta_n X_n$

Y = typical summer month's ticket sales

X_1 = population in thousands

X_2 = gross retail sales in millions of dollars

X_3 = civilian labor force in thousands

X_4 = percent labor in professional and management

X_5 = percent unemployment

X_6 = 1970 college enrollment in thousands

X_7 = number completed four years of college in thousands

X_8 = median income in thousands of dollars

X_9 = percent families with greater than \$15,000 income

X_{10} = percent families with income less than the poverty level

X_{11} = number of hospital beds in thousands

X_{12} = number of physicians and dentists

X_{13} = terminal facilities rating

X_{14} = level of bus service rating

Table VII.6. Table of coefficients of simple correlation (r)

	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	Y
X_1	.969	.998	.242	.079	.492	.952	-.028	.527	-.434	.856	.673	.359	.868	.930
X_2		.977	.172	.013	.426	.948	-.037	.481	-.389	.852	.663	.310	.795	.961
X_3			.249	.044	.498	.959	-.046	.529	-.423	.868	.691	.352	.868	.944
X_4				-.482	.813	.421	-.036	.587	-.136	.420	.564	-.134	.297	.338
X_5					-.335	-.124	.337	-.360	-.199	-.052	-.196	.246	.068	-.049
X_6						.678	-.093	.679	-.269	.621	.708	.208	.520	.565
X_7							-.066	.626	-.417	.901	.789	.288	.834	.964
X_8								-.048	-.231	-.060	-.051	-.007	-.035	-.035
X_9									-.558	.412	.480	.142	.457	.505
X_{10}										-.319	-.342	-.215	-.381	-.370
X_{11}											.931	.161	.806	.918
X_{12}												.031	.711	.788
X_{13}													.308	.293
X_{14}														.779

Table VII.7. Selected statistics utilizing all variables

			Variable											
Model	R^2	Intercept	X_7	X_2	X_{12}	X_{14}	X_{13}	X_4	X_9	X_1	X_5	X_6	X_3	X_{10}
I	.93	6.1	339.7(16.6)											
II	.95	0.9	183.7(3.4)	3.0(3.0)										
III	.97	- 34.2	60.1(1.0)	4.2(4.4)	2.2(2.9)									
IV	.97	157.7	83.8(1.4)	4.4(4.9)	2.5(3.3)	-10.3(1.8)								
V	.97	- 418.3	70.1(1.2)	4.4(5.0)	2.9(3.7)	-11.8(2.1)	8.4(1.4)							
VI	.98	-1334.4	-26.3(0.3)	5.9(4.6)	2.8(3.7)	-10.8(2.0)	10.9(1.8)	34.3(1.5)						
VII	.98	- 982.2	20.5(0.2)	5.5(4.3)	2.5(3.3)	-11.4(2.1)	10.8(1.8)	40.8(1.8)	-30.1(1.4)					
VIII	.98	-1122.9	32.1(0.4)	6.3(4.0)	2.3(2.9)	- 7.5(1.1)	11.8(2.0)	43.1(1.9)	-28.9(1.3)	- 7.0(0.9)				
IX	.98	-1610.9	60.9(0.7)	6.8(4.3)	2.1(2.7)	- 6.6(1.0)	10.9(1.9)	50.3(2.2)	-22.8(1.0)	-12.9(1.5)	56.6(1.3)			
X	.98	-2282.6	229.0(1.3)	5.1(2.3)	2.1(2.7)	- 7.2(1.1)	15.2(2.2)	65.8(2.5)	-21.0(1.0)	-16.8(1.8)	76.0(1.7)	- 72.4(1.1)		
XI	.99	-2257.0	297.4(1.7)	3.0(1.2)	1.8(2.3)	-10.5(1.6)	14.0(2.1)	65.6(2.6)	-21.0(1.0)	-50.3(2.0)	104.9(2.2)	- 89.6(1.4)	81.0(1.4)	
XII	.99	-3119.3	336.2(1.9)	2.6(1.0)	2.0(2.4)	-10.9(1.6)	15.3(2.2)	66.3(2.6)	- 4.6(0.2)	-51.4(2.0)	127.4(2.4)	-108.6(1.6)	81.0(1.4)	47.1(1.0)

Notes: Variables X_8 and X_{11} did not appear in initial output order based on forward selection process.

Shown are β values and + statistics (in parentheses).

that a β value could have been obtained by chance when it is actually zero. A t-test value less than 1.9 indicates a relatively high probability that the β value does not differ significantly from zero.

An examination of Table VII.7 indicates a high R^2 value for all models tested. However, from Table VII.6 a high degree of collinearity can be noted between many of the independent variables. It should also be noted that a very large intercept value exists for those equations with a number of variables. Another disappointing condition is the illogical negative sign for most values of X_{14}, the level of service variable.

The variables X_{13} and X_{14}, that reflect the quality of service afforded by bus transportation, did not appear as highly significant indicators of the propensity to use interstate buses. Furthermore, the negative sign associated with X_{14} is inconsistent with the rather high positive correlation between bus service level and patronage as indicated in Table VII.6. Therefore, the most suitable models did not include these variables.

Thirteen other equations were generated in which pre-selected independent variables were tested for their explanatory capability. Although R^2 values were generally acceptable, only one of the other equations was suitable when evaluated on an objective basis. Bases used for this evaluation included the following:

- Intercept (α_o in Table VII.5) with an absolute value of less than 100.
- R^2 of at least 0.85.
- t value for each regression coefficient of at least 1.9.

- Signs for each regression coefficient that were consistent with the sign of the correlation between the independent variables and Y, the dependent variable, as displayed in Table VII.6.

Only one additional multiple linear regression equation satisfied these criteria. This equation is as follows:

$$Y = -27.4 + \underset{(14.0)}{5.0\, X_2} + \underset{(4.8)}{2.7\, X_{12}}$$

where:

Y = bus station ticket sales in a typical summer month

X_2 = gross retail sales of the community in thousands of dollars

X_{12} = number of physicians and dentists in the community

(t values are indicated in parentheses.)

A plot of the relationship between actual (Y) and calculated (YHAT) values for the dependent variable resulting from use of this equation is shown in Figure VII.2.

Further attempts to develop a more satisfactory model included the following:

- Stratification of data according to population of the community.
- Testing of nonlinear forms of equations.
- Developments of alternative methods of quantifying X_{14}.

None of these modifications in the modeling procedure yielded improvements in the explanatory capabilities of the models tested.

Conclusions

The process of developing multivariate equations to model intercity bus travel in Iowa was useful for developing an understanding of independent

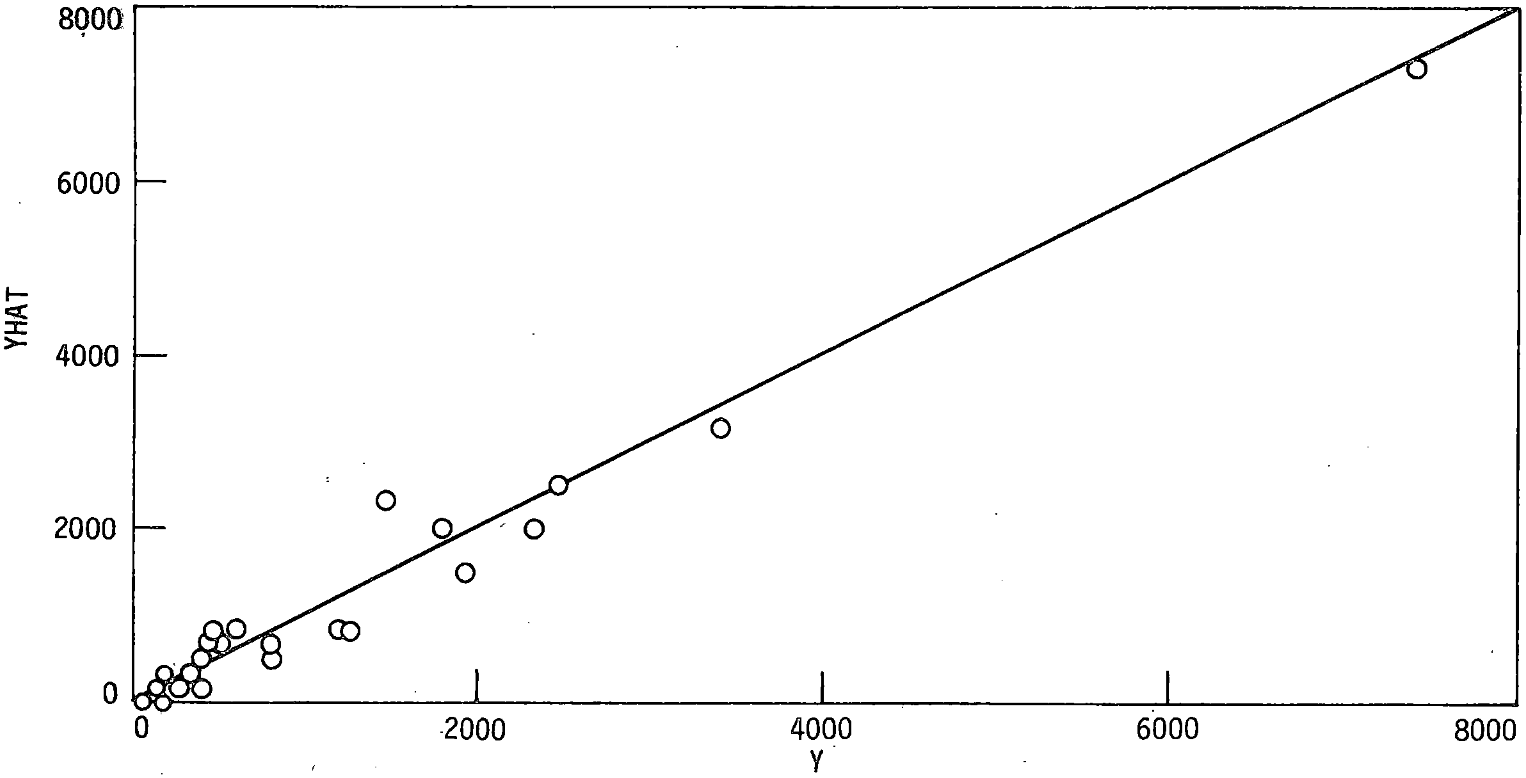


Figure VII.2. Plot of actual and calculated values for dependent variable variables of concern. First it has been shown that population mass may be required to generate travel, but that several social, cultural, and economic attributes of the population significantly influence the volume of trips generated. Due perhaps to the small sample and the lack of longitudinal data, the interrelationships between these population characteristics variables cannot be clearly ascertained at this time.

It is apparent that many variables that were not identified or could not be quantified have a role in determining the characteristics of bus travel from a community. Furthermore, the level of service involves factors that are difficult to define in quantitative terms. For example, a community located on a major transcontinental highway may be afforded a level of service substantially in excess of the level warranted by the amount of travel generated locally. Hence, the level of service variable was not helpful in predicting patronage. However, it may be noted from Table VII.6 that X_{14} tends to be rather strongly correlated with variables such as X_1 and X_2 that are measures of the size of a community. Not unexpectedly, the level of service tends to be better at larger communities than at smaller ones. Consequently, community size variables in combination with variables that define the nature of a community in terms of services and opportunities that it affords appear to offer the most satisfactory capability for modeling usage of intercity buses.

VIII. A POTENTIAL INTERCITY BUS NETWORK

A stated goal of the Iowa Department of Transportation is to provide adequate, safe, and efficient transportation services to the public (7). Further, the Department of Transportation Commission has received a legislative charge to promote the coordinated and efficient use of all available modes of transportation for the benefit of the state and its citizens. The Commission is also to consider energy and environmental issues in association with transportation development.

The intercity bus mode of passenger travel is an important element in a statewide transportation system. Even though bus companies are privately owned, the economic vitality of the intercity bus industry must be of concern to those public officials charged with the accomplishment of transportation goals. This is because buses constitute the only form of intercity public transportation that is available to most of that portion of society in Iowa that lacks access to private automobiles. Additionally, buses are highly efficient in their consumption of energy compared with all other forms of passenger travel, and they minimize the adverse effect of vehicular travel upon the human environment, further reasons for assuring the continuation of service by this mode.

Criteria for Establishing a System

General System Criteria

An understanding of existing and potential demand for intercity bus passenger travel is an essential requirement in order to formulate recommendations for a system. One indication of intercity travel demand is the historical experience indicating the number of daily person trip interchanges by automobile among the 23 selected study cities. This measure of desire for travel among major cities in Iowa is presented graphically in Figure VIII.1 and was shown previously in Table IV.7. The importance of Des Moines as a focus for intrastate travel as well as other travel corridors of most intensive demand are indicated in Figure VIII.1.

As described in Chapter IV, destinations for bus ticket sales from the study cities were determined for a typical summer month. Using the 23 study cities as centroids for 23 travel destination tracts encompassing the entire state, the number of bus trip interchanges between each pair of tracts was determined. This travel was then assigned to minimum travel-time paths on the primary highway system. Figure VIII.2 portrays the consolidated network for travel among all study cities and indicates the bus travel volume assigned to each primary highway segment that attracted some travel on this basis. Note that these volumes are for a typical summer month and include only intrastate travel originating at the 23 study cities. Any trips for which either origin or destination, or both, was outside Iowa are not included. Such an assignment serves to identify corridors, although not necessarily routes, of highest demand for intercity bus travel.

Another criterion for identification of potential intercity bus passenger travel corridors is the location of existing major highway routes. These major routes have evolved because of intensive travel demands. They may serve major markets in other states rather than between Iowa traffic generators, but their very existence indicates a propensity for highway travel in that corridor. Figure VIII.3 identifies those corridors considered most important for planning the system.

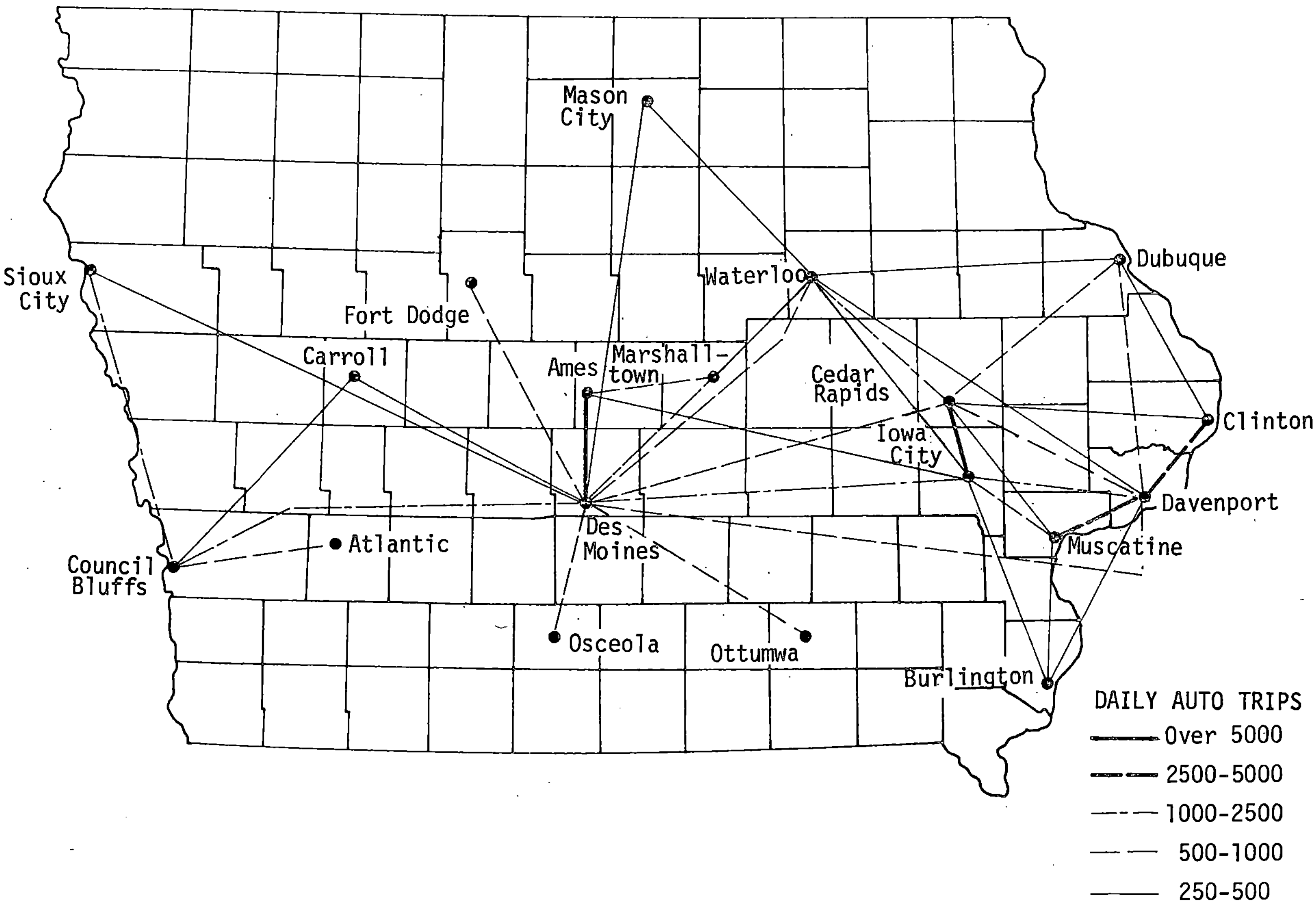


Figure VIII.1. Average daily person trip interchanges by automobile for trip volumes greater than 250 per day

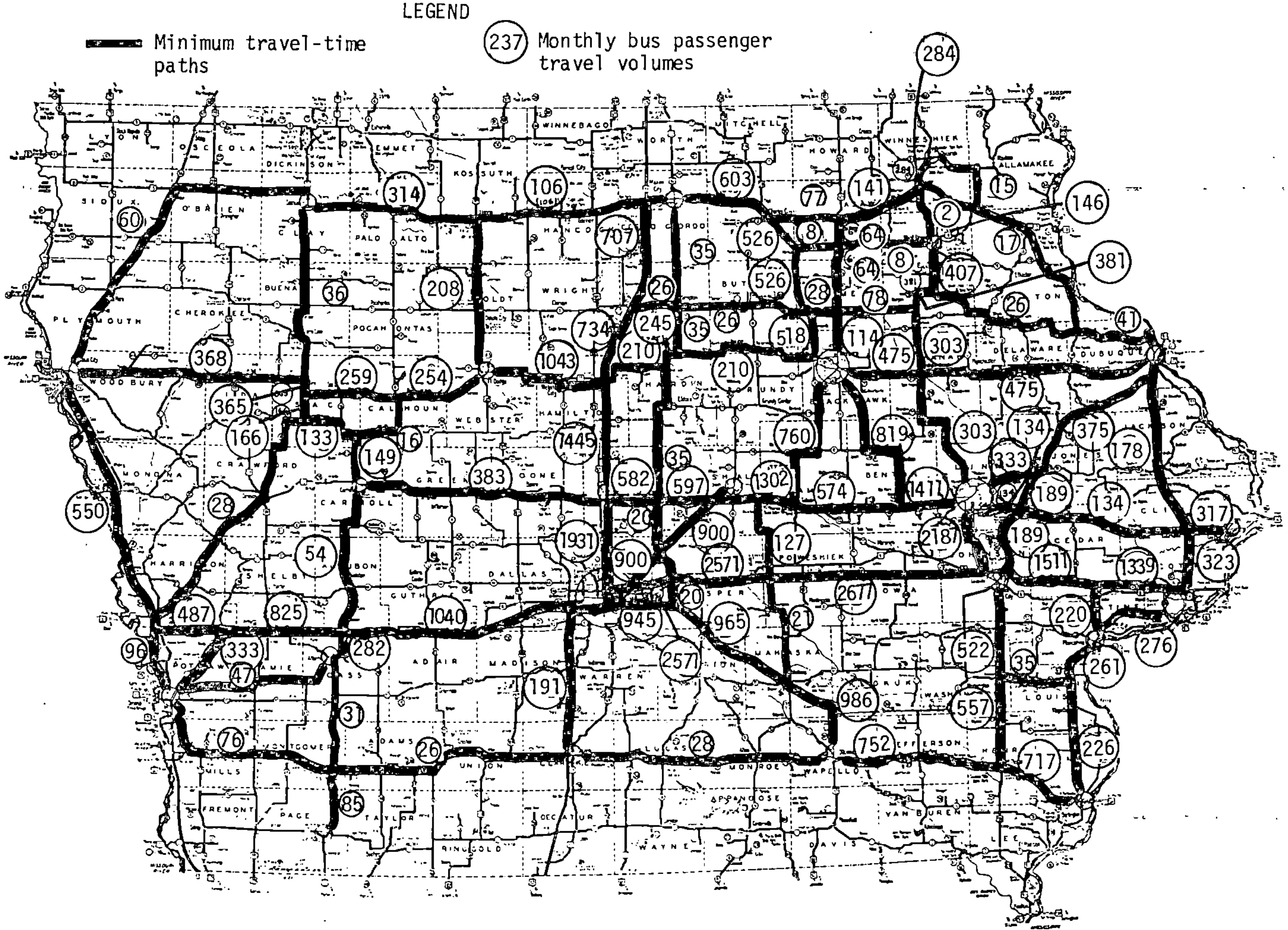


Figure VIII.2. Minimum travel time paths and monthly bus passenger travel volumes between 23 selected Iowa cities

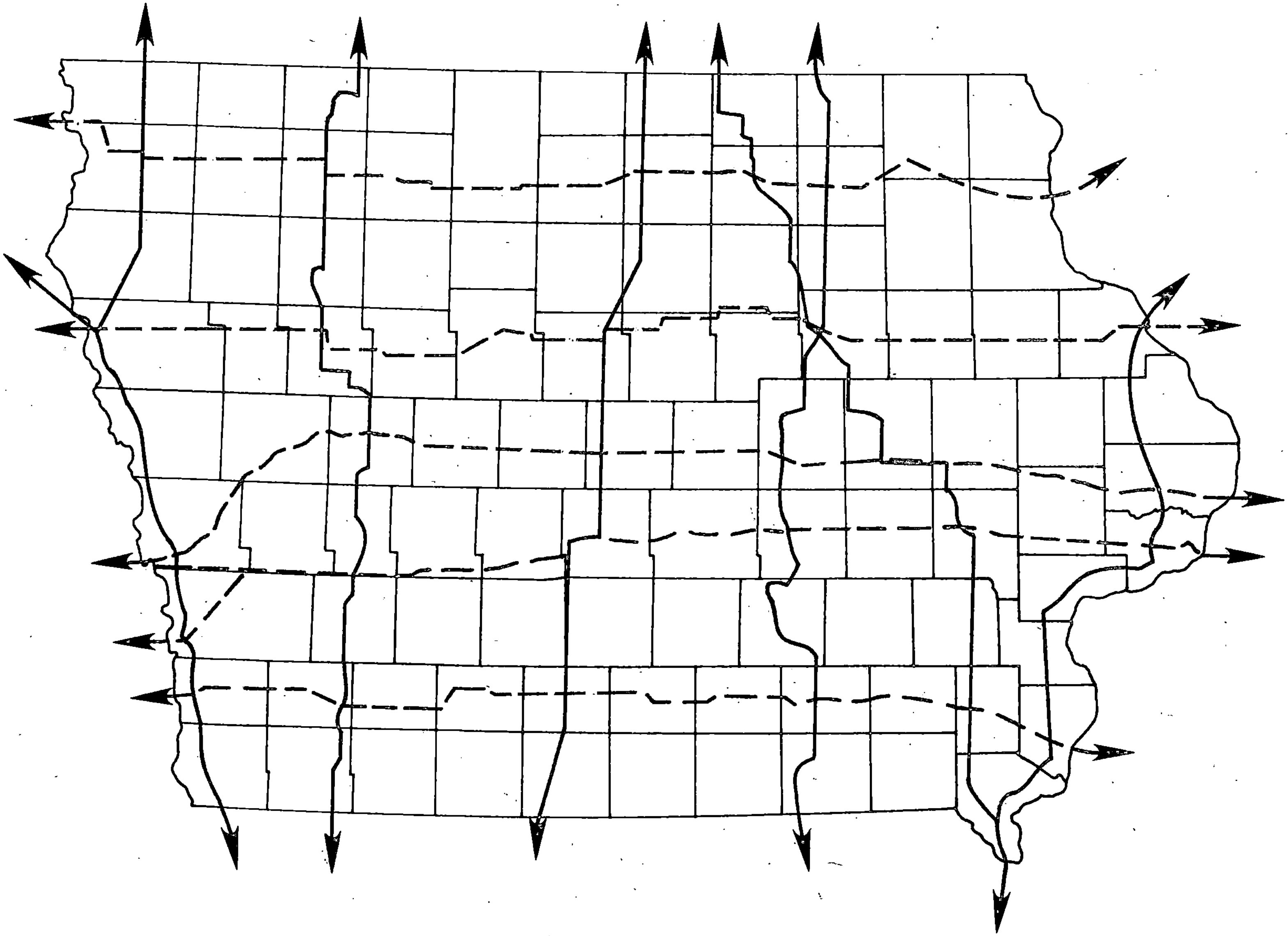


Figure VIII.3. Major highway routes traversing Iowa

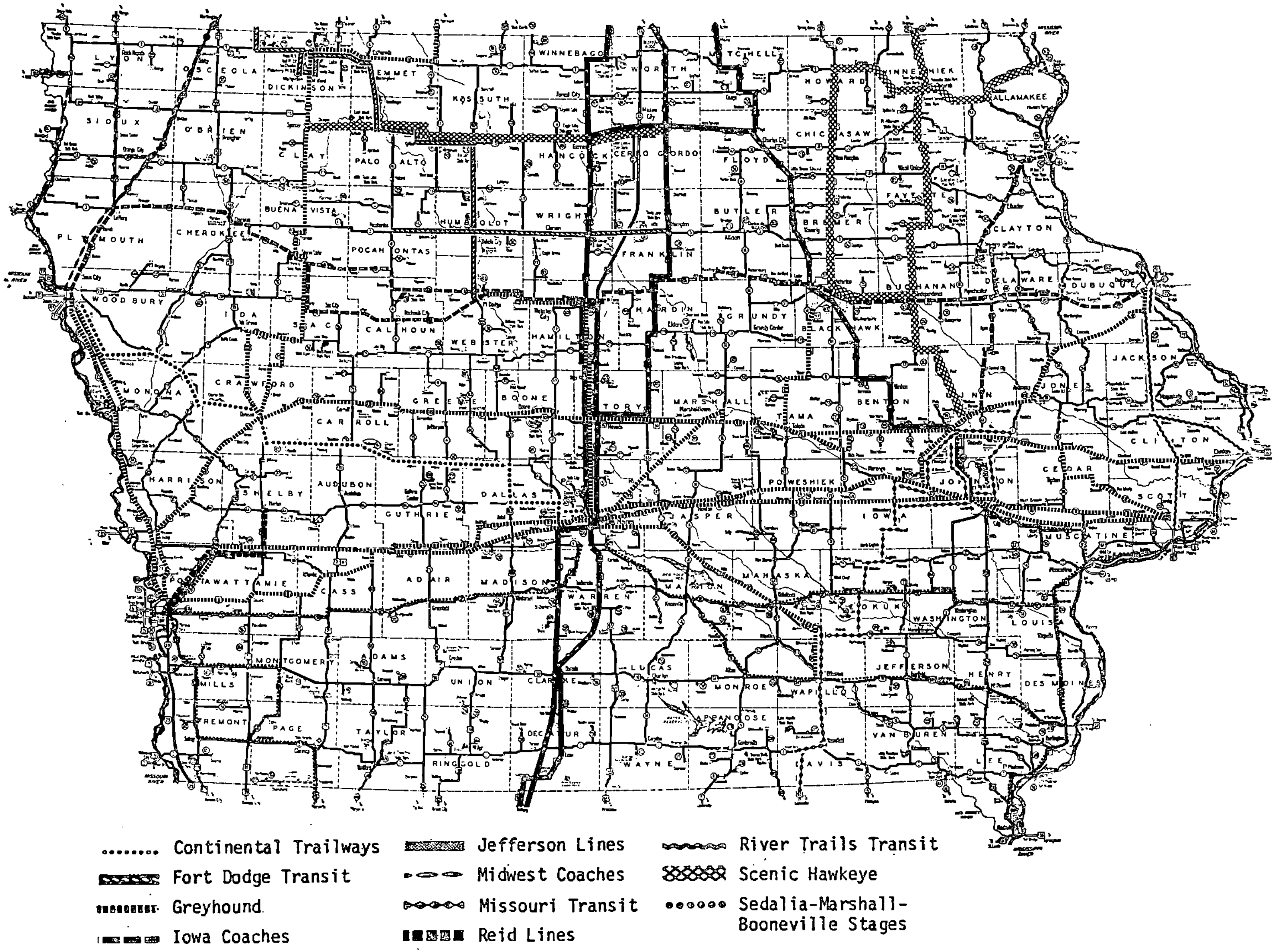
Existing bus routes represent the response of bus carriers to demonstrated demand. Figure VIII.4 identifies those routes in existence in 1977 and the carrier providing service on each route.

Population concentrations are a prerequisite to the generation of significant bus passenger volumes. A certain critical mass must be available in order to support profitable bus service. Figure VIII.5 identifies major population centers in Iowa coded according to size of city.

The role of the 16 planning regions in Iowa has a potential influence on bus passenger travel. A significant decentralization of governmental functions could create increased demand for travel to and from regional central places. If this change were also to incorporate a policy of requiring all governmental personnel to travel by bus, there would be a corresponding increase in intercity bus passenger travel. Figure VIII.6 identifies the 16 planning regions in Iowa.

An additional variable possibly influencing the configuration of an intercity bus system is the existence of many rural special transit services, each having its own area of influence. The Iowa Department of Transportation has surveyed these services and is currently guiding the preparation of regional transit plans. By coordinating these special services within each region, their operations can more effectively be directed toward the accomplishment of federal, state, and local goals and objectives.

Based on these existing and potential indicators of intercity bus passenger travel generators and corridors of travel, the following criteria for selecting an intercity bus network were developed.



Source: Russell's Official National Motor Coach Guide, June 1977

Figure VIII.4. Intercity passenger bus routes and carriers in Iowa

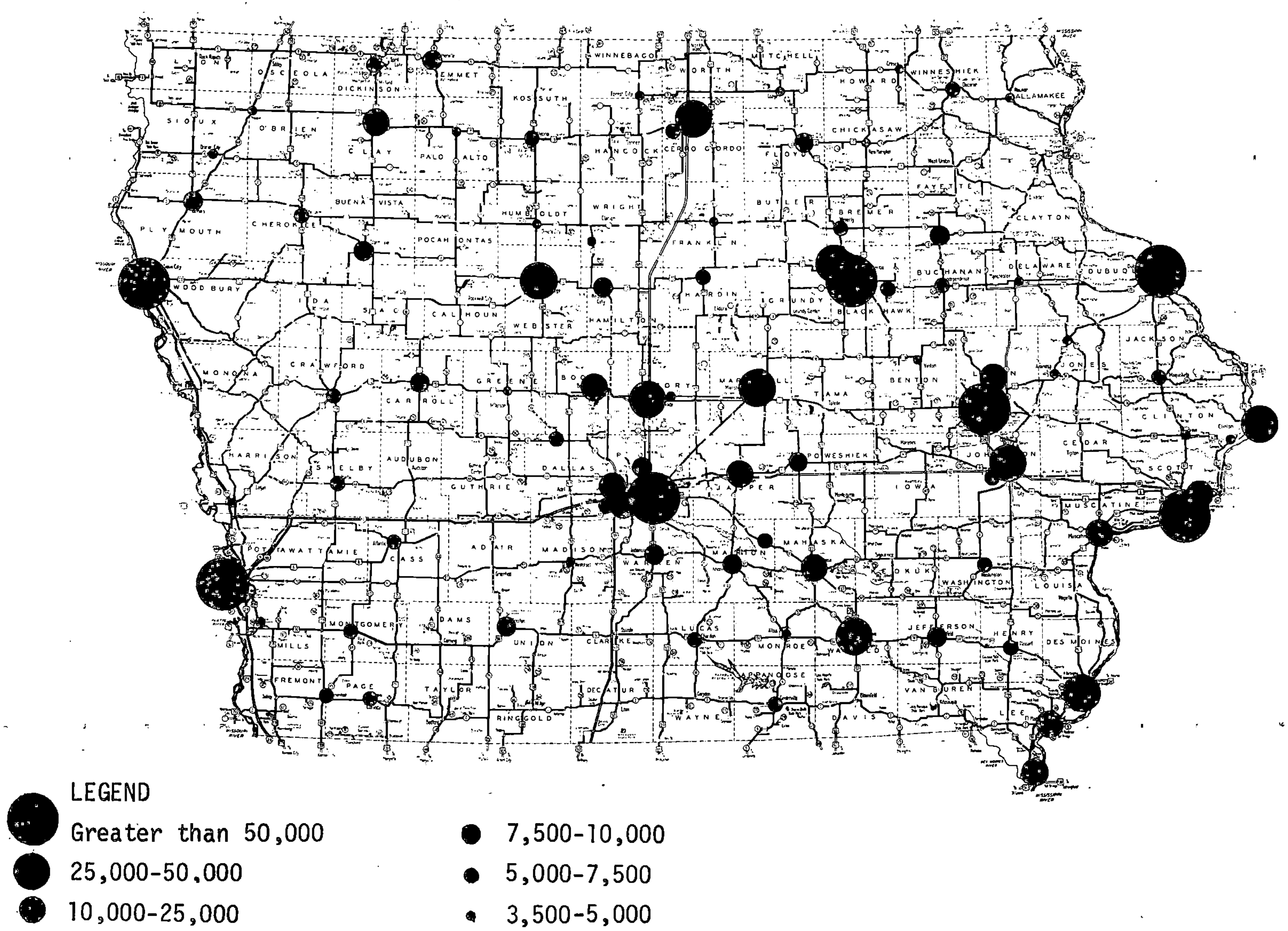


Figure VIII.5. Principal population centers in Iowa

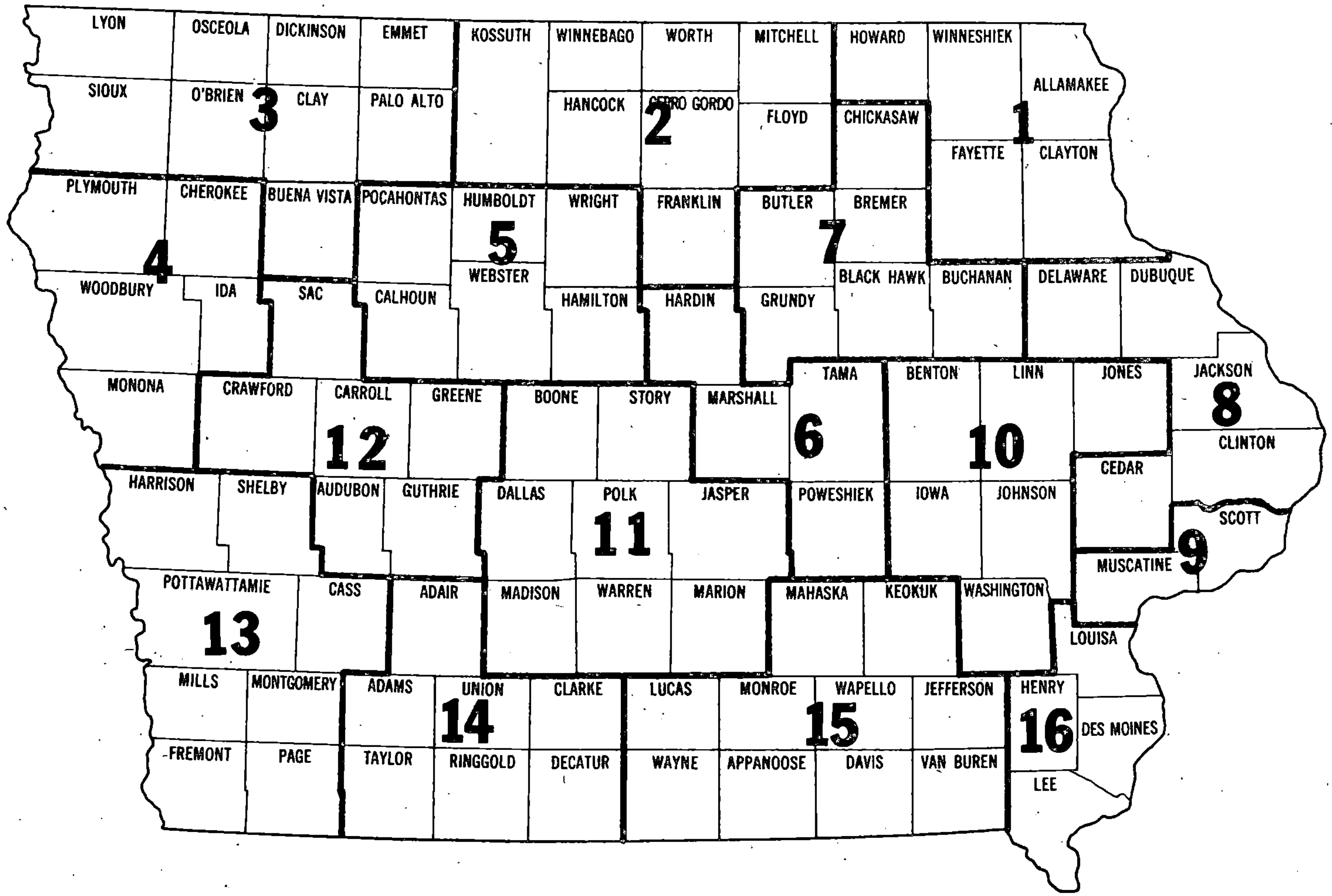


Figure VIII.6. Planning regions in Iowa

Subsystem I.	Major interstate highway system routes serving national markets; routes with greater than 500 intrastate bus trips (Figure VIII.2) serving major Iowa markets; and routes with 175 to 500 intrastate bus trips (Figure VIII.2) serving intermediate Iowa markets.
Subsystem II.	Routes with fewer than 175 intrastate bus trips (Figure VIII.2) but serving major highway corridors and interconnecting regional centers.
Subsystem III.	Existing certificated carrier routes supplementing interregional travel corridors that are not included in subsystems I and II.
Subsystem IV.	Rural special services transit operating within a regional concept and supplementing the certificated intercity bus carriers regular services.

Criteria for Express Service

An attractive attribute of travel by private automobile is the capability to make comparatively long trips without the necessity for intermediate stops. Most persons utilizing bus travel are similarly interested in travel to a specific destination but must tolerate the intermediate stops required to serve the needs of other passengers.

However, bus carriers provide some express services, but these are limited to routes connecting large city pairs capable of generating an economically sufficient demand for such service. Thus, Iowans benefit from access to express services operating between Chicago, Omaha, and Denver and between Kansas City and Minneapolis. As a result, some of the largest cities in Iowa have express service, but only because they are at a suitable distance from and are fortuitously located between large cities that are major travel generators.

Given the desirability of express service, the question arises as to whether such service would have a broader application in Iowa. The pronounced focus of intrastate travel on Des Moines suggests the possibility of a number of express routes connecting regional central places with Des Moines. Such a system is portrayed in Figure VIII.7.

The route network shown in Figure VIII.7 connects all 16 regional centers with Des Moines. Outlying centers desirably would have a supplemental schedule of local services that interlined with the express service.

A sample express service schedule is presented in Table VIII.1. This schedule is based on arrival in Des Moines at 10:00 a.m. and departure from Des Moines at 3:00 p.m. These times were selected arbitrarily on the assumption that express bus service would be designed to meet a need for government workers and shoppers to spend at least five hours in Des Moines.

Only a few patrons can be projected for such a system even if all official travelers were required to use express buses. Serious consideration of this type of system would require sufficient demand volume to justify the express service plus enough residual demand between smaller intermediate communities to support local service in most of the same corridors. Clearly, current bus travel volumes in Iowa are insufficient to suggest that such a system should be developed.

Identification of a State System Network

In the previous section the criteria for selecting an intercity bus network were set forth. Based on these criteria the following four subsystems comprising a state bus system network are presented:

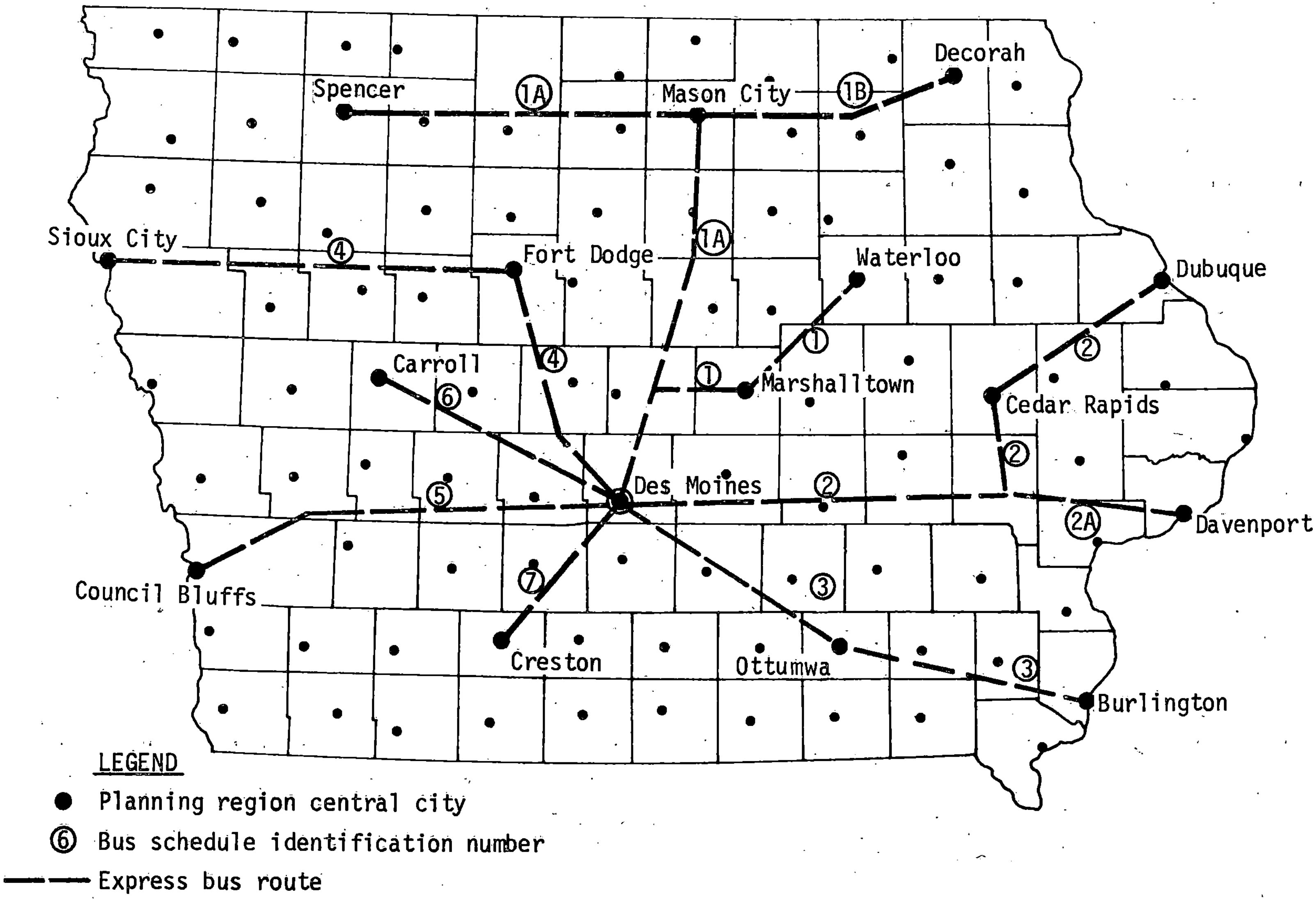


Figure VIII.7. An express bus system focusing on Des Moines

Table VIII.1. Sample express bus schedule

Route 1A	↓	↑	Route 1B	↓	↑
Spencer	5:10	7:50	Decorah	5:35	7:25
Mason City	7:15	5:45	Mason City	7:15	5:45
	7:20	5:40			
Ames	9:20	3:40	Route 2A		
Route 1			Davenport	5:25	7:35
			Cedar Rapids	7:00	6:00
Waterloo	7:20	5:40			
Marshalltown	8:30	4:30	Route 2		
	8:35	4:25	Dubuque	5:30	7:30
Ames	9:20	3:40	Cedar Rapids	7:00	6:00
	9:25	3:35		7:05	5:55
Des Moines	10:00	3:00	Iowa City	7:40	5:20
				7:45	5:15
Route 3			Des Moines	10:00	3:00
Burlington	6:45	6:15			
Ottumwa	8:15	4:45	Route 4		
	8:20	4:40	Sioux City	5:45	7:15
Des Moines	10:00	3:00	Fort Dodge	8:10	4:50
				8:15	4:45
Route 5			Des Moines	10:00	3:00
Council Bluffs	7:20	5:40			
Des Moines	10:00	3:00	Route 6		
			Carroll	8:10	4:50
Route 7			Des Moines	10:00	3:00
Creston	8:30	4:30			
Des Moines	10:00	3:00			

Note: This hypothetical schedule disregards existing carrier schedules, duplication of services, and other variables and is presented for illustrative purposes only.

Subsystem I.	Corridors responsive to principal intrastate travel demands (Figure VIII.8).
Subsystem II.	Routes serving interregional travel demands and providing access to interstate travel corridors (Figure VIII.9).
Subsystem III.	Existing certificated carrier routes supplementing interregional travel corridors (Figure VIII.10).
Subsystem IV.	Rural transportation special services. An idealized example is illustrated in Figure VIII.11.

Subsystem I traverses or passes on the border of 65 of Iowa's 99 counties. These counties include 84 percent of the population of the state. An additional 27 counties are served by Subsystem II. These two subsystems combined therefore would serve 98 percent of the state's population.

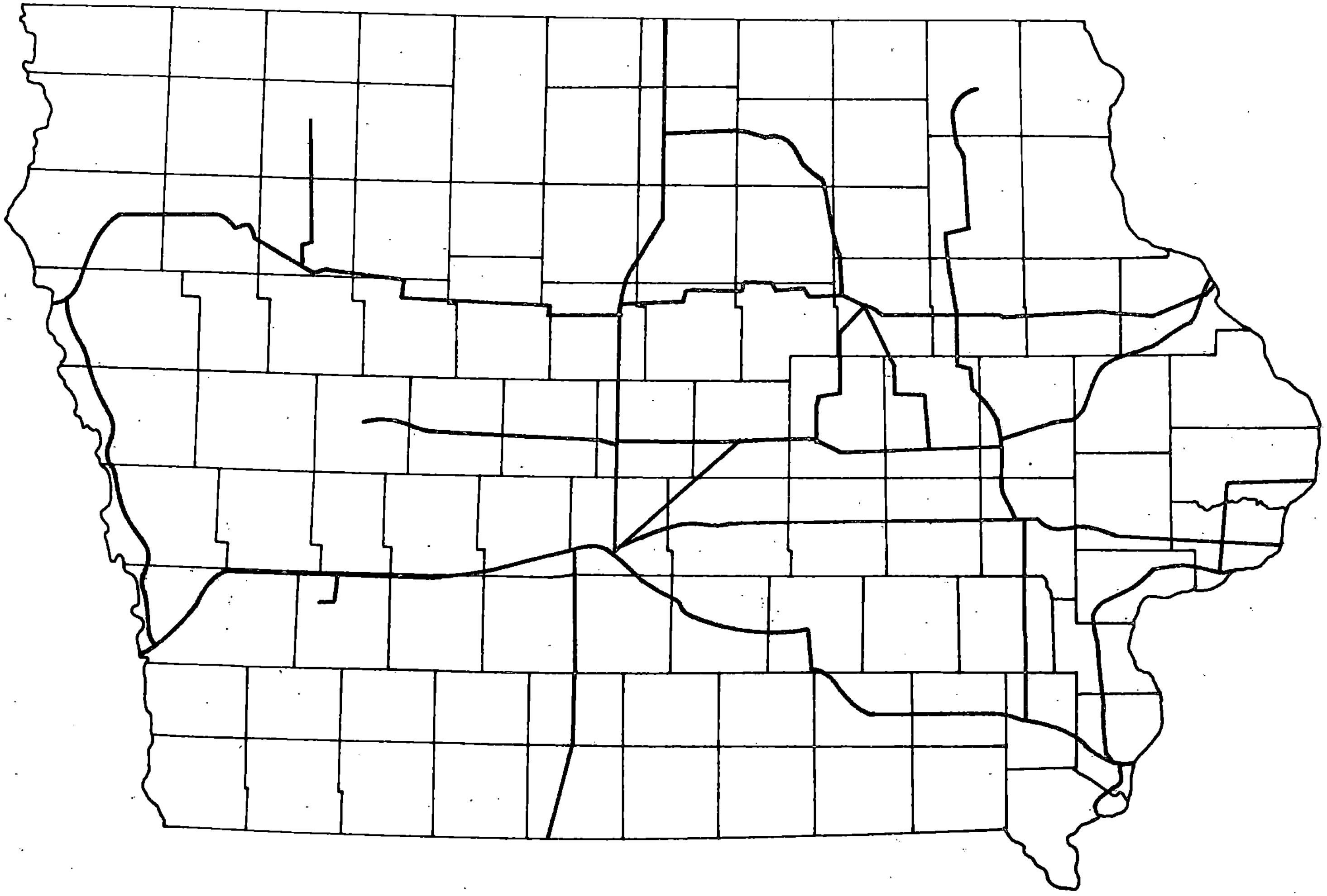


Figure VIII.8. Bus network subsystem I

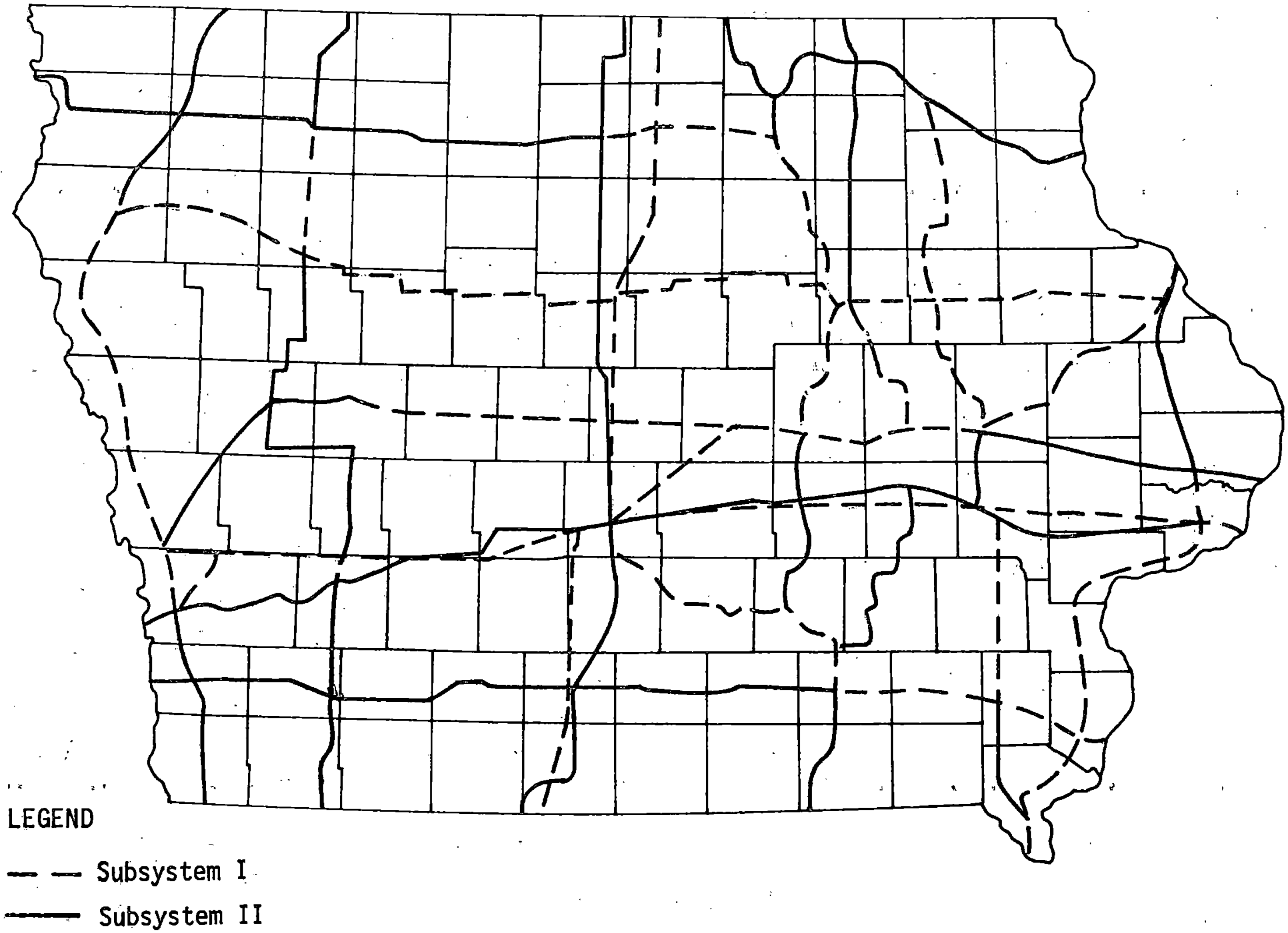


Figure VIII.9. Bus network subsystem II

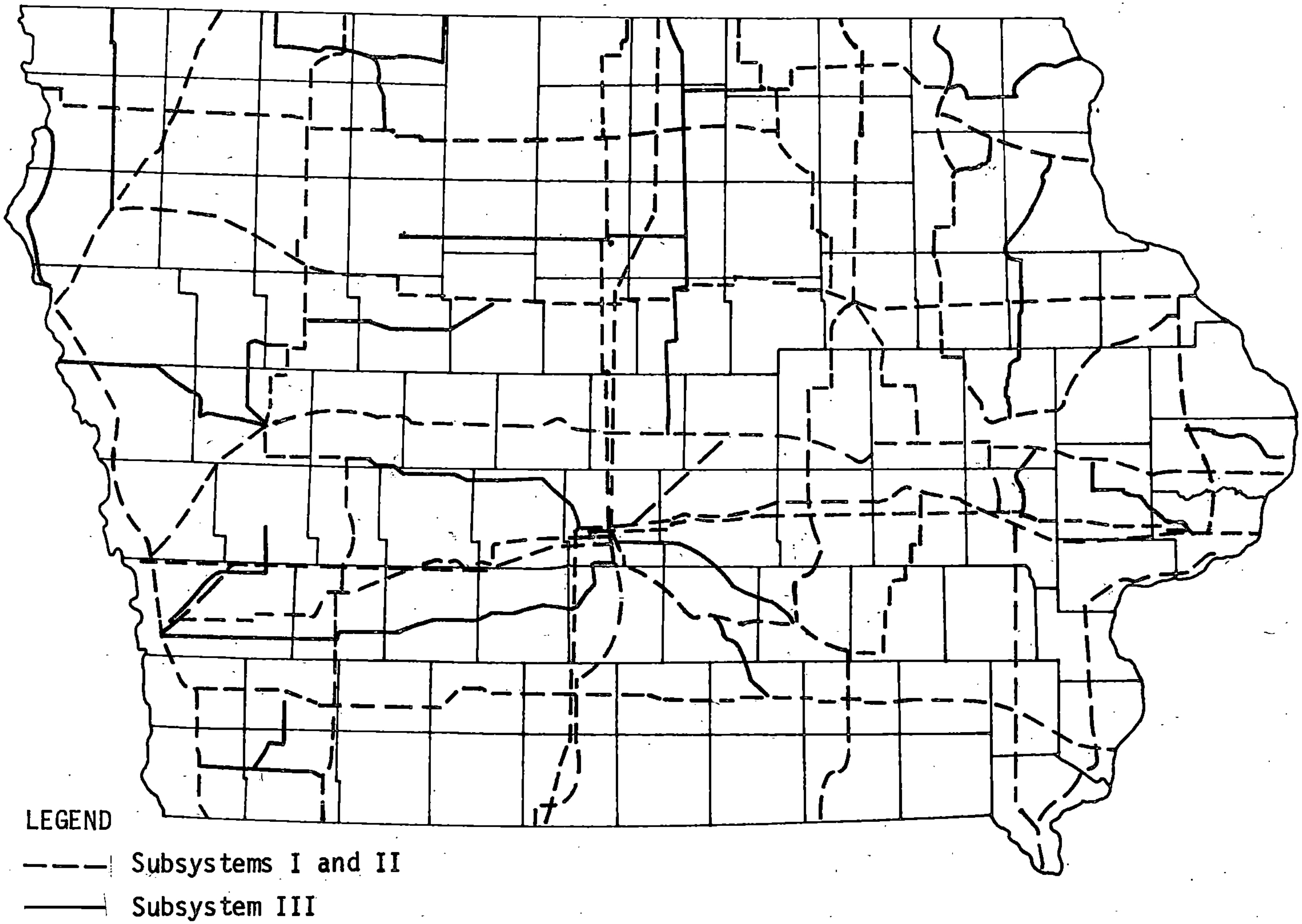


Figure VIII.10. Bus network subsystem III

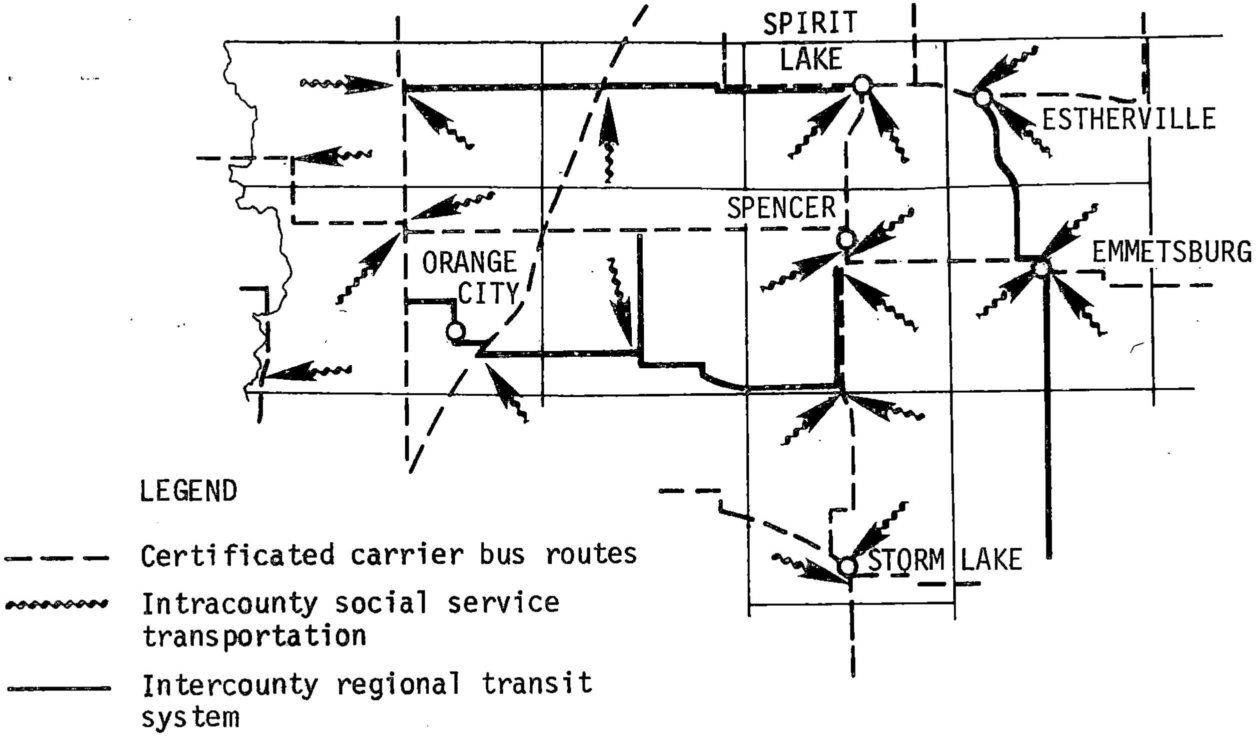


Figure VIII.11. Idealized example of coordinated regional bus system

PART 3

COMMUTER AIR CARRIERS

IX. CURRENT COMMUTER AIR CARRIER SERVICE IN IOWA

A summary of the history of commuter air carrier service was outlined in Chapter III. Current service is provided for scheduled passenger transport by commuter air carriers at Clinton, Des Moines, Dubuque, Fort Madison, Keokuk, Pocahontas, and Spencer. The current route structure of the commuter air carriers is shown in relation to the communities having certificated trunk or local service airline operations in Figure IX.1. Note that when Figure IX.1 is compared with Figure IX.2 each carrier tends to focus on a geographical corridor which lies between the trunk and local service airline route structure. This commuter route structure has as terminal points foci on Des Moines, Chicago, Minneapolis, and St. Louis. Typically a commuter air carrier route has to terminate in a major airport in order to participate in the market of interlining air passengers. Except in very remote and isolated communities (such as in Alaska and a few Western U.S. states), insufficient air passenger travel demand exists to support travel between small cities.

The current level of flight frequency is noted for commuter air service to Iowa communities in Table IX.1. Commuter airline routes serving Iowa communities, shown in Figure IX.1, are generally less circuitous than the certificated service currently being provided to the smaller cities in Iowa, as shown by Table IX.2. The level of service provided by commuters is generally greater than or equal to that afforded by certificated service to smaller communities as measured by frequency of flights. This is evident in comparing the data in Tables IX.1 and IX.3.

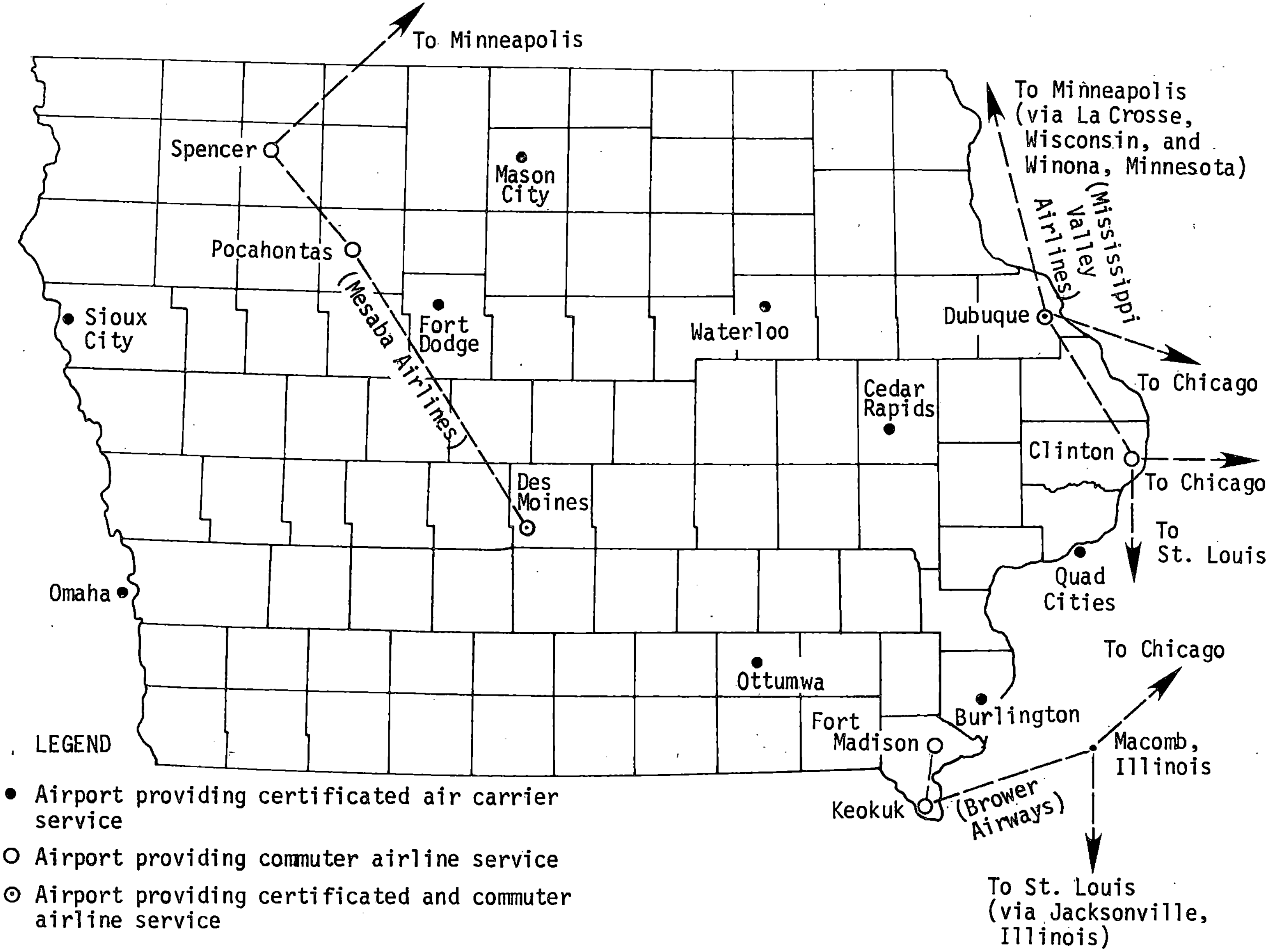
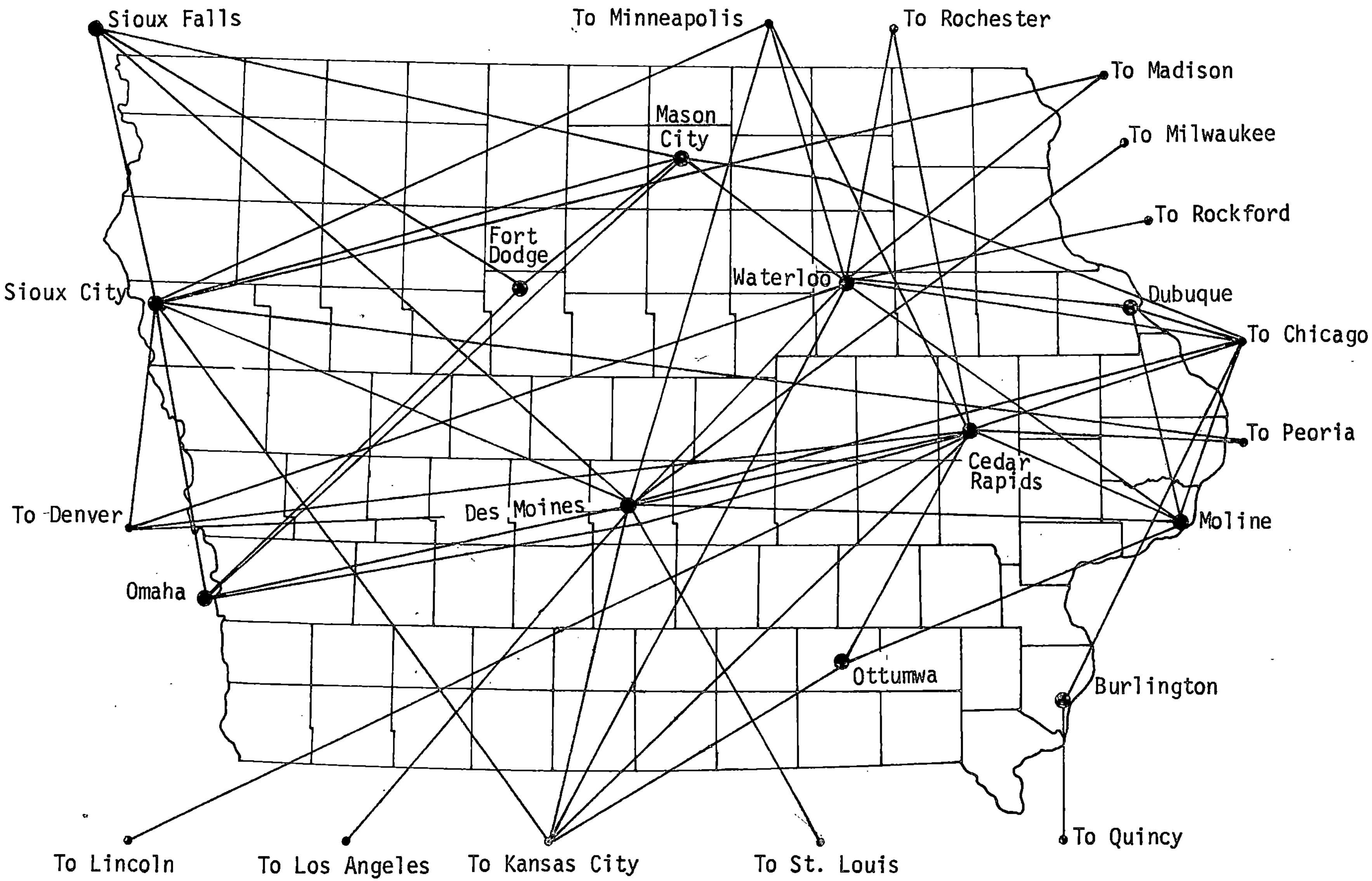


Figure IX.1. Iowa commuter airline passenger routes and certificated air carrier stations



Source: Official Airline Guide, June 15, 1977.

Figure IX.2. Certificated air carrier routes and stations in Iowa with direct nonstop connections

Table IX.1. Commuter airline service to Iowa communities

Community	Serving carrier	Major Terminus	Round trips per week
Clinton	Mississippi Valley Airlines	Chicago	24
		Minneapolis	17
		St. Louis	18
Des Moines	Mesaba Airlines	--	12
Dubuque	Mississippi Valley Airlines	Chicago	24
		Minneapolis	17
		St. Louis	18
Fort Madison	Brower Airways	Chicago	19
		St. Louis	18
Keokuk	Brower Airways	Chicago	19
		St. Louis	19
Pocahontas	Mesaba Airlines	Des Moines	12
		Minneapolis	7
Spencer	Mesaba Airlines	Des Moines	12
		Minneapolis	7

Source: Official Airline Guide, North American Edition, Reuben H. Donnelly Corp., Oak Brook, Illinois, June 15, 1977.

Since commuter air carriers are generally supporting certificated air carriers by feeding passengers into large terminals for interlining with the certificated carriers, the commuter airline is primarily in competition with the private automobile. Commuter airline fares are shown in Table IX.4 and have been converted to a per-mile basis for the same trip by highway. Current estimates of the cost of operating a standard, intermediate, compact and sub-compact automobile in Iowa are \$0.176, \$0.158, \$0.137, and \$0.119 per mile, respectively, including both ownership and operating costs (7). Operating costs only for the

Table IX.2. Certificated service to selected Iowa communities

Ozark Air Lines flight number	Airports served					
502	STL	UIN	BRL	ORD		
507	ORD	BRL	UIN	STL		
599	ORD	MCW	SUX	FSD		
803	ORD	BRL	UIN	STL		
810	STL	UIN	BRL	ORD		
844	MCI	COU	STL	MLI	DBQ	ORD (Except Sat. and Sun.)
844	STL	MLI	DBQ	ORD	(Sat. and Sun.)	
847	ORD	DBQ	MLI	STL		
861	ORD	BRL	UIN	STL		
862	STL	UIN	BRL	ORD		
870	MCI	OTM	CID	MLI	ORD	
871	ORD	MLI	CID	OTM	MCI	
872	MCI	OTM	CID	MLI	ORD	
873	ORD	MLI	OTM	MCI		
876	OMA	MCW	ALO	ORD		
877	ORD	DBQ	ALO	MCW	FOD	OMA
888	OMA	FOD	MCW	ALO	DBQ	ORD
889	ORD	DBQ	ALO	MCW	OMA	
958	STL	DSM	FOD	FSD		
959	FSD	FOD	DSM	STL		
980	ALO	DBQ	ORD			
982	FSD	MCW	ORD			
985	ORD	MCW	SUX	FSD		
987	ORD	DBQ	ALO			
994	FSD	SUX	MCW	ORD		

ORD = Chicago O'Hare BRL = Burlington UIN = Quincy STL = St. Louis
DBQ = Dubuque ALO = Waterloo CID = Cedar Rapids DSM = Des Moines
OTM = Ottumwa FSD = Sioux Falls MCI = Kansas City International
COU = Columbia SUX = Sioux City MLI = Moline MCW = Mason City
FOD = Fort Dodge OMA = Omaha

Source: Official Airline Guide, July 1, 1977.

Table IX.3. Certificated flight frequency to selected Iowa communities

Community	Major Terminus	Round trips per week	Added one-way trips per week
Burlington	Chicago	21	-
	St. Louis	21	-
Dubuque	Chicago	21	7
	St. Louis	14	-
	Kansas City	-	5
Fort Dodge	Chicago	7	-
	St. Louis	7	-
Mason City	Chicago	28	-
Ottumwa	Chicago	14	-
	Kansas City	14	-

Source: Official Airline Guide, July 1, 1977.

same respective classes of automobiles are \$0.084, \$0.074, \$0.067, and \$0.054 per mile. People traveling by commuter air carrier would be expected to desire time savings in travel and also to be willing to pay for it. Thus, it would seem that the fare for the Spencer and Pocahontas connection to Minneapolis is far too low on a per-mile basis. Substantial variation exists in the per-mile fare according to the distance of flight as shown in Table IX.4. It is fully appropriate that short flight connections have a high cost per mile due to the substantial fixed cost associated with providing commuter air carrier service. The limited seat capacity of the aircraft utilized should not be occupied with short-flight passengers if such passenger's fares are being cross-subsidized by the longer-flight passengers. Thus, the pricing variations in fares evidenced

Table IX.4. Commuter airline fares at Iowa stations, June 15, 1977

City pair	Highway mileage[a]	Basic fare, $[b]	Fare per ground mile	Fare tax included, $[b]	Fare per ground mile
Clinton - Chicago	137	$28.70	$0.209	$31.00	$0.226
- Dubuque	62	26.85	0.433	29.00	0.468
- Minneapolis	312	49.07	0.157	53.00	0.170
- St. Louis	255	40.74	0.160	44.00	0.173
Dubuque - Chicago	178	$34.26	$0.192	$37.00	$0.208
- Minneapolis	252	45.37	0.180	49.00	0.194
- St. Louis	299	47.22	0.158	51.00	0.171
Fort Madison - Chicago	248	$38.89	$0.157	$42.00	$0.169
- St. Louis	196	35.19	0.180	38.00	0.194
Keokuk - Chicago	269	$41.67	$0.155	$45.00	$0.167
- St. Louis	163	35.19	0.216	38.00	0.233
Pocahontas - Des Moines	139	$29.63	$0.213	$32.00	$0.230
- Minneapolis	197	23.46	0.119	25.34	0.129
Spencer - Des Moines	181	$35.19	$0.194	$38.00	$0.210
- Minneapolis	195	23.46	0.120	25.34	0.130

[a] 1977 Official Transportation Map, Iowa Department of Transportation.

[b] Official Airline Guide, June 15, 1977.

in Iowa generally are proper. Discussion of the appropriateness of individual variations will be reserved for subsequent chapters.

X. AIR TRAVEL DEMAND INVENTORIES

Introduction

Air travel demand estimates were required at a number of communities not having any scheduled air service. An earlier planning and research effort (28) considered the commuter air carrier demand estimation procedures utilized in the Pacific Northwest Region Airport System Project, the Oregon Commuter Air Service Project, and the Nebraska Air Transportation Requirements Study in developing the "Iowa Community Factor Approach" to define potential commuter air carrier market communities. In this approach to delineating potential service communities, all cities in Iowa with 1970 populations of 5,000 or more were initially tabulated as the set of communities to be considered for the potential to utilize commuter air carrier service. This resulted in an array of 63 communities for which the 1970 population, the forecast year 2000 population, and the highway distance to Minneapolis/St. Paul, Chicago, St. Louis, and Kansas City were tabulated. Further, the highway distances from each community to Des Moines, Omaha, Sioux Falls, Sioux City, Cedar Rapids, Waterloo, Ottumwa, Burlington, Dubuque, Fort Dodge, Mason City, Quad Cities, and Clinton were tabulated.

Isolation from the major focal points for transportation, economic activities, social functions, and cultural patterns constituted one measure of potential need for commuter air carrier service. Chicago represents the major air transportation hub for travel to the northeastern U.S. and the midwestern financial center; St. Louis is the major air travel gateway to the southeastern U.S. and a midwestern manufacturing center; Kansas City is a major air transportation gateway to the southwestern U.S. and a regional federal government center; Minneapolis/St. Paul is a major air transportation gateway to the northwestern U.S. and a communication and manufacturing center. These major metropolitan areas have trunk carrier services with which passengers and cargo must interline to obtain effective and efficient schedule access to the rest of the world. The unique and large-scale activities within each of these major metropolitan areas also represent a concentration of intercity travel destinations.

Proximity to existing certificated air carrier service was a signigicant factor in determining the potential applicability of third level carrier service. Since an intrastate route structure was the ultimate goal of the commuter air carrier feasibility study (28), the proximity of communities to Iowa air carrier stations and the state boundary air carrier stations (principally, Omaha, Sioux Falls, and Quad Cities) was tabulated. If a community was within a reasonable service distance of existing air carrier operations, it was considered unlikely that any economically viable commuter air carrier service could be established. Highway distances were also tabulated to certificated air carrier stations in neighboring states which were close to Iowa (a total of 10 cities). The original 63-community set of cities with 5,000 or more persons was reduced to 42 candidate communities by eliminating those cities with certificated air carrier service and their associated suburbs, and by including Coralville with Iowa City.

The number of manufacturing installations which employed 250 or more employees in each of the 42 communities was also tabulated.

Recognizing that manufacturing employment is a poor estimator of aviation passenger demand, large manufacturing installations were considered to be a relative measure of the potential need for executive and regional marketing travel. Table X.1 contains the summarized data for all 42 candidate communities considered for further analysis.

Since, at this time, only the relative merit of the various communities for commuter air carrier service was desired, a ranking system was devised to weigh the factors included in estimating potential for service. Proximity to major metropolitan areas (Kansas City, Minneapolis/St. Paul, St. Louis, Chicago) was rated as:

1. Candidate community was more than 250 miles from all four = 4
2. Candidate community was more than 250 miles from only three = 3
3. Candidate community was more than 250 miles from only two = 2
4. Candidate community was more than 250 miles from only one = 1
5. Candidate community was less than 250 miles from all four = 0.

If the candidate community was more than 60 miles from both Des Moines and Omaha, one rating point for isolation was added. If the candidate community was more than 50 miles from <u>all</u> of Sioux Falls, Cedar Rapids, Sioux City, Waterloo, and Quad Cities, one rating point was added for isolation. When the candidate community was more than 40 miles from <u>all</u> other air carrier airports in its vicinity, one rating point was added. This rating was cumulative.

Each of the 42 communities was also rank ordered according to the forecast of population change between 1970 and 2000 with the highest ranking assigned to the community expected to have the largest increase, and so on. The communities were also ranked according to the expected

Table X.1. Iowa community factors for commuter air carrier potential

Community	Population		Distance to major metropolitan areas				Closest air carrier community		Manufacturing plants with 250+ employees	1970 air taxi passengers estimated
	U.S. census 1970	Forecast 2000	Minneapolis/ St. Paul	Chicago	St. Louis	Kansas City	City	Distance		
Algona	6,032	7,100	188	397	465	283	Fort Dodge	43	1	571
Ames	39,505	56,600	253	302	366	220	Des Moines	30	2	5,835
Ankeny	9,151	22,500	273	338	346	201	Des Moines	10	0	956
Atlantic	7,306	7,800	308	415	413	170	Omaha	60	0	723
Boone	12,468	13,100	268	327	381	224	Des Moines	45	0	1,401
Carroll	8,716	10,400	288	378	427	221	Fort Dodge	59	0	900
Centerville	6,531	7,900	375	331	212	173	Ottumwa	41	2	630
Chariton	5,009	5,400	340	339	254	169	Ottumwa	47	0	454
Charles City	9,268	9,400	162	297	347	335	Mason City	29	2	971
Cherokee	7,272	7,000	280	448	502	272	Sioux City	50	1	719
Clarinda	5,420	6,000	388	447	330	120	Omaha	89	0	500
Creston	8,234	10,200	365	392	301	155	Des Moines	76	1	839
Decorah	7,703	9,300	145	232	353	385	LaCrosse, WI	64	0	772
Denison	6,213	8,800	315	403	449	216	Omaha	76	1	592
Estherville	8,108	8,300	190	443	515	328	Fairmont, MN	36	2	823
Fairfield	8,715	8,500	340	264	184	244	Ottumwa	25	2	900
Fort Madison	13,996	13,300	383	257	134	240	Burlington	17	5	1,617
Grinnell	8,402	9,900	276	282	255	241	Des Moines	51	0	860
Harlan	5,049	6,400	335	423	421	189	Omaha	47	0	458
Independence	5,910	6,200	235	248	282	326	Waterloo	23	0	556
Indianola	8,976	13,500	310	339	290	181	Des Moines	17	0	933
Iowa City	47,744	63,200	303	217	206	300	Cedar Rapids	27	3	8,658
Iowa Falls	6,454	8,800	215	327	348	273	Mason City	47	0	621
Keokuk	15,173	13,700	390	282	115	215	Quincy, IL	40	4	1,786
Knoxville	7,755	7,600	305	313	251	195	Des Moines	37	0	779
Le Mars	8,159	11,400	287	479	539	323	Sioux City	26	0	829
Maquoketa	5,677	7,100	276	167	277	390	Dubuque	31	1	529
Marshalltown	26,219	31,300	250	276	291	251	Des Moines	50	3	3,514
Mount Pleasant	7,007	6,700	351	250	158	260	Burlington	28	1	687
Muscatine	22,405	25,700	339	194	204	309	Quad Cities	32	5	2,893
Newton	15,619	16,500	286	296	270	221	Des Moines	30	2	1,852
Oelwein	7,735	7,000	201	253	297	340	Waterloo	33	0	776
Oskaloosa	11,224	12,600	310	288	227	220	Ottumwa	25	1	1,230
Pella	6,784	10,200	280	303	244	218	Des Moines	37	2	660
Perry	6,906	7,600	298	352	366	225	Des Moines	30	1	675
Red Oak	6,210	5,100	380	446	398	149	Omaha	53	1	592
Shenandoah	5,968	5,700	402	468	390	127	Omaha	66	0	563
Spencer	10,278	11,900	226	445	517	309	Worthington, MN	55	1	1,103
Storm Lake	8,591	10,900	263	435	484	272	Fort Dodge	61	1	884
Washington	6,317	6,700	334	236	189	270	Ottumwa	54	1	604
Waverly	7,205	9,200	190	285	317	320	Waterloo	14	1	711
Webster City	8,488	8,300	243	350	353	255	Fort Dodge	21	1	871

Source: Table 11.1, Reference 28.

number of annual air taxi operations (assumed 0.5 commuter air carrier potential passenger per operation) with the highest ranking assigned to the largest number of operations. The results of this ranking are shown in columns one through six of Table X.2. Some concern was expressed that the magnitude of the population change rankings and the air taxi operations rankings might be dominating the final ranking since the other two measures could not provide the unique discrimination possible in population and air taxi operations. Therefore, a composite ranking was developed by scaling the annual air taxi operations and the population change into the same ordinal magnitude as the other two factors. (Scale values are footnoted in Table X.2.) The "composite index" rating was the ranking used to estimate the potential of a community to utilize commuter air carrier services.

The 42 communities were grouped according to the ranking by the composite index as shown in Table X.3. Note that the cities in which third level carrier service was either existing or had been attempted ranked high. Also, two communities with a significant degree of isolation which had no history of commuter air carrier service ranked quite high: Denison and Storm Lake. Service areas were hypothesized which could be adequately served by a one- or two-stop flight. If more than two stops are required to reach the airport with numerous flight interline opportunities or major socioeconomic activities, the commuter air carrier service was considered to be ineffective in terms of time and cost by comparison with automobile transportation.

A radial spoke route structure with non-stop flight between the smaller or isolated city and the larger hub airport city was considered

Table X.2. Ranking of candidate communities for commuter air carrier service potential

Community	Air carrier access ranking	Air-taxi operations ranking	Population change ranking	Large manufacturing ranking	Summed ranks	Community potential ranking	Air-taxi operations index[a]	Population change index[b]	Composite index ranking
Algona	2	36	19	5	62	32	5	4	17
Ames	3	2	4	4	13	1	1	1	1
Ankeny	3	12	1	6	22	3	5	1	9
Atlantic	3	25	26	6	60	27	5	5	33
Boone	3	8	29	6	46	17	4	5	25
Carroll	2	15	17	6	40	11	5	4	20
Centerville	3	31	14	4	52	23	5	3	9
Chariton	3	42	25	6	76	39	6	5	37
Charles City	4	11	32	4	51	21	5	5	25
Cherokee	2	26	36	5	69	35	5	6	25
Clarinda	2	40	23	6	71	36	6	4	25
Creston	2	19	13	5	39	10	5	3	9
Decorah	3	24	15	6	48	19	5	3	20
Denison	2	35	5	5	47	18	5	1	5
Estherville	3	21	31	4	59	26	5	5	20
Fairfield	4	15	35	4	58	25	5	6	33
Fort Madison	4	7	39	1	51	21	3	6	6
Grinnell	3	18	18	6	45	16	5	4	25
Harlan	3	41	11	6	61	30	6	3	25
Independence	4	38	30	6	78	40	5	5	37
Indianola	3	13	3	6	25	4	5	1	9
Iowa City	4	1	7	3	15	2	1	2	2
Iowa Falls	3	32	8	6	49	20	5	2	17
Keokuk	4	6	41	2	53	24	3	6	9
Knoxville	3	22	33	6	64	33	5	6	37
Le Mars	2	20	7	6	35	8	5	2	9
Maquoketa	4	39	12	5	60	27	5	3	20
Marshalltown	3	3	16	3	25	4	1	4	4
Mount Pleasant	4	28	37	5	74	38	5	6	37
Muscatine	4	4	21	1	30	6	1	4	2
Newton	3	5	28	4	40	11	3	5	9
Oelwein	3	23	40	6	72	37	5	6	37
Oskaloosa	5	9	22	5	41	13	4	4	25
Pella	4	30	3	4	41	13	5	1	6
Perry	3	29	24	5	61	30	5	4	20
Red Oak	3	35	42	5	85	42	5	6	33
Shenandoah	2	37	38	6	83	41	5	6	33
Spencer	2	10	20	5	37	9	4	4	9
Storm Lake	1	16	10	5	32	7	5	3	6
Washington	3	33	27	5	68	34	5	5	25
Waverly	3	27	9	5	44	15	5	3	17
Webster City	4	17	34	5	60	27	5	6	37

Source: Table 11.2, Reference 20.

[a] Annual air taxi operations categorized: (0 - 500) = 6, (501 - 1000) = 5, (1001 - 1500) = 4, (1501 - 2000) = 3, (2001 - 2500) = 2, (2500 +) = 1

[b] Population change categorized: (less than 0%) = 6, (+ 0.1 to + 10.0%) = 5, (+ 10.1 to + 20.0%) = 4, (+ 20.1 to + 30.0%) = 3, (+ 30.1 to + 40.0%) = 2, (greater than + 40.0%) = 1

Table X.3. Community groupings for commuter air carrier service potential

Composite index ranking[a]	Communities achieving that rank
1	Ames[b]
2	Iowa City,[c] Muscatine[b]
4	Marshalltown[b]
5	Denison
6	Storm Lake, Pella, Fort Madison[b]
9	Keokuk,[b] Ankeny, Indianola, LeMars, Spencer,[b] Creston, Newton, Centerville
17	Waverly, Iowa Falls, Algona
20	Carroll, Decorah, Estherville, Maquoketa, Perry
25	Oskaloosa, Grinnell, Boone, Charles City, Harlan, Washington, Cherokee, Clarinda
33	Fairfield, Atlantic, Shenandoah, Red Oak
37	Webster City, Knoxville, Oelwein, Mount Pleasant, Chariton, Independence

Source: Table 11.3, Reference 28.

[a] Lowest rank indicates highest potential; tie ranks tabulated at highest order.

[b] Communities with a past history of third level carrier service.

[c] Community previously having certificated air carrier service.

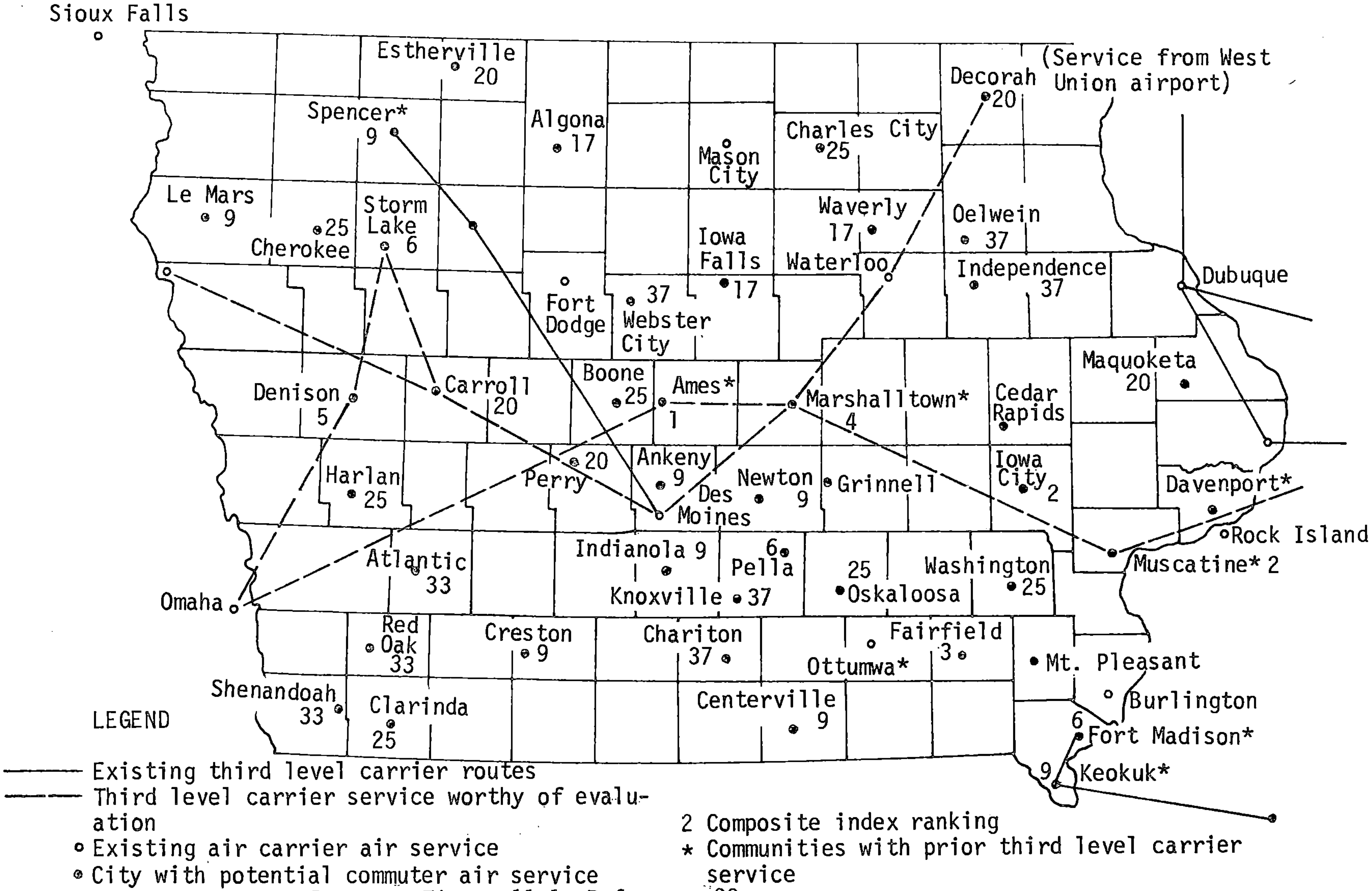
ideal. Research and study conducted for that report and previously published information was considered insufficient to identify what size or characteristics were needed for the outlying community to generate enough traffic to sustain a route. Figure X.1 indicates several potential commuter air carrier routes recommended for further feasibility investigation.

Analyses conducted in this study (28) resulted in a planning research design consisting of 17 communities to be included in air travel demand inventories. Communities selected for analysis included those having commuter airline service (Clinton, Dubuque, Fort Madison, Keokuk, Pocahontas, and Spencer), those communities receiving certificated airline service but exhibiting low passenger demand levels (Burlington, Dubuque, Fort Dodge, Mason City, and Ottumwa), and communities that the _1976 Update to the Iowa Airport System Plan_ identified as needing further study to evaluate the potential to sustain commuter airline operation (Ames, Carroll, Decorah, Denison, Marshalltown, Muscatine, and Storm Lake).

Inventories Conducted

Secondary Data Sources

A variety of documents and sources of secondary data were inventoried and utilized to various degrees in the analysis stages. To the maximum extent possible, this planning research was based on secondary data. Implementation of recommendations resulting from the analysis should be possible with a minimum expansion of local bureaucracy and minimum interference into a relatively free market segment of



Source: Figure 11.1, Reference 28.

Figure X.1. Commuter air carrier potential service areas for further evaluation, May 1976 the transportation industry. The primary sources of secondary data utilized in this planning research are listed in Table X.4. Specific reference to individual data sources is made in this report as each is utilized in detailed analysis.

Table X.4. Sources of secondary data

Source	Typical document
U.S. Bureau of Census	General social and economic characteristics (by state).
Civil Aeronautics Board	Airport activity statistics (annually).
Federal Aviation Administration	Office of Management Systems reports on commuter airline activity; Office of Aviation Policy reports on commuter airline activity.
U.S. Transportation System Center	Special studies dealing with commuter air carriers.
Iowa Department of Transportation	Community trip origin and destination reports; intercity trip interchange tables; state transportation plans; state airport system plans; special studies of commuter airline operation.
Iowa State University Library	Official Airline Guide
The various states	Commuter airline planning studies (Coastal Plains Region, Nebraska, Ohio, Oregon, Pacific Northwest Region).
Commuter Airline Association of America	The Digest (monthly newsletters); periodical reports and bulletins.

Primary Data Sources

Travel Agency Survey

Telephone books for the 17 study communities were examined to obtain listings of the travel agencies serving these communities. A total of 32 agencies were identified of which data in one form or another were obtained from 25 agencies. Cooperating agencies of interest to this study were located in Ames, Burlington, Clinton, Carroll, Clear Lake, Decorah, Dubuque, Fort Dodge, Harlan, Marshalltown, Mason City, Muscatine, Newell, Ottumwa, Spencer, and Storm Lake. Data sought from each agency contacted included (1) the address of each person purchasing public transportation tickets during the month of July 1976, (2) the final trip destination of each public transportation ticket sold in July 1976, (3) the airport or station where public transportation was first boarded for each July 1976 ticket, and (4) the monthly ticket volume sold by public transportation modes for 12 months prior to July 1976. Data actually obtained varied from all items sought at several agencies to only a brief summary total of ticket sales at several agencies to no information. A listing of agencies contacted with a brief notation as to the nature of the data provided is contained in Appendix G. The research staff is particularly indebted to those agencies which contributed their time and effort to furnish the desired data.

On-board Commuter Passenger Survey

An initial question posed in the development of this planning research asked to what degree the persons riding commuter airlines and those riding other transportation modes have similar social and economic travel purposes. In order to examine passenger characteristics, travel purposes, economic evaluation of competing modes, and attitudes toward public policy measures, an on-board survey was conducted sampling passengers on all flights serving Iowa cities. On-board surveys were used rather than waiting room surveys because at many commuter air carrier stations it is difficult to define the passenger waiting area. Also, at each station a very small number of passengers board, making the data collection process more efficient if passengers are intercepted en route. A total of 226 commuter airline passengers who were flying into or out of Iowa stations responded to the survey. Each airline was sampled for three consecutive days during the period July and August, 1976. The distribution of the sample is shown in Table X.5. No person was surveyed more than once if a repeat flight or a return leg of a round trip occurred. Only two persons refused to participate in the survey. The high rate of passenger participation is attributed to the excellent cooperation of the management and the flight personnel of the commuter air carriers. (A facsimile of the survey form is included in Appendix H.)

Table X.5. Distribution of on-board interviews

Airline	Cities served	Interviews	Percent
Mississippi Valley Airlines	Dubuque and Clinton	133	58.8
Brower Airways	Fort Madison and Keokuk	41	18.2
Mesaba Airlines	Spencer and Pocahontas	52	23.0
Total		226	100

Certificated Air Carrier Waiting Room Passenger Survey

It was necessary to verify the degree to which certificated air carrier passenger characteristics, travel purposes, economic evaluations of competing modes, and attitudes toward public policy measures coincided with those of commuter air carrier passengers in order to hypothesize the impact of replacing the certificated carrier with a commuter carrier. The airport terminal waiting rooms at Burlington, Dubuque, Fort Dodge, Mason City, and Ottumwa were surveyed on three consecutive days during July and August, 1976. (A facsimile of the survey form is included in Appendix H.) A total of 229 certificated airline passengers completed the survey questionnaire. As indicated in Table X.6, at the stations where complete information was made available, the survey personnel were able to contact about one-half of the passengers boarding to issue survey forms, and about one-half of the forms issued were completed and returned. The difference in

Table X.6. Distribution of waiting room interviews

City	Passengers boarding	Survey forms issued	Interviews completed	Percent of passenger interviews
Burlington	163	91	51	22.3
Dubuque	NA	NA	95	41.5
Fort Dodge	54	33	18	7.8
Mason City	NA	73	31	13.8
Ottumwa	NA	NA	34	14.8
Total			229	

NA - Not available

passenger participation as compared with the on-board commuter air carrier survey is attributed to the following factors: (1) less time was available to complete the form from time of arrival at the airport terminal until departure time than was available en route; (2) passengers taking the survey form on-board were provided self-addressed stamped return envelopes, but no survey person was on the plane to answer questions about the form or about the survey; (3) certificated air carrier flight personnel were informed; (4) it was difficult to identify passengers in a waiting area and contact them without appearing to be one of the notorious airport solicitors. Subsequent analysis of the sample characteristics will indicate that since no significant differences existed between certificated and commuter air carrier passengers, having approximately equal sample sizes is convenient.

Household Survey

A questionnaire was mailed to a sample of households from each of the 17 study communities seeking the same information on the economic evaluation of competing travel modes, attitudes toward public policy measures, and general household travel patterns as was asked of commuter air carrier and certificated air carrier passengers. An initial mail-out sample varied from three to five percent of the households as listed in current telephone directories, with the percentage varying inversely with population. The questionnaire was excessively long and too involved to attempt to replicate through the mail what had been administered to air carrier passengers in a personalized manner. All local newspapers were informed of the survey, and good coverage was provided. A return rate of about 50 to 60 percent was hoped for in spite of the complexity of the form. (A facsimile of the survey form is contained in Appendix H.) In the period two to four weeks after the initial mailing a follow up mailing was made to all households not replying. The return rate varied from 20.6 percent to 34.6 percent as shown in Table X.7. The final returned sample represented from 0.619 to 1.731 percent of the community households, with an overall average of approximately one percent.

Demographic Characteristics of Survey Respondents

Tables X.8, X.9, and X.10 contain a socioeconomic description of the three samples and the U.S. Census data for the cities associated with each sample survey. As is to be expected, the airline passengers are of a social structure typified by high incomes, being well-educated, and being members of the working age group. The household survey responses have the expected bias in the same directions due to the complexity of the questionnaire. Note that commuter air carrier and certificated air carrier passengers are essentially identical.

Table X.7. Distribution of household survey responses

City	Number of households selected	Percent of total households	Completed survey forms	Percent of forms mailed	Percent of total households
Ames	587	4	141	24.0	0.962
Burlington	528	4	117	22.2	0.886
Carroll	175	5	37	21.1	1.057
Clinton	524	4	118	22.5	0.906
Decorah	160	5	46	28.8	1.438
Denison	133	5	37	27.8	1.391
Dubuque	669	3	138	20.6	0.619
Fort Dodge	432	4	112	25.9	1.037
Fort Madison	264	5	57	21.6	1.094
Keokuk	269	5	73	27.1	1.354
Marshalltown	424	4	124	29.2	1.170
Mason City	565	4	130	23.0	0.920
Muscatine	468	5	98	20.9	1.047
Ottumwa	447	5	103	23.0	1.152
Pocahontas	52	5	18	34.6	1.731
Spencer	215	5	57	26.5	1.326
Storm Lake	184	5	60	32.6	1.630
Total	6,096		1,466	24.0	1.004

Table X.8. Household income distribution of survey respondents and associated cities

Annual household income level	Commuter airlines		Certificated airlines		Households	
	Survey percent	1970 census percent	Survey percent	1970 census percent	Survey percent	1970 census percent
Less than $5,000	0.5	16.7	3.1	17.6	7.7	18.3
$5,000 - $9,999	6.6	33.9	5.7	35.0	18.3	34.6
$10,000 - $14,999	9.6	31.1	13.0	30.7	27.4	29.6
$15,000 - $24,999	34.0	15.0	34.2	13.5	31.7	14.3
$25,000 - $49,999	37.6	2.7	33.2	2.6	12.2	2.9
$50,000 or more	11.7	0.5	10.9	0.5	2.6	0.6

Table X.9. Age distribution of survey respondents and associated cities

	Commuter airlines		Certificated airlines		Households	
Age bracket	Survey percent	1970 census percent	Survey percent	1970 census percent	Survey percent	1970 census percent
Under 18 years	3.7	38.9	2.5	38.5	0.4	37.8
18-24 years	8.9	7.4	11.8	7.2	10.5	9.3
25-39 years	36.4	15.9	40.4	15.4	30.1	15.8
40-64 years	48.1	25.6	41.9	25.9	42.0	24.8
65 years and older	2.8	12.2	3.4	13.0	17.1	12.3

[a] U.S. Census data age groups break at ages 0-19 and 20-24 years.

XI. ANALYSIS OF AIR TRAVEL DEMAND

Demand Indicators

Indicators From the Literature

A significant body of research and planning literature was examined in this study to gain depth and insight into potentially useful indicators of commuter airline demand. A wide variety of indicators was found to have been used in the past. Among the more commonly occurring variables were household income levels (29,30,31,32), employment activity or categories (29,30,32), access to aviation facilities (21,30,31,33,34,35), population of city (17,21,31,32,34,35), aviation activity level (17,34, 35,36), travel cost and travel resistance factors (31,34), general population characteristics (32,37), and traveler characteristics (38). Commuter airline demand indicators for use in this planning research effort were subsequently selected on the basis of three criteria: (1) the variables (indicators) had to appear to be logical characteristics of Iowa communities since demand estimates were required in communities with no air service; (2) the variables should have been substantiated as valid measures of demand by previous research; (3) the variables should represent measures easily obtained or ones for which data were readily accessible.

The studies reviewed in the literature also enumerated a wide range of specific variables used in estimating passenger demand. Among the most frequently used variables were population, income, retail sales, and employment (classified by occupational categories). Other variables used less frequently included wholesale sales, miles to the nearest hub airport, education level, and age.

Commuter Air Carrier On-board Survey

Additional input to the variable selection process was provided by the commuter airline on-board survey results. Socioeconomic characteristics of the passengers which appeared to reinforce the above variable list included occupation, annual household income, age, and education level. Of the total number of respondents, the results revealed that 81.6 percent of the heads of household were from professional, technical, or managerial occupations; 83.0 percent of the households had annual incomes of at least $15,000; over 85 percent of the passengers were 25 years of age or older; and about 60 percent of the passengers were college graduates.

Tables XI.1 through XI.5 contain data on trip length, trip purpose, frequency of flying, reason for traveling a commuter airline, and the occupation of the household head for commuter airline passengers. Comparable data for certificated airline passengers are shown in Tables XI.6 through XI.10.

In addition to the dominant values noted above for the commuter air carrier survey results as a whole, the sample was subdivided into medium-sized cities (Dubuque and Clinton) and small cities (Fort Madison, Keokuk, Pocahontas, and Spencer). There was some concern that the characteristics of passengers traveling to the small cities might be substantially different from those traveling to the medium-sized cities. If so, the commuter air carrier survey results would have to be stratified when they were used in conjunction with the certificated air carrier survey results. The differences between 100-149 miles and 150-199 miles in Table XI.1 are due to the geographic proximity of Clinton to Chicago. Otherwise, the

Table XI.1. Commuter airline passenger total trip length

Trip length, miles	Total Responses	Total Percent	Small cities Responses	Small cities Percent	Medium cities Responses	Medium cities Percent
100-149	32	14.7	1	1.1	31	24.8
150-199	62	28.4	38	40.9	24	19.2
200-299	49	22.5	24	25.8	25	20.0
300-399	8	3.7	1	1.1	7	5.6
400-499	7	3.2	5	5.4	2	1.6
500 or more	60	27.5	24	25.8	36	28.8
Total	218	100.0	93	100.0	125	100.0

Table XI.2. Commuter airline passenger trip purpose

Trip purpose	Total Responses	Total Percent	Small cities Responses	Small cities Percent	Medium cities Responses	Medium cities Percent
Business	164	74.2	69	74.2	95	74.2
Personal or family affairs or shopping	15	6.8	4	4.3	11	8.6
Medical	1	0.5	-	-	1	0.8
Social or recreation	39	17.6	19	20.4	20	15.6
Other	2	0.9	1	1.1	1	0.8
Total	221	100.0	93	100.0	128	100.0

Table XI.3. Number of times commuter airline passengers had previously flown on commuter airlines in past year

Previous air trips	Total		Small cities		Medium cities	
	Responses	Percent	Responses	Percent	Responses	Percent
0	119	54.6	47	51.6	72	56.7
1 or 2	27	12.4	11	12.1	16	12.6
3 or 4	21	9.6	9	9.9	12	9.4
5 or 6	19	8.7	8	8.8	11	8.7
7-12	11	5.0	4	4.4	7	5.5
13-24	11	5.0	5	5.5	6	4.7
25-36	7	3.2	5	5.5	2	1.6
Over 36	3	1.4	2	2.2	1	0.8
Total	218	99.9[a]	91	100.0	127	100.0

[a] Does not equal 100 percent due to rounding.

results are essentially the same. In Tables XI.2 and XI.3 the results are essentially the same. In Tables XI.2 and XI.3 the results are nearly identical for small and medium-sized cities. In Table XI.4 the differences in responses between the two sample subgroups are mostly in the degree to which "travel time plus other factors" and "only airline available" were responses. Since both of these responses are related to the degree to which a community is isolated, and since research assistants had to decide into which category to place a written response, these differences are considered trivial. The small city responses tend to be more strongly grouped in professional-technical-managerial occupations

Table XI.4. Commuter airline passenger reasons for traveling by commuter airline

	Total		Small cities		Medium cities	
Reason	Responses	Percent	Responses	Percent	Responses	Percent
Travel time saving	72	34.8	26	30.2	46	38.0
Travel cost saving	1	0.5	1	1.2	-	-
Convenience or scheduling	57	27.5	26	30.2	31	25.6
Comfort	1	0.5	1	1.2	-	-
Owned no car or one not available	1	0.5	-	-	1	0.8
Travel time plus other factors	23	11.1	15	17.4	8	6.6
Only airline available	41	19.8	13	15.1	28	23.1
Other	11	5.3	4	4.7	7	5.8
Total	207	100.0	86	100.0	121	99.9[a]

[a] Does not equal 100 percent due to rounding.

than the medium-sized cities as shown in Table XI.5. However, the bias is not great enough to warrant separate analysis; therefore all subsequent analysis was done with the total sample.

When the certificated air carrier survey results in Tables XI.6 through XI.10 are compared with the commuter survey results in Tables XI.1 through XI.5, a few differences are noted. A substantially higher proportion of the certificated carrier passengers were making trips over

Table XI.5. Commuter airline passenger occupation of household head

	Total		Small Cities		Medium cities	
Occupation	Responses	Percent	Responses	Percent	Responses	Percent
Professional, technical, or managerial	164	81.6	70	87.5	94	77.7
Farm owner or manager	3	1.5	1	1.3	2	1.7
Clerical or sales	12	6.0	6	7.5	6	5.0
Craftworker, equipment operator or laborer	5	2.5	-	-	5	4.1
Unemployed	2	1.0	1	1.3	1	0.8
Retired	4	2.0	1	1.3	3	2.5
Other	11	5.5	1	1.3	10	8.3
Total	201	100.1[a]	80	100.2[a]	121	100.1[a]

[a] Does not equal 100 percent due to rounding.

500 miles in length, and a somewhat higher proportion of the same group than the commuter air carrier passengers were traveling for social/recreational purposes. The two factors should be reinforcing but do not totally explain the differences. Certificated air carrier passengers were a little more experienced in flying (compare Tables XI.3, XI.8), were a bit more interested in travel time savings and less interested in convenience as reasons to fly (compare Tables IX.4, IX.9), and both samples had nearly identical occupational profiles (compare Tables XI.5,

Table XI.6. Certificated airline passenger total trip length

Trip length, miles	Responses	Percent
100-149	1	0.5
150-199	15	6.8
200-299	31	14.2
300-399	34	15.5
400-499	11	5.0
500 or more	127	58.0
Total	219	100.0

Table XI.7. Certificated airline passenger trip purpose

Trip purpose	Responses	Percent
Business	140	61.4
Personal or family affairs or shopping	20	8.8
Medical	0	0
Social or recreation	61	26.8
Other	7	3.1
Total	228	100.1[a]

[a] Does not equal 100 percent due to rounding.

Table XI.8. Number of times certificated airline passengers had previously flown on airlines in past year

Previous air trips	Responses	Percent
0	93	41.3
1 or 2	52	23.1
3 or 4	21	9.3
5 or 6	21	9.3
7-12	13	5.8
13-24	10	4.4
25-36	9	4.0
over 36	6	2.7
Total	225	99.9

[a] Does not equal 100 percent due to rounding.

XI.10). Since Tables X.8, X.9, and X.10, discussed in the previous chapter, indicated little difference between the two samples with respect to age profile, education profile, or income profile, the two samples were considered equivalent for use in demand analyses.

Indicators Selected for Regression Analysis

A stepwise multiple regression analysis was utilized to develop an equation to estimate the average daily passenger enplanements (ADPE) at each of the 17 study communities. The final equation form had to be such that it could be applied to any community in addition to the study cities. After considering the passenger characteristics obtained from both the commuter air carrier on-board survey and the certificated air carrier

Table XI.9. Certificated airline passenger reasons for traveling by certificated airline

Reason	Responses	Percent
Travel time saving	84	38.5
Travel cost saving	1	0.5
Convenience or scheduling	26	11.9
Comfort	1	0.5
Owned no car or one not available	3	1.4
Travel time plus other factors	66	30.3
Only airline available	15	6.9
Other	22	10.1
Total	218	100.1[a]

[a] Does not equal 100 percent due to rounding.

waiting room survey, as well as the readily available sources of secondary data, a decision was made to select only a few variables for initial inclusion in the regression analysis. Five variables were chosen after careful evaluation of previous studies, the on-board passenger survey results, and the existing problem. These variables were (1) POPL = 1970 community population, (2) INCOME = percentage of families in the community with annual incomes of at least $15,000, (3) OCCUP = percentage of persons in the community employed in professional, technical, or managerial occupations, (4) EDUC = percentage of persons in the community over 25 years of age with four or more years of college, and (5) ISOLATE = miles to the nearest hub airport. All five variables seemed reasonable and logical

Table XI.10. Certificated airline passenger occupation of household head

Occupation	Responses	Percent
Professional, technical or managerial	139	73.5
Farm owner or manager	10	5.3
Clerical or sales worker	8	4.2
Craftworker, equipment operator or laborer	10	5.3
Household or service worker	2	1.1
Unemployed	4	2.1
Retired	5	2.6
Other	11	5.8
Total	189	99.9[a]

[a] Does not equal 100 percent due to rounding.

indicators of demand and had been substantiated in previous research. Also, data for the first four variables were readily available from the U.S. census.

Regression Estimator of Demand

Stepwise multiple regression was the technique used in the development of an equation to estimate commuter airline passenger demand for the 17 study communities. This technique provides a means of choosing independent variables to insure the best prediction possible with the fewest independent variables. The method recursively constructs a prediction equation one variable at a time. The first step is to provide the single variable which is the best predictor. The second variable to be added to the regression equation is that which provides the best prediction in conjunction with the first variable. This process is continued until all the independent variables have entered or until no other variable will make a significant contribution to the equation.

Data were obtained from references 36 and 39 for 58 communities having certificated or commuter air carrier service during 1974 in Iowa, Nebraska, Minnesota, Illinois, Missouri, and Kansas. Since the U.S. Census data are for 1970, it was desirable to have commuter air carrier activity for a year reasonably close to 1970. Military stations were not accepted as typical since Iowa has no military installations generating commuter airline travel. Appendix J contains the data analyzed initially. After the first regression test it was decided that the average daily passenger enplanements at Manhattan, Kansas, and Joplin, Missouri, were too large to be consistent with the Iowa communities for which an estimating equation was sought.

The details of the analysis steps are contained in Appendix I. The resulting prediction equation was:

$$\text{ADPE} = 2.81694 + 0.09372 \ (\text{ISOLATE} \times \text{POPL})$$

With a coefficient of determination of 0.401 and a t-value of 6.01 for the regression coefficient, based on a sample of 56 data points. No higher R^2 value was ever achieved with any equation that did not display intercorrelation among the independent variables, or much larger constant terms, or trivial independent variables (such as the cube of population). This equation is considered to be a reasonable estimator of the ultimate commuter airline demand that might be manifest in a mature market, i.e., a community that has had continuous commuter air carrier service for several years. Table XI.11 contains the estimated ultimate demand for commuter air carrier service at the 17 study communities. Note that the equation tends to underestimate the current demand level at locations having frequent and direct connections to a major air hub such as Chicago (for example, Dubuque and Burlington). Mason City is strongly underestimated, and while it does not have direct connections to Chicago there are frequent connections. With the exception of Fort Madison and Keokuk it tends to approximate current utilization of existing services. This does not mean that this is all the air travel demand. It does indicate that with respect to the six-state data base the level of service provided by commuter and certificated air carrier and the passenger utilization thereof is fairly consistent. There has long been an aviation demand hypothesis that passenger utilization was very significantly affected by service levels, especially in frequency of flights. The recent expansion of service at Clinton and Dubuque may provide a local case study to observe such effects. The low predicted ultimate passenger enplanement levels at Decorah, Denison, and Pocahontas will be examined in more detail in Chapter XII.

As a check on the validity of concentrating on the analysis of the previously designated 17 communities, the demand estimating equation was applied to the remaining 32 communities originally examined as potential commuter air service cities in the 1976 Update of the Iowa State Airport System Plan. Table XI.12 contains the estimated demand from these communities in descending order of average daily passenger enplanements. The lowest one-half of the estimated activity levels in Table XI.12

Table XI.11. Estimated demand for commuter air carrier service in a mature market at 17 selected Iowa communities

Community	Average daily passenger enplanements (ADPE)
Ames	15.19
Burlington	23.81[a]
Carroll	9.56
Clinton	15.94[b]
Decorah	7.32
Denison	6.75
Dubuque	62.52[c]
Fort Dodge	28.96[d]
Fort Madison	14.63[e]
Keokuk	16.87[e]
Marshalltown	15.47
Mason City	25.31[a]
Muscatine	9.28
Ottumwa	25.31[d]
Pocahontas	4.69[b]
Spencer	11.25[b]
Storm Lake	8.72

[a] Significantly underestimates current utilization of certificated air carrier service.

[b] Approximates current utilization of commuter air carrier service.

[c] Approximates current utilization of certificated air carrier service but does not account for current commuter air utilization.

[d] Approximates current utilization of certificated air carrier.

[e] Significantly over estimates current utilization of commuter air carrier service.

Table XI.12. Estimated demand for commuter air carrier service in a mature market at 32 selected Iowa communities

Community	ADPE	Community	ADPE
Centerville	14.78	Atlantic	6.10
Estherville	12.56	Knoxville	5.82
Iowa City	11.81	LeMars	5.82
Fairfield	11.25	Iowa Falls	5.63
Algona	9.56	Red Oak	5.63
Oskaloosa	9.00	Shenandoah	5.63
Newton	8.82	Washington	5.63
Webster City	8.82	Pella	5.44
Boone	8.44	Perry	5.44
Mount Pleasant	8.07	Ankeny	5.25
Grinnell	7.88	Chariton	5.16
Creston	7.32	Harlan	5.16
Charles City	7.03	Oelwein	5.07
Cherokee	6.75	Indianola	4.69
Maquoketa	6.19	Independence	4.50
Clarinda	6.10	Waverly	3.47

(beginning with Atlantic) exceed only Pocahontas' activity among the 17 primary candidate communities. These same 16 cities are all within 60 air miles of a hub airport, which distance is too short for an efficient stage length flight into a connecting air service unless such a flight was a short-haul portion of a commuter air carrier route developed primarily to service some other city at a greater distance.

The 16 higher activity estimates in Table XI.12 contain four cities that are too close to a hub airport to be considered feasible commuter air communities except as noted above (Boone, Charles City, Iowa City, and Newton). Nine of the remaining cities are between 60 and 100 air miles from a hub airport, which is an undesirably close proximity for effective competition with the automobile but may be feasible in special circumstances of high expected demand and appropriate ground facilities (Centerville, Cherokee, Clarinda, Creston, Grinnell, Maquoketa, Mount Pleasant, Oskaloosa, and Webster City). Oskaloosa's airport is so close to Ottumwa's airport that as long as certificated service exists at Ottumwa commuter service to Oskaloosa is impractical. Webster City and Fort Dodge are in a similar relationship geographically. Centerville is the only community with an estimated potential demand high enough to warrant any more detailed study. Geographically, Centerville is sufficiently isolated from Des Moines as a hub airport, from Ottumwa as a certificated air carrier with a low level of service, and from Interstate 35 as a major interstate regional access route that as the Rathbun Reservoir recreational area develops it might justify development of a commuter airline connection. Initiation of a commuter airline route to Centerville would require the development of recreational facilities oriented to types of tourism that did not require large amounts of personal gear. Current facilities in the area do not appear sufficient to yield the predicted demand level for at least 5 to 10 years.

Only Algona, Estherville, and Fairfield are more than 100 air miles from a hub airport and simultaneously have sufficient predicted ultimate demand to warrant further consideration. However, Fairfield is near Ottumwa (current certificated air carrier airport), and Estherville is near Spencer (current commuter air carrier airport). This implies that both of these cities would have to be considered a portion of an expansion system, perhaps in conjunction with replacement service at a low service level air carrier station, rather than as independent commuter air stations. Algona is still near enough to the Mason City airport that as long as a reasonable number of flights serve Mason City it is not likely that the predicted demand could be developed. However, a reduction in certificated service at Mason City might permit Algona to become a profitable station on a commuter air carrier route.

Route Demand Analysis by Highway Trip Diversion

Selected Commuter Airline Routes

Fourteen commuter airline routes were selected for analysis by the travel diversion approach. The general basis for the selection included consideration of the distribution of connecting terminal points and the distribution of the 17 study communities. Substantial attention was also given to flight stage lengths that would enhance travel efficiencies with respect to existing air carrier routes and highway travel. The 14 routes listed below are by no means the only routes with potential for third level service in Iowa. However, they are considered to be the primary candidates for network expansion based on predicted ultimate commuter air carrier demand (previous section). This conclusion is based on assumed routes with only one or two stops that terminate at a hub airport and do not compete with any direct connection adequately served by a certificated carrier. The availability of secondary data to support the analysis was also essential. Figure XI.1 illustrates the city pair links that were analyzed and are listed by potential route below:

1. Spencer-Des Moines
2. Spencer-Storm Lake-Des Moines
3. Sioux City-Carroll-Des Moines
4. Council Bluffs (Omaha)-Carroll-Ames-Marshalltown-Muscatine
5. Waterloo-Marshalltown-Des Moines
6. Mason City-Marshalltown-Des Moines
7. Mason City-Ft. Dodge-Des Moines
8. Burlington-Ottumwa-Des Moines
9. Des Moines-Ottumwa-Davenport (Quad Cities)
10. Sioux City-Ft. Dodge-Waterloo
11. Sioux City-Spencer-Mason City-Waterloo
12. Sioux City-Storm Lake-Mason City-Waterloo
13. Burlington-Clinton
14. Spencer-Ft. Dodge-Des Moines

As is evident from Figure XI.1, Pocahontas, Decorah, and Denison were not included in any potential routes. One reason for their omission was that no origin-destination survey data were avilable for these

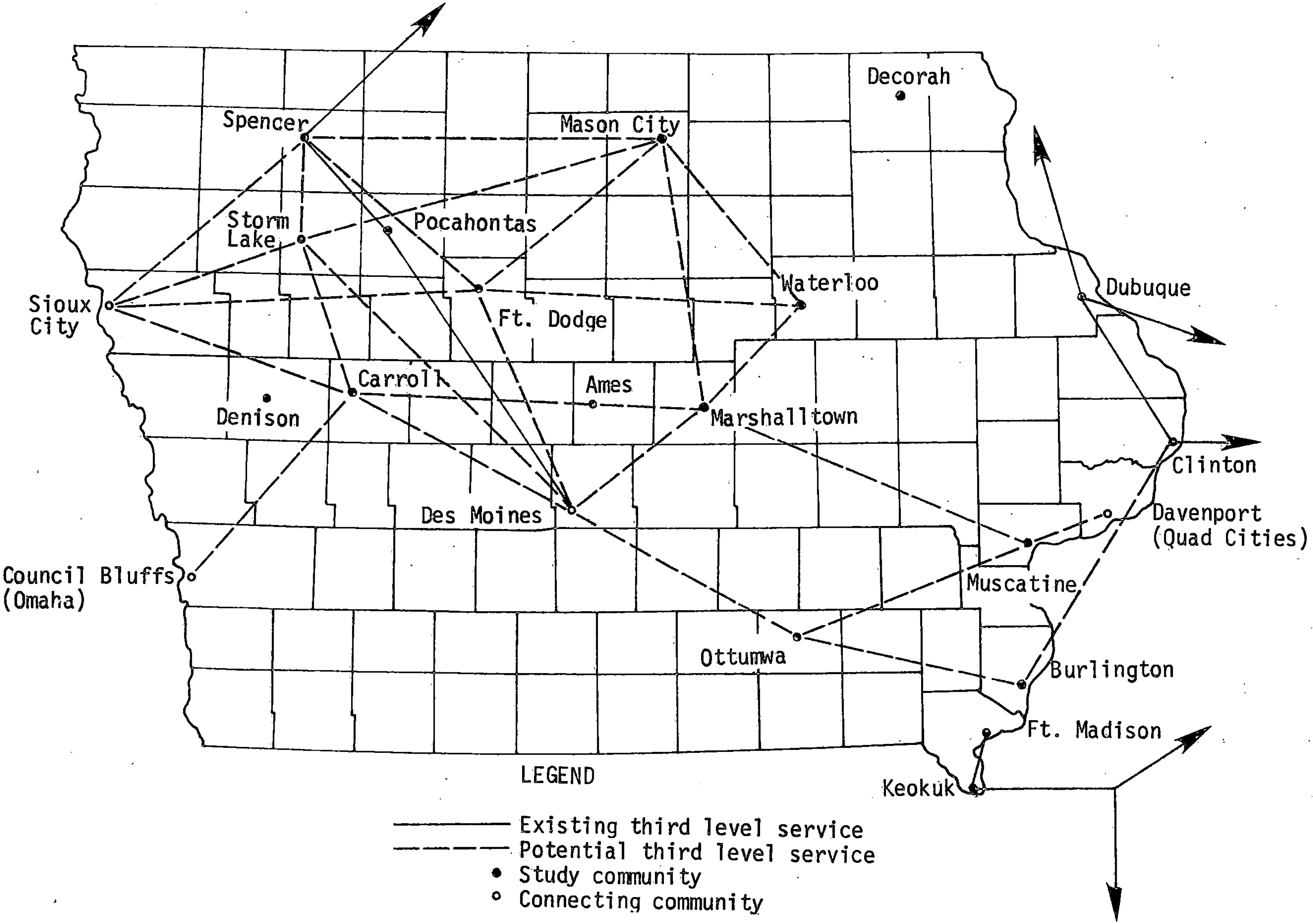


Figure XI.1. Potential commuter air carrier service links communities. Such data were essential in the estimation of route passenger demand. The availability of such data would make possible the determination of additional route demand estimates. For example, Denison might be included in a route between Storm Lake and Omaha, or Decorah might be added to the Des Moines-Marshalltown-Waterloo route.

Diversion Curve Development

The concept of city pair diversion utilized in this analysis phase consisted of estimating the potential diversion of highway trips to commuter airline travel. The diversion potential was based on the intercity highway distance. It was assumed that an individual's choice of mode was dependent on his or her estimate of travel time difference over the intended route. These estimates of travel time differences are a direct function of the highway distance between communities and were taken to be normally distributed. Therefore, the estimated trip diversion plotted linearly on probability paper.

The actual diversion curves used to estimate route demand are shown in Figure XI.2. Justification for these curves was based on existing data, previous study models, and judgment.

Initially, it was decided that two distinct curves would be desirable. The difference was attributed to the size of the communities in each city pair analysis. Cities designated as small had populations less than 50,000, and those denoted as large had populations of at least 50,000. Then, one diversion curve was established for use by city pairs in which both communities were either small or large. A second curve pertained to city pairs in which one community was small and the other large. For the small-large diversion curve, a 50-mile lower limit was

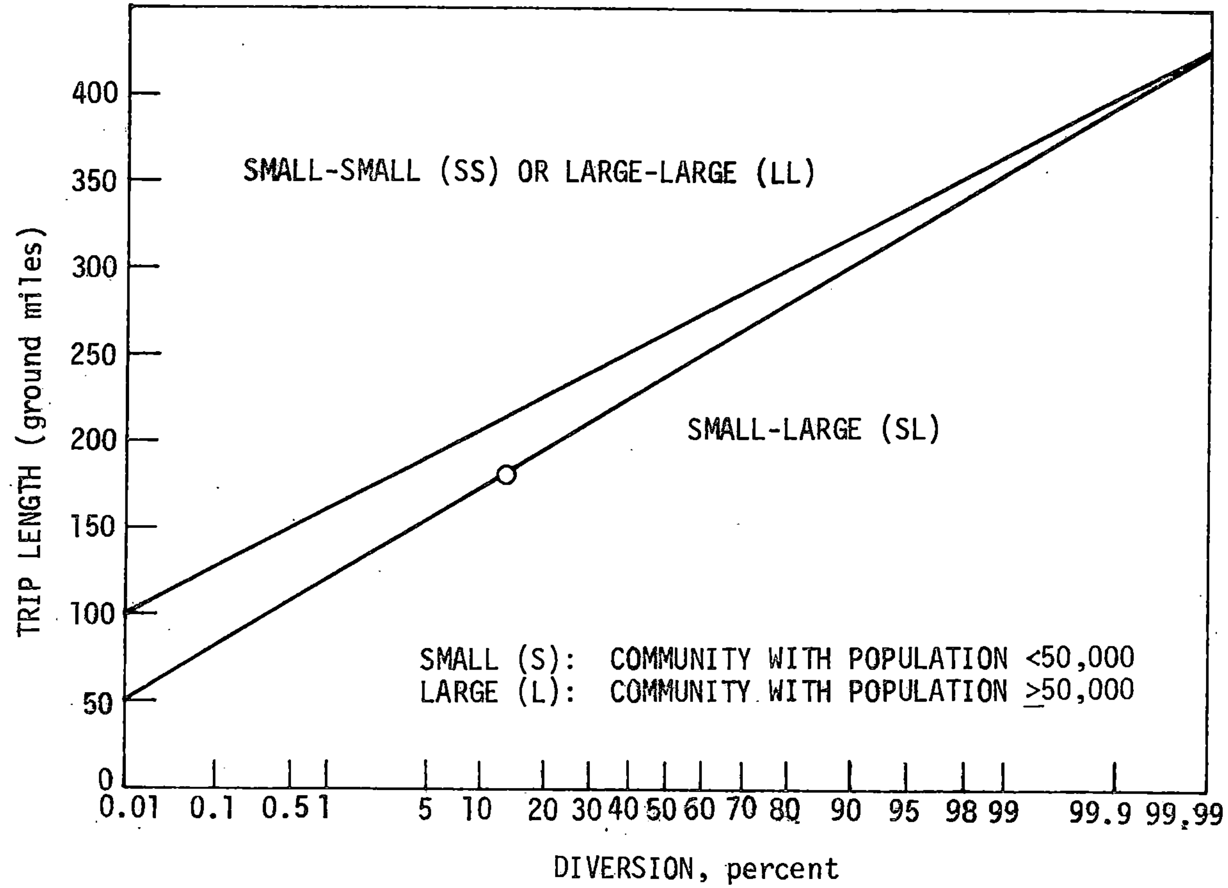


Figure XI.2. Diversion curves used in estimating city pair trip diversion set as the point at which no diversion could be expected. This seemed to represent a reasonable threshold value for city pairs of this type. A second point to this curve was established from existing data for the Spencer to Des Moines route. From the 1975 trip interchanges listed in Appendix K, 154 daily trips were made between Spencer and Des Moines. In addition, 1976 passenger information provided from Mesaba Airlines (40) indicated that the Spencer-Des Moines route was averaging 20 passengers per day. Therefore, for this city pair the diversion of trips to commuter airlines was taken to be 13 percent. The diversion curve for the small-large city pairs was drawn through the two points and resulted in an upper limit of approximately 425 miles. This implied that virtually all highway trips greater than 425 miles would be diverted to commuter air carriers.

The lower limit to the diversion curve for small-small or large-large city pairs was set at 100 miles. This value had been used in previous diversion models (41). The primary reason for the increased threshold value was based on a consideration of certain travel characteristics such as total travel time and convenience between these city pair types. For instance, substantial inconvenience to travelers may result at the destination airport of a small-small city pair. On the other hand, increased travel time delays and difficulties in airport access may cause greater problems between large-large city pairs. The same upper limit to the diversion curve was used as in the first curve for small-large city pairs.

Procedure for Estimating Route Demand

Potential commuter airline passenger demands for the selected routes were estimated through the application of various trip factors to the appropriate city pair trip interchanges for each route. Each potential route was broken down into all possible city pair interchanges. All city pair passenger demands were then estimated unless the city pair failed to meet the lower distance limit for diversion or if the city pair was judged to have satisfactory certificated air carrier service. Those city pairs which did not meet the distance criteria were: Spencer-Storm Lake-Carroll-Ames, Ames-Marshalltown, Mason City-Marshalltown, Mason City-Fort Dodge, Burlington-Ottumwa, and Spencer-Fort Dodge. Trips which were regarded as being adequately served were: Sioux City-Des Moines, Waterloo-Des Moines, Davenport (Quad Cities)-Ottumwa (however, this link was included in the demand analysis since the commuter route would provide direct service as compared with the existing route which includes a stop at Cedar Rapids), and Mason City-Waterloo. In reality, some diversion is likely to occur in the Sioux City-Des Moines, Waterloo-Des Moines, and Mason City-Waterloo markets because of time scheduling or service level deficiencies. The deletion of those links results in more conservative demand predictions.

The city-pairs evaluated as having inadequate existing service and included in the estimation process were Fort Dodge-Des Moines, Davenport (Quad Cities)-Des Moines, Fort Dodge-Waterloo, Sioux City-Waterloo, and Mason City-Sioux City. All other city pairs in a route for which diversion could be estimated were included in the demand analysis.

The process of estimating the daily commuter airline passenger demand for each city pair consisted of several steps. First, the total daily highway trip interchange (see Appendix K) was multiplied by the business trip purpose percentage (see Appendix L). For small-large city pairs, the trip purpose percentage from the small community was used. An average of the trip purpose percentages was used for city pairs in the small-small or large-large categories (42). A trip diversion percentage was then determined from Figure XI.2. Multiplying this factor by the estimated daily business trips yielded the potential daily business trips that might be diverted to commuter airlines. This same approach could have been used for all trip purposes to estimate the total daily diverted trips. However, a simpler method was devised. Business trips were assumed to represent 75 percent of the total commuter airline trips for each city pair. This factor was obtained from the travel results of the on-board commuter airline passenger survey. Total daily route demand was finally determined by addition of all city pair (link) demand estimations. An illustration of the demand estimation for one route is provided below.

Route: Spencer-Fort Dodge-Des Moines

Link: Spencer-Des Moines (small-large)

Total daily highway trip interchange (see Appendix K) = 154

Business trip purpose percentage (see Appendix L) = 19.1

Total daily business trip interchange = (154) (0.191) = 29.4

Diversion percentage (Figure XI.2: 181 miles and small-large diversion curve) = 13 percent

Potential daily commuter airline business trips = (29.4) (0.13) = 3.82

Estimated daily commuter airline trips = 3.82/0.75 = 5.09

Link: Fort Dodge-Des Moines (small-large)

Total daily highway trip interchange (see Appendix K) = 769

Business trip purpose percentage (see Appendix L) = 16.4

Total daily business trip interchange = (769) (0.164) = 126

Diversion percentage (Figure XI.2: 90 miles and small-large diversion curve) = 0.17 percent

Potential daily commuter airline business trips = (126) (0.0017) = 0.21

Estimated daily commuter airline trips = 0.21/0.75 = 0.28

Total daily passenger route demand = 5.09 + 0.28 = 5.37

It is important to note that the Spencer-Fort Dodge city pair (small-small) was not included because the intercity highway distance is only 92 miles. Thus, no diversion could be estimated.

All 15 route demand estimates are listed in Table XI.13. A detailed breakdown of city pair passenger demand estimates is contained in Appendix M. Note that only the Spencer-Des Moines route and the Sioux City-Storm Lake-Carroll-Des Moines routes exhibit any substantial highway to commuter air carrier diversion. These results are based on highway travel origin-destination studies conducted prior to the initiation of the Spencer-Pocahontas-Des Moines route. The data were factored up to form current city trip interchanges rather than resurveying the communities. During the first year of commuter airline passenger operation on the Spencer-Pocahontas-Des Moines route about five passengers per day were enplaned at Spencer and Pocahontas, which is consistent with the estimation process.

Further examination of the results indicates that commuter airline routes through Fort Dodge, Ottumwa, Burlington, and Mason City cannot be expected to achieve significant diversion of trips from the

Table XI.13. Estimated daily trip diversion for selected routes at initiation of service

	Route	Total estimated daily trips
1.	Spencer - Des Moines	5.09
2.	Spencer - Storm Lake - Des Moines	5.89
3.	Sioux City - Carroll - Des Moines	0.18
4.	Council Bluffs (Omaha) - Carroll - Ames - Marshalltown - Muscatine - (Chicago)	3.61
5.	(Decorah) - Waterloo - Marshalltown - Des Moines	0.04
6.	Mason City - Marshalltown - Des Moines	0.92
7.	Mason City - Fort Dodge - Des Moines	1.17
8.	Burlington - Ottumwa - Des Moines	1.45
9.	Des Moines - Ottumwa - Davenport (Quad Cities)	2.08
10.	Sioux City - Fort Dodge - Waterloo	1.30
11.	Sioux City - Spencer - Mason City - Waterloo	2.39
12.	Sioux City - Storm Lake - Mason City - Waterloo	2.16
13.	Burlington - Clinton	0.00
14.	Spencer - Fort Dodge - Des Moines	5.37
15.	Sioux City-Storm-Lake-Carroll-Des Moines	8.46

automobile on intrastate trips. However, if a commuter airline offered higher service levels through more frequent flights than current certificated service provides and/or replaced the certificated service, substantial passenger volumes could be expected to be diverted from the current certificated air carrier market to the commuter air carrier demand. This conclusion makes it imperative that the status of regulation, legislation, and certificated carrier economy be followed closely in these stations. Should the currently authorized service be proposed to CAB for deletion or replacement, the State of Iowa should require that any commuter operator replacing certificated carriers at these stations also provide additional service to communities not now receiving any scheduled service but needing it.

Demand Factors from Household Survey

Each household survey respondent was asked to estimate, by mode and by trip purpose, the number of household trips made during the previous 12 months to each of 20 communities (the 16 Iowa planning region centers plus Chicago, St. Louis, Kansas City, and Minneapolis/St. Paul). Table XI.14 contains a summary of total reported destinations. Note that the automobile is the dominant mode, accounting for about 10 times the number of trips made by all other modes, even to major metropolitan areas outside Iowa. The city order in decreasing attraction of total trip destinations is Des Moines, Cedar Rapids, Chicago, Waterloo/Cedar Falls, Davenport/Quad Cities, Minneapolis/St. Paul, and Council Bluffs/Omaha. This clearly establishes the necessity to include both in-state and out-of-state centers in commuter air carrier route considerations.

Table XI.14. Household survey responses in total trip destinations for one year by city

Destination community	Auto	Bus	Commuter and commercial air	General aviation	Total
Chicago	10,854	333	1,132	263	12,582
Kansas City	7,325	215	634	182	8,356
Minneapolis/ St. Paul	10,076	324	687	201	11,288
St. Louis	6,698	151	718	179	7,746
Burlington	5,201	90	272	166	5,729
Carroll	3,713	32	164	36	3,945
Cedar Rapids	12,201	233	608	193	13,235
Creston	1,374	36	118	34	1,562
Council Bluffs/ Omaha	9,136	236	458	197	10,027
Davenport/ Quad Cities	10,389	260	617	195	11,461
Decorah	2,776	49	232	98	3,155
Des Moines	19,888	484	978	304	21,654
Dubuque	6,033	139	375	100	6,647
Fort Dodge	7,438	189	307	70	8,004
Marshalltown	4,850	84	304	104	5,342
Mason City	5,180	90	276	155	5,701
Ottumwa	3,466	35	199	104	3,804
Sioux City	6,892	143	327	155	7,517
Spencer	5,811	40	220	120	6,191
Waterloo/ Cedar Falls	10,700	263	611	200	11,774
Total	150,001	3,426	9,237	3,056	165,720

The total trip attraction rate by mode was 102.32 trips per year by automobile, 2.34 trips per year by bus, 6.30 trips per year by scheduled air service, and 2.08 trips per year by general aviation on a household basis. This further indicates the dominant role of automobile travel, suggesting that, within the region of analysis, all other modes are supplementary to automobiles until some economic, social, or environmental factor dramatically changes the relative modal costs.

One word of caution is necessary. Some respondents apparently had difficulty distinguishing between "commuter airline scheduled service" and "air taxi or charter service."

Scheduled air trips were indicated to Creston, Decorah, and Carroll where no commuter airline service existed.

The destinations by destination city, trip purpose, and distance to the destination city are contained in Appendix N. Automobile trips were indicated largely for personal business (41 percent) and business related travel (33 percent). Since scheduled air trips were primarily business related (83 percent) and peaked in the 150 to 299 mile trip range, the prime potential for automobile to air diversion would appear to be among trips 150 to 299 miles long for business purposes (38 percent of automobile business trips) if scheduled air service were expanded. It is unlikely that automobile business trips exceeding 300 miles can be diverted in the current economic climate because the person driving that far probably requires the auto in his or her business.

Bus travel was primarily personal business related (35 percent) and social-recreational related (33 percent). The 21 percent of automobile trips for social-recreational purposes may offer the best opportunity for diversion to bus travel. Both modal patterns peak in a similar fashion with respect to distance. Logically, time is not as critical in automobile social-recreational travel. Therefore, higher quality bus service might attract some automobile person-trips.

Demand Factors from Travel Agency Survey

One of the demand parameters estimated from the travel agency data was the service area a new commuter air carrier station on a route might be expected to serve. As can be seen from Table XI.15, the preponderance

Table XI.15. Travel agency service areas

Community	Percent of trips from home city	Average miles traveled to agency city for ticket purchasers from outside agency city
Burlington	59.5	22.0
Carroll	48.6	17.6
Fort Dodge[a]	84.1	27.9
Harlan[b]	96.1	26.0
Marshalltown[c]	87.7	17.2
Muscatine[d]	98.5	25.0
Newell	75.0	15.6
Storm Lake	73.4	20.7

[a] Trips departing at Fort Dodge only.

[b] Trips departing at Omaha only.

[c] Trips departing at Des Moines only.

[d] Trips departing at Moline only and having an Iowa hometown.

of all tickets are sold to residents within the home community. The average trip distance for persons traveling from outside the community to obtain a ticket seldom exceeds 25 miles. Therefore, it seems appropriate to base demand estimates on the characteristics of the community served, recognizing that a commuter air carrier might, over an extended period of service, develop a market area encompassing other communities surrounding the service point.

All of the airline ticket data that could be identified by boarding and terminating airport were tabulated by community, originating airport, and trip distance as shown in Table XI.16. Note that most of the trip length distributions are bimodal. One mode frequently occurs in the range from 200 to 500 miles. The second frequently occurs in the range from 1,200 to 1,500 miles. The second modal point is a sufficiently large proportion of each city sample that, when combined with a few very long trips, the mean ticket trip distance is usually over 1,000 miles.

The very significant point of this analysis is that the majority of this travel is to points beyond the boundaries of Iowa and adjacent states. Therefore, for any of this demand to be diverted to commuter airlines will require commuter airline schedules to facilitate such activities as passenger interlining with trunk carriers. Baggage exchange between the commuter and the trunk carrier must be simple and efficient. Rates and schedules of the commuter air carriers must be published in a manner that is accessible to all travel agents (e.g., the Official Airline Guide). Otherwise, most of these trips are of such length that these passengers will drive a considerable distance in

Table XI.16. Distribution of travel agency tickets by trip distance

	Percent of July 1976 tickets sold																									
Ticket trip distance	AMES departing Des Moines	BURLINGTON	CLINTON departing Clinton	CLINTON departing Moline	CARROLL departing Des Moines	CARROLL departing Omaha	CLEAR LAKE departing Des Moines	CLEAR LAKE departing Mason City	CLEAR LAKE departing Minneapolis	DECORAH departing Rochester	DUBUQUE	FORT DODGE departing Fort Dodge	FORT DODGE departing Des Moines	HARLAN departing Omaha	MARSHALLTOWN departing Des Moines	MASON CITY departing Mason City	MASON CITY departing Des Moines	MUSCATINE departing Moline	NEWELL departing Des Moines	NEWELL departing Sioux City	OTTUMWA departing Des Moines	OTTUMWA departing Ottumwa	SPENCER departing Des Moines	SPENCER departing Spencer	STORM LAKE departing Omaha	STORM LAKE departing Sioux City
0-199	4	8	17	1	1	2	1	3	0	0	27	3	< 1	0	< 1	0	0	11	0	0	2	3	33	100	1	0
200-399	20	6	15	13	14	1	25	21	5	10	25	25	11	11	16	15	9	20	0	33	10	20	19	0	11	13
400-599	11	5	6	8	13	14	8	27	7	10	5	19	5	35	8	5	35	18	0	0	4	5	19	0	12	19
600-799	12	12	30	15	14	2	22	4	8	5	11	11	6	7	16	10	13	24	0	0	5	3	14	0	4	13
800-999	17	37	14	10	44	10	15	18	7	5	17	6	14	4	19	0	0	8	100	0	17	23	5	0	12	13
1,000-1,199	13	6	9	5	8	22	8	5	13	35	6	14	26	0	12	5	4	4	0	0	6	3	0	0	12	12
1,200-1,399	9	2	1	9	2	42	14	12	37	10	2	5	4	17	5	45	35	4	0	66	6	0	0	0	43	24
1,400-1,599	11	3	0	16	5	6	5	4	7	25	4	15	25	7	19	0	0	10	0	0	46	38	10	0	4	2
1,600-1,799	< 1	8	4	17	0	0	0	0	1	0	3	0	1	18	0	0	0	0	0	0	0	0	0	0	0	0
1,800-1,999	< 1	< 1	0	< 1	0	0	0	0	10	0	0	0	< 1	0	< 1	0	0	0	0	0	0	0	0	0	0	0
2,000-2,199	< 1	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,200-2,399	< 1	1	0	2	0	0	0	0	0	0	0	0	0	0	< 1	0	0	0	0	0	0	0	0	0	0	0
2,400-2,599	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,600-2,799	< 1	2	0	0	0	0	0	0	0	0	0	0	0	0	< 1	0	0	0	0	0	0	0	0	0	0	0
2,800-2,999	0	1	0	0	0	0	0	0	0	0	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,000-3,199	< 1	1	0	< 1	0	0	0	0	4	0	0	< 1	0	0	< 1	0	0	0	0	0	0	0	0	0	0	0
3,200-3,399	0	0	0	0	0	0	0	0	0	0	0	0	0	0	< 1	0	0	0	0	0	0	0	0	0	0	0
3,400-3,599	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,600-3,799	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3,800-3,999	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
4,000-4,199	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	< 1	0	0	0	0	0	0	0	0
4,200-4,399	< 1	1	0	1	0	0	0	4	0	0	0	0	< 1	0	< 1	10	0	< 1	0	0	0	0	0	0	0	4
4,400-4,599	< 1	1	1	0	0	0	0	< 1	0	0	< 1	< 1	2	0	2	10	0	< 1	0	0	6	0	0	0	0	0
4,600-4,799	< 1	0	2	1	0	0	1	2	0	0	0	0	2	0	< 1	0	4	0	0	0	0	0	0	0	1	0
4,800-4,999	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	< 1	0	0	0	5	0	0	0	0
5,000-5,199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5,200-5,399	< 1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5,400-5,599	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5,600-5,799	0	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5,800-5,999	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6,000 or more	< 1	0	0	0	0	0	0	0	0	0	0	< 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

order to begin the trip on the airline carrying them for almost all the trip (for example, passengers ticketed in Mason City, Fort Dodge, and Ottumwa departing out of Des Moines). The management of individual commuter airlines and their relations with trunk carriers will be major factors in any diversion of this air carrier demand.

XII. ECONOMIC IMPLICATIONS OF DEMAND ESTIMATES

Carrier and Route System Implications

In a 1972 study the Civil Aeronautics Board (CAB) estimated that any point enplaning 17 or 18 passengers per day would probably be able to support viable and unsubsidized commuter airline service. However, to be conservative in their estimates, they established a threshold of 25 passengers per day as an enplanement level for a viable commuter market (43). In this same study the CAB staff estimated that any point enplaning 40 passengers per day would probably be able to support viable and unsubsidized local service airline service using twin-engine aircraft seating 45 to 55 passengers. Much of the local service to Dubuque, Burlington, Fort Dodge, Mason City, and Ottumwa uses this type of aircraft. One economic factor impacting the estimates of demand is the possibility of the local service airline converting to an all-jet fleet. Since two of the five stations listed do not now enplane 40 passengers per day, an all-jet fleet would place even more economic pressure on the airline to abandon service to these cities.

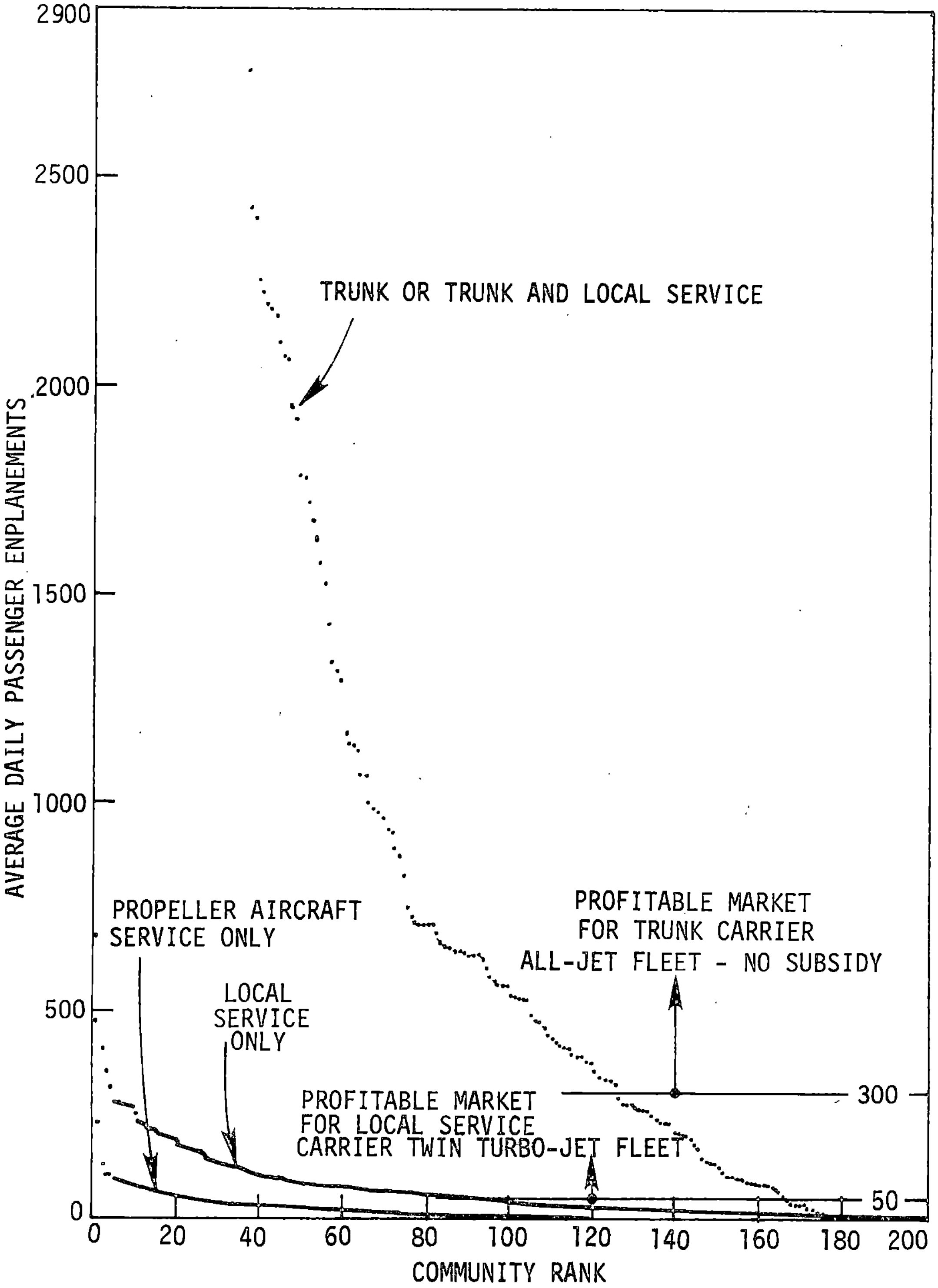
Using this CAB study as a starting point, the U.S. Department of Transportation, Office of Transportation Regulatory Policy, conducted a study of the rate at which commuter air carriers initiated and dropped service to cities along their routes (36). The short-term continuity of service covering fiscal years 1973 and 1974 was examined, and a long-term continuity of service analysis covering the period fiscal year 1973 through fiscal year 1976 was subsequently conducted. The results of this analysis showed that no city enplaning more than six passengers per day lost service because of insufficient traffic demand. Using the same conservative philosophy as CAB, this study concluded that:

1. Any point enplaning fewer than six passengers per day cannot retain commuter airline service without subsidy.
2. Points enplaning 6 to 10 passengers per day have a 50 percent chance of retaining commuter air carrier service without subsidy.
3. Points enplaning 10 to 16 passengers per day have a 75 percent chance of retaining commuter air carrier service without subsidy.
4. Points enplanning 17 or more passengers per day are certain of retaining commuter air carrier service without subsidy.

Analysis of the passenger enplanement levels, category of carrier (trunk or local service), and equipment utilized at various stations receiving certificated service in 1974 provides the following estimates of passenger demand levels associated with various types of service and economic expectations:

- Level at which a trunk carrier with all-jet fleet can be expected to stay in the market.
- Level at which a local service carrier can be expected to retain service using twin turbo-jet equipment.
- Level below which only piston aircraft can be expected to provide service.

These are shown graphically in Figure XII.1. Examination of the figure shows that several breaks occur in the rank order curve of enplanements at stations receiving service from trunk or trunk and local service carriers. The break at 300 passenger enplanements per day coincides with the break in enplanement levels marking the beginning of a concentrated occurrence of stations served only by local service air carriers.



Note: Thirty-six largest airports served by trunk carriers are not shown.

Source: References 36 and 44.

Figure XII.1. Average daily passenger enplanements rank ordered by carrier classification and equipment type, 1974

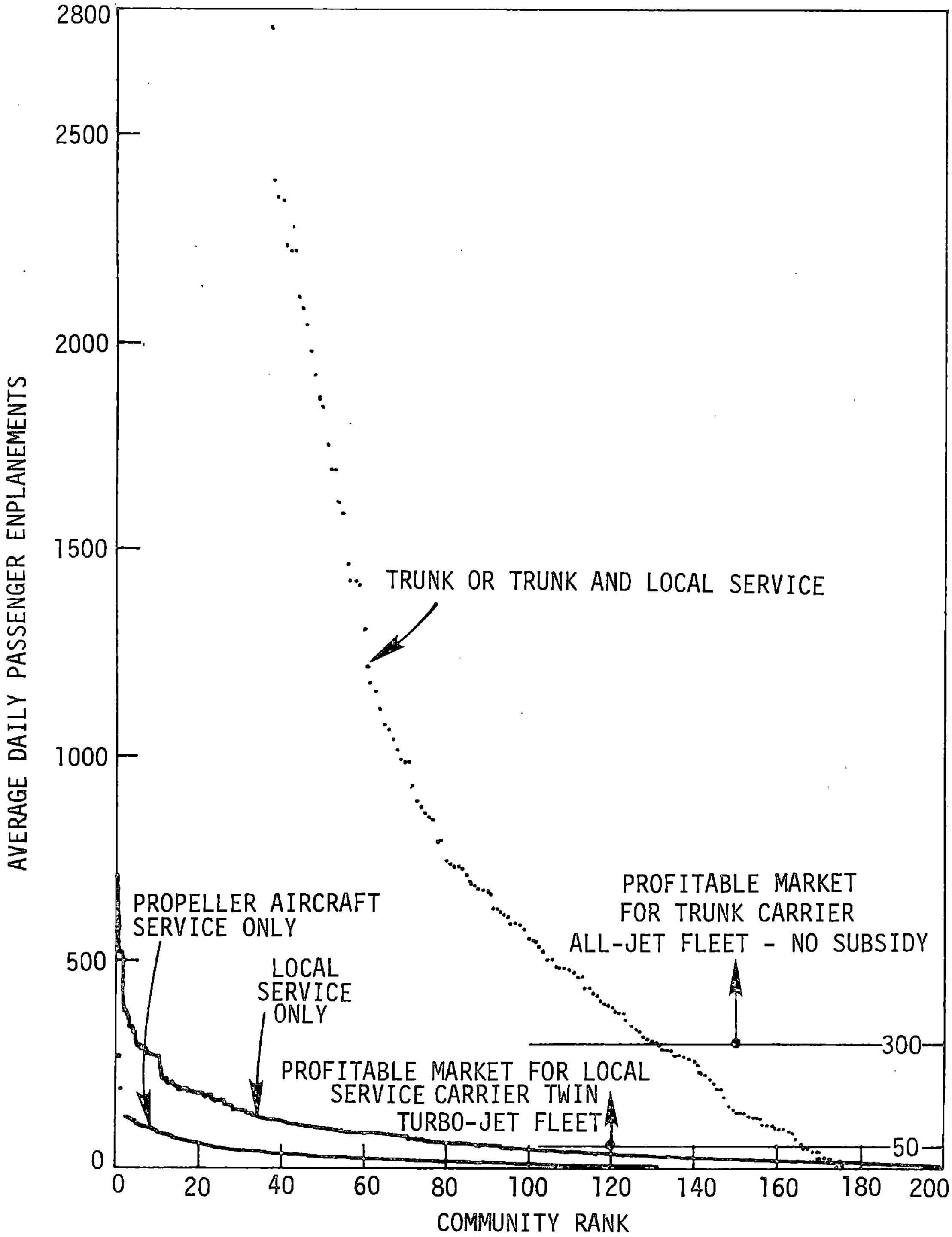
Since it also is the dividing line between stations receiving service from a single trunk carrier as the only service (functioning like a local service carrier) and those stations receiving service from two or more carriers, 300 passengers per day was taken to be a lower bound for a profitable trunk carrier market.

In the same fashion, by comparing the point at which the rank ordering of enplanement levels at stations receiving only propeller service flattens out with the rank ordering of enplanements at stations receiving service from only local service air carriers, a level of 50 passengers enplaned per day appears to be a likely point at which local service air carriers would have to drop service using an all-jet fleet.

Figure XII.2 is a 1976 enplanement data update of Figure XII.1. Note that no significant changes have occurred in the curves. It is anticipated that the levels selected would gradually drift upward unless fares charged increased to match inflation of costs.

These data and analyses have been combined to yield the projected service viability scale shown in Table XII.1. The implication of accepting such an analysis is that, in the long term, as local service air carriers move to an all-jet fleet, Fort Dodge and Ottumwa have to be considered as appropriately served by extensive commuter air carrier routes rather than jet equipped local service carriers. Burlington, Dubuque, and Mason City are expected to retain local service carrier operations, although all three would be at the lower end of the viable market demand scale with an all-jet fleet.

The ultimate community demand estimates generated in Chapter XI indicate, when compared with Table XII.1, that if commuter air carrier



Note: Thirty-six largest airports served by trunk carriers are not shown.

Source: Reference 45.

Figure XII.2. Average daily passenger enplanements rank ordered by carrier classification and equipment type, 1976

Table XII.1. Projected carrier service viability

Average daily passenger enplanements	Carrier service viability
300 +	Subsidy free trunk carrier all-jet service certain.
50-299	Local service carrier all-jet service with limited subsidy necessary on unprofitable route segments.
25-49	Local service carrier propeller service with subsidy necessary on unprofitable route segments. Commuter carrier service without subsidy assured, possibly with competing commuter carriers.
17-24	Commuter carrier service without subsidy assured.
10-16	Commuter carrier service without subsidy is dependent upon management matching equipment and operation to demand. Retention of service without subsidy assured except on routes carrying excess seat capacity.
6-9	Commuter carrier service can be retained without subsidy about 50 percent of the time.
1-5	Air taxi (charter) is the appropriate service.

service were undertaken to serve Carroll, Decorah, Denison, Muscatine, Pocahontas, or Storm Lake, it is 50 percent probable that subsidy would be required in the long run to retain service unless some type of cross-subsidy exists. None of these stations can generate sufficient demand to justify the initiation of service by themselves. However, if another station (such as Fort Dodge or Ottumwa, with a commuter replacing a certificated local service carrier) has sufficient demand to justify service initiation, a route which passes near these communities could pick up additional revenue at a profit.

Ames, Clinton, Fort Madison, Marshalltown, and Spencer are communities with predicted ultimate demand levels such that careful commuter air carrier management and suitable route structures are required to assure successful (no subsidy) operations. The success of Mississippi Valley Airlines in Clinton and Brower Airways in Fort Madison affords positive examples. The Air Nebraska activity in the past in Ames is an example where success was not achieved.

Carrier and Route Segment Implications

The Spencer and Pocahontas routes to Des Moines and Minneapolis will be utilized as an illustration of the economic implications of these analyses for a specific route. The ultimate demand for this route is calculated to be 16 passenger enplanements per day. This expands to about 960 passengers per month. Traffic had grown to 795 passengers per month on this route structure by January 1, 1977 (18,46), 83 percent of the predicted ultimate market demand. It is recognized that the demand prediction equation is not precise. However, it is unlikely that it substantially underestimates the demand in small cities as evidenced by the calibration data fit discussed in Chapter XI.

The service is currently being provided by a Beech 99 aircraft as the basic equipment configuration with two round trips per day Monday through Friday and one round trip each on Saturday and Sunday on the Spencer-Pocahontas-Des Moines route and one daily round trip on the Pocahontas-Spencer-Minneapolis route (18). An alternate backup aircraft is available for service continuity during maintenance periods. This operation produced a subsidized monthly deficit ranging from $1,395 to $15,317 in the period May 16, 1976, through November 30, 1976, with the highest amount in November (18,46).

The Beech 99 basic service currently in operation accrues a monthly fixed cost of $17,475 and a monthly variable cost of $21,000 (140 hours at $150 per hour), including services from Spencer to both Des Moines and Minneapolis. However, the contract agreement covering this service provides for assured revenues of $36,500 per month to the carrier. Since this service provides 2,340 trip seats per month, 1,106 passengers are required to avoid payment of subsidy, a load factor of 47.3 percent (46). This is 115 percent of the predicted ultimate demand for the communities served. Such a demand level is well within the estimating error of the predicting equation and, therefore, may be possible to achieve.

From a state system view of transportation there are important economic implications resulting from this demand comparison. The travel inventory data indicated that Des Moines was a significant concentration of destinations from all other communities in the state. Des Moines is also the seat of government for Iowa. Certificated air carrier service in Des Moines currently is provided by Ozark, United, American, and Braniff, affording direct connections to major cities in the multi-state region surrounding Iowa. Iowa's economic interest in any commuter operation has to be vested first in service within the state. Therefore, examining alternatives for the service to Spencer and Pocahontas by a route Spencer-Pocahontas-Des Moines and using the cost figures provided by the current carrier (46), the following analysis is presented.

A Cessna 402 aircraft requires one pilot and will yield nine passenger seats. Reference 46 indicates a monthly fixed cost of $14,675 and, for 90 hours of operation (current Spencer-Pocahontas-Des Moines schedule but not including service to Minneapolis), a variable cost of $107 per hour is quoted. Assume further that the level of flight service using a Cessna 402 was increased by 50 percent by providing three round trips Monday through Friday (early morning, midday, and late evening), two round trips on Saturday (1 a.m., 1 p.m.), and one on Sunday. The variable cost increases from $9,630 to $14,445 per month, yielding a total monthly cost of $29,120 for 135 hours of operation including a profit.

The earlier discussion of commuter air carriers in Chapter III made note of per-mile fare rates. It would seem that a per-mile fare of $0.20 (net) on this route would not be unreasonable if frequent and convenient service was provided. This would result in a one-way basic or net fare of $36.20. Such a fare would require an average minimum of 305 passengers per month to break even.

The expanded schedule would provide an average of 156 flights per month. At nine seats per flight, this yields 1,404 passenger seats per month. The suggested fare level thus would require an average load factor of 57.3 to break even on the expanded schedule. This compares with 93 percent (note that this figure from Reference 46 is apparently based on a capacity of eight seats) for a Cessna 402 at the current fare or 63 percent for a Beech 99 at the current fare, considering only the original Spencer-Pocahontas-Des Moines flight schedule (46).

The 805 minimum passengers for break even is only two percent above the December 1976 traffic level on the total route pattern connecting Spencer and Pocahontas with both Des Moines and Minneapolis. During the four full months of service to Des Moines only before the run to Minneapolis was added, passenger levels were 653, 774, 782, and 700 for an average of 727. The 805 minimum passengers is 11 percent above this average. If the traffic level never increased above 727 passengers per month at a net fare of $36.20, the subsidy required would be $2,803 per month.

One objection to using the smaller aircraft could be that at times more than nine passengers may desire to board a flight. Assuming that the demand were to exceed the nine-passenger seat capacity each morning on the Spencer to Pocahontas to Des Moines run and on the evening return run Monday through Friday, the average load factor on the remaining flights required to break even may be determined. An average of 43 flights per month would be filled, yielding 387 passengers per month during times when demand might exceed capacity. The additional 418 passengers for break-even operations spread across the remaining 113 flights yield a required load factor of 41 percent. This does not seem unreasonable given that the midday round trip would add considerable flexibility to a traveler's schedule.

The foregoing analysis is not intended to be a critical review of one route system operation. It is intended to illustrate that there usually are a number of options in a typical operating decision concerned with equipment selection and route configuration. Some options tend to be more responsive to statewide interests, whereas others may be more responsive to the interests of a local community or a carrier. Consideration of participation by the state in support of a particular route or operation must recognize the following factors that are of primary concern to the state:

- Access and mobility for all its citizens.
- Development of a total transportation system.
- Allocation of limited resources.
- Emphasis first on intrastate service and second on interstate service.

As such, the state's economic interest in assuring continuity of service during a demonstration period (one year, perhaps two years maximum) must recognize a probable initial service demand level, a probable ultimate demand, maximum frequency of service at minimum subsidy cost, and long-term viability directed toward no subsidy. Thus, the economic implications of the state's interest may suggest an operation that is radically different from what either the local community or the commuter operator envisions. The state as a whole should not be expected to share in any activity by either the local community or the operator that exceeds the state's interest in affording transportation alternatives for its citizens.

A more general analysis was made of other routes since specific operating data for these routes were not available. Although some of the links have been served within the route structure considered previously by commuter airlines, records of these operations are no longer available.

Typical aircraft operating costs were obtained from Reference 31 for aircraft types with passenger capacities of five, nine, and 15 persons that were commonly used by commuter air carriers. These were further verified by consulting currently active commuter operators as well as fixed base operators and others providing air taxi service.

Initial demand levels used for this analysis are contained in Table XI.13. To obtain a range of probable daily revenues on each route, two assumptions were used:

1. All travel occurred on the shortest link included in a given route at a fare of $0.20 per mile.
2. All travel utilized the entire route between termini (except for Council Bluffs to Chicago, which duplicates direct air carrier service) at a fare of $0.25 per mile.

The average daily revenue was calculated using a weighted average trip length and a fare of $0.225 per mile.

Estimated operating costs were calculated for each route for each of the three types of aircraft based on hourly costs and cruise speeds reported in Reference 31. Calculations were made for each of two operating conditions, a minimum level of service of one round trip per day and a desirable level of service of three round trips per day.

The resulting estimates of operating costs and revenues are displayed in Table XII.2. A comparison of the most optimistic forecast of initial revenues with the cost of providing even a minimum level of service with 15-passenger aircraft indicates that use of this aircraft type would be

Table XII.2. Revenue and cost comparison for selected routes.

Route considered	Total estimated two-way daily passengers	Initial revenue estimate range[a] (per day)	Initial revenue estimate average[b] (per day)	Average daily cost levels for two levels of flight service with varying size of aircraft.[c]					
				1 round trip per day			3 round trips per day		
				5 passengers	9 passengers	15 passengers	5 passengers	9 passengers	15 passengers
Sioux City-Carroll-Des Moines	0.18	$3.28-$4.64	$3.96	$93.34	$101.35	$222.65	$280.02	$304.05	$667.95
Council Bluffs-Carroll-Ames-Marshalltown-Muscatine-(Chicago)	3.61	$67.15-$351.07	$186.92	$247.82	$269.13	$591.26	$743.45	$807.38	$1,773.78
(Decorah)-Waterloo-Marshalltown-Des Moines	0.04	$0.40-$1.00	$0.64	$89.02	$96.68	$212.30	$267.07	$290.03	$636.90
Mason City-Marshalltown-Des Moines	0.92	$9.20-$27.37	$20.47	$71.19	$77.31	$169.87	$213.58	$231.92	$509.60
Mason City-Fort Dodge-Des Moines	1.17	$21.06-$30.92	$24.04	$89.48	$97.19	$213.46	$268.45	$291.57	$640.40
Burlington-Ottumwa-Des Moines	1.45	$21.46-$57.64	$34.36	$75.51	$82.04	$180.22	$226.54	$246.11	$540.66
Des Moines-Ottumwa-Davenport	2.08	$34.53-$84.76	$58.34	$101.52	$110.24	$242.19	$304.58	$330.71	$726.57
Sioux City-Fort Dodge-Waterloo	1.30	$28.08-$74.10	$44.56	$110.17	$119.64	$262.90	$330.50	$358.91	$788.68
Sioux City-Spencer-Mason City-Waterloo	2.39	$37.76-$136.23	$79.50	$133.74	$145.27	$319.03	$401.23	$435.82	$957.10
Sioux City-Storm Lake-Mason City-Waterloo	2.16	$34.13-$123.12	$70.63	$139.07	$151.03	$331.72	$417.22	$453.08	$995.15
Burlington-Clinton	0.00	0	0	$56.76	$61.64	$135.46	$170.28	$184.92	$406.37
Sioux City-Storm Lake-Carroll-Des Moines	8.46	$130.28-$397.62	$232.61	$111.64	$121.23	$266.25	$334.91	$363.70	$798.75

[a] Low end of range assumes that all passengers are on shortest link at a fare of $0.20 per mile. High end of range assumes that all passengers are on entire length of route at a fare of $0.25 per mile.

[b] Based on a weighted average trip length at $0.225 per mile revenue.

[c] Based on average cruise speeds and average operating costs per hour for total operating costs. Exercise caution in applying these values to any specific operation.

unprofitable on all routes except the Sioux City-Storm Lake-Carroll-Des Moines route. However, it is unlikely that one flight per day would be attractive enough to generate patronage at the predicted level. Therefore, 15-passenger aircraft must be considered as unsuitable for operation without subsidy on the routes analyzed. In fact, none of the routes analyzed, except the one mentioned above, exhibit any short-run potential for profitable operation using any aircraft type.

The average initial estimated revenues may be considered as most appropriate for comparisons of benefits and revenues. Of the routes studied, only the Sioux City-Storm Lake-Carroll-Des Moines route apparently exhibits any long-range potential for profitability at an acceptable level of service. Growth in patronage on this route to a level 50 percent higher than the estimated initial demand would result in projected revenues approximately equal to operating expenses. This is the case using either five-passenger or nine-passenger aircraft. However, examination of the origin-destination pattern of airline ticket sales by travel agencies in and near Carroll and Storm Lake indicated a predominant movement to points west and southwest of Iowa. Thus, it may be anticipated that passenger demand would tend to be directed toward Sioux City for this travel and that the capacity of a five-passenger aircraft would frequently be inadequate. The nine-passenger aircraft is therefore considered to be the only feasible alternative at this service level. It should be reiterated that any service initiated along any route similar to those studied with a flight frequency sufficient to be attractive to potential patrons would not be expected to operate profitably for at least the first year of operation.

This analysis strongly suggests that few if any routes in Iowa currently exhibit the potential for profitable commuter service. The data also suggest that profitable and effective operation of 15-passenger aircraft in commuter service in Iowa could be expected only as a replacement for certificated service at smaller cities now served by certificated carriers. For example, if no certificated service existed at Fort Dodge and Ottumwa, a network of commuter routes probably could be developed that could be profitable and would provide expanded air transportation access to residents of small cities in Iowa.

PART 4

CONCLUSIONS AND RECOMMENDATIONS

XIII. ATTITUDE IMPLICATIONS FOR PUBLIC POLICY

Survey Findings

One of the concerns of this study was the degree to which commuter air carrier passengers would change modes to an express bus and the degree to which the two modes are interchangeable. Table XIII.1 contains data from the answers to three questions posed to the commuter and certificated air carrier passengers that further indicate that the two modes serve different purposes and needs. It has already been established that current use of the two modes is by different population groups for different trip purposes. Attitudinally, air passengers are not interested in using an express bus system, and time is the primary reason. They do not perceive any ground transportation as satisfying their trip needs (except an automobile under certain circumstances). Furthermore, while they are willing to pay a sizable amount for air fare, they would only pay about the level of current non-express intercity bus fares for an express bus trip.

Each survey respondent was asked to evaluate his or her preference or favorability toward using public transportation funds to support express bus systems or commuter air service. Table XIII.2 contains the summary responses. The reaction to the concept of using state funds by all three samples is generally neutral with a tendency toward opposition. When the question shifts to using local taxes for supporting express bus routes, all samples are definitely opposed, with 48 percent of the household survey being "strongly opposed." The use of state taxes for commuter air service is favorable to passengers riding

Table XIII.1. Commuter and certificated air carrier passenger perception of express bus as an alternative

Item	Percent responding Commuter air carrier	 Certificated air carrier
1. Would you have considered express bus for this trip if such service were available?		
Yes	21.1	19.6
No	78.9	80.4
2. If you would not have considered express bus for this trip, why?		
Travel time (only)	83.3	74.7
Travel time plus other reasons	5.3	12.6
Travel cost	0	0
Convenience or scheduling	2.9	3.4
Comfort	1.1	0
Rather drive a car	2.9	2.8
Rather fly	3.5	1.1
Other	2.3	5.1
3. If you would have considered riding an express bus, how much would you have paid?		
Won't ride	7.8	7.5
0-$4	0	7.5
$5-9	15.7	10.0
$10-19	50.0	50.0
$20-39	31.5	7.5
$40-59	0	7.5
$60-100	0	0
Other	2.6	0

Table XIII.2. Survey respondents' opinions about the use of public transportation funds for commuter airlines and express bus routes

Public fund use opinion expression	Percent responding Commuter air carrier	 Certificated air carrier	 Household respondent
1. Using STATE taxes for EXPRESS bus routes			
Strongly opposed	28.6	20.5	28.3
Somewhat opposed	16.7	19.5	20.1
Don't care	23.8	24.7	11.7
Somewhat favorable	22.4	24.7	29.7
Strongly in favor	8.6	10.7	10.2
2. Using LOCAL taxes for EXPRESS bus routes			
Strongly opposed	36.1	28.2	48.0
Somewhat opposed	25.1	27.2	25.4
Don't care	22.0	24.6	10.5
Somewhat favorable	9.9	14.4	12.9
Strongly in favor	6.8	5.6	3.3
3. Using STATE taxes for COMMUTER AIR service			
Strongly opposed	17.1	25.0	36.3
Somewhat opposed	14.8	18.9	21.5
Don't care	15.7	19.8	12.2
Somewhat favorable	34.3	26.4	22.4
Strongly in favor	18.1	9.9	7.6
4. Using LOCAL taxes for COMMUTER AIR service			
Strongly opposed	23.8	31.8	52.0
Somewhat opposed	21.7	22.1	23.5
Don't care	15.3	19.0	11.0
Somewhat favorable	23.8	20.0	11.4
Strongly in favor	15.3	7.2	2.0

commuter airlines, neutral to slightly opposed by passengers on certificated airlines, and opposed by household respondents. The further removed a person is from the service, the lower the interest. Attitudes toward using local taxes to support commuter airlines has the same pattern but more opposition across the board. "Strong" opposition was expressed by 52 percent of the household respondents. The subsidization of either of the modes is not a popular cause among local taxpayers.

If such services as express bus and commuter air were expanded as a matter of policy, where do people desire to travel on such modes? Table XIII.3 contains the result of asking the household survey respondents to identify a first, second, and third choice of cities they would travel to on each of the two modes if express bus and commuter air were available in their home community. Des Moines is very strongly the intrastate focal point. Note that in air travel the major metropolitan areas in adjacent states are considered very desirable, while in bus travel Cedar Rapids and Waterloo intervene as desired destinations. This indicates that public perceptions of the degree to which funds or efforts expended in these areas are well spent will in part depend on the degree to which access to these communities is increased.

System Implications

No strong public support exists to subsidize either express bus service or commuter air service. Hence, all possible public effort should be made to facilitate success by private, unsubsidized carriers. Critical review should be taken of the long-term impact of some of the

Table XIII.3. Household survey respondents' preferences for cities to which express bus service or commuter air service would be used one or more times per year

	Percent selecting the city	
Five most frequently selected cities	Bus travel	Air travel
<u>First choice city</u>		
Chicago	13.4	14.8
Des Moines	18.4	12.8
Minneapolis/St. Paul	14.8	18.4
Omaha/Council Bluffs	4.8	4.4
St. Louis	3.4	4.3
<u>Second choice city</u>		
Chicago	11.2	14.6
Des Moines	17.0	13.8
Minneapolis/St. Paul	8.5	8.8
St. Louis	5.4	9.4
Cedar Rapids (bus); Omaha/Council Bluffs (air)	4.3	4.8
<u>Third choice city</u>		
Chicago	7.2	8.5
Des Moines	11.9	11.5
Minneapolis/St. Paul	8.4	8.9
St. Louis	5.4	7.9
Waterloo (bus); Kansas City (air)	5.2	7.6

currently publicly operated bus systems which may be negatively impacting viable private services. If the long-term effect of current programs is to reduce the vitality of the private sector, the current short-term success may be viewed as a failure in public systems. Eventually public policy attitude is reflected in fund allocation in a representative society.

Public opinion is that commuter air carrier operators should not be directly subsidized. Perhaps, taxes could be dropped and other preferential treatments given to encourage private initiative in this area.

Desired destinations for both express bus and commuter air indicate that a few cities in Iowa are focal points with the major concentrations of desire being Des Moines and out of state metropolitan areas. This implies that routes in either mode not reflecting such desires have little chance of attracting trips from the automobile under the current travel cost competition among modes.

XIV. RECOMMENDED PROGRAM FOR INTERCITY BUS TRANSPORT

Introduction

It has been pointed out previously that the intercity bus passenger market includes a number of persons without ready access to an automobile. However, since most Iowans are generally able to travel by automobile, the potential intercity bus market is relatively small. Without changes in current social, political, and economic conditions, intercity buses will not compete effectively with private automobiles in terms of travel time, comfort, convenience, or cost. A most significant change to enhance the relative attractiveness of travel by intercity bus would be one adversely affecting the continued availability of inexpensive motor fuel.

Governments have a legitimate concern with several problem areas that will tend to be alleviated with an increase in the bus share of the intercity passenger travel market. Fuel conservation, environmental factors, and possible reductions in highway expenditures provide the basis for this concern.

There are various options available to governments to enhance intercity bus travel. Several of these are pointed out in Figure XIV.1 along with the forces at work to create the current imbalance in the relative attractiveness of bus and automobile travel. State governments can influence these factors in varying degrees, although energy costs and availability and general economic conditions largely transcend state boundaries, suggesting that actions at the federal level exert a more pervasive effect than actions by a state.

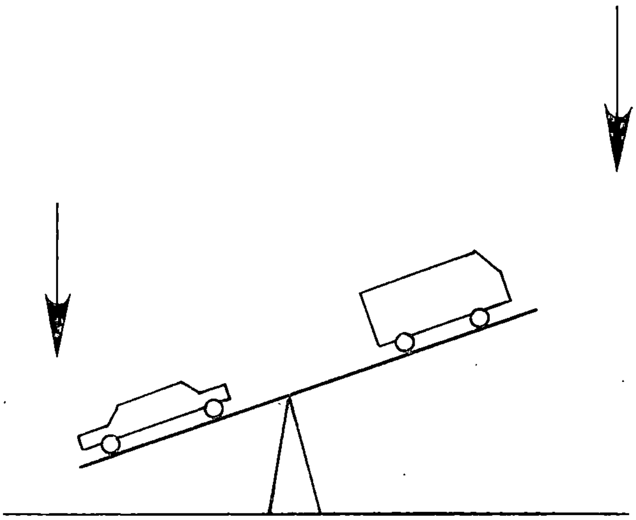
Rationing of motor fuel obviously would exert a considerable effect on the current balance. One effect of rationing would be to expand

Increase in use
forces

Gasoline readily available
Gasoline relatively inexpensive
Good roads
Surplus disposable income
Readily available autos

Increase in use
forces

Improved scheduling
Improved terminals
Reduced travel times
Reduced fares
Improved marketing
Improved interlining
Improved social status
Governmental support



Potential for Changing
the Balance

Change the perceived difference in costs
Reduce gasoline availability
Improve bus travel times
Improve the social image of bus use
Improve terminal facilities

Figure XIV.1. Factors influencing relative use of automobiles and intercity buses the size of the captive market with a corresponding adverse effect on life-styles. Less drastic and more desirable approaches would be directed to increasing bus usage among persons who choose this mode although having access to an automobile.

Enhancing the attractiveness of bus travel is an ambitious goal in the context of the current social, cultural, and economic environment. Terminal conditions, scheduling, marketing practices, and fare levels are significant variables in determining bus patronage. These traditionally have been matters almost exclusively within the domain of the private sector. This jurisdiction is appropriate, although an increasing public role may be necessary to offset exogenous influences resulting from other governmental actions (tax programs, subsidies to competing modes, controls on motor fuels, etc.) that impinge adversely upon intercity bus operations.

Considerable discussion is taking place at the federal level concerning the most suitable intensity of regulatory control for all transportation modes. The most probable direction of change, if any modification results from these discussions, is toward a relaxation of control. Any federal deregulation of intercity bus carriers would be expected to necessitate similar changes in state legislation.

Recommendations Relating to Intercity Buses

The recommendations that follow are based on two essential premises, as follows:

1. The changes that they induce would increase patronage of intercity buses and would be beneficial in the net to bus users and the general public.

2. Time is of the essence in the sense that it is necessary to reverse current trends that, if they were to continue unabated, will result in continued deterioration of intercity bus service.

These recommendations presume that primary concern for providing intercity bus service will remain with the private sector. However, it also is assumed that the role of government must be increased in some respects in order to induce carriers to respond more effectively to public sector goals and objectives. Such inducement would be in the form of financial incentives. Concurrently, controls would be required to assure that such expenditures are directed specifically to the accomplishment of program goals. Recommendations are presented in the following paragraphs.

Support of Certain Bus Network Components

The recommended intercity bus route network for Iowa was developed and presented in Chapter VIII. This network is a composite of the following:

- Corridors responsive to principal interstate travel demands.
- Routes serving interregional travel demands and providing access to interstate travel corridors.
- Certificated carrier routes with current service.

The interest of the state is to cause necessary service to be provided where gaps exist in the system and to assure continuation of service where carriers indicate the intention to abandon route segments. This interest should be manifested by a willingness to afford financial support for essential route segments when there is no other alternative to assure the initiation or continuation of bus service.

Subsystem II includes some route segments (identified in Table XIV.1) on which no bus service currently is available. In most cases

Table XIV.1. Segments of recommended intercity bus system not currently served by certificated bus carrier

1. Sioux Falls-Sheldon-Spencer
2. Osage-Cresco
3. Red Oak-Creston-Osceola-Chariton-Albia
4. Red Oak-Audubon or Harlan-Denison
5. Oskaloosa-Montezuma-Tama
6. Keokuk-Mount Pleasant-Iowa City

these routes previously received service but operations were suspended when operating costs for the specific route segments began to exceed operating revenues as a result of increasing costs or declining patronage or both. These route segments should receive the highest priority for state support.

Subsystem III includes several route segments on which service is currently provided that are believed to be only marginally profitable or perhaps unprofitable. Presumably, unprofitable routes are being cross-subsidized by profitable routes operated by the same carrier or from charter operations. Determination of profitability necessarily includes consideration of revenues from all sources including package express as well as passenger fares. Operational data are not available in sufficient detail to identify these route segments. However, the identity of these routes is suggested when carriers request permission to discontinue services. Any such route should be considered for state support. A final determination as to the essentialness of a specific route segment and an evaluation of the desirability of state support would be necessary in each case.

Thus, both route segments without bus carrier service and those that are candidates for abandonment of service may be approved for state support as essential elements of the intercity bus route network. In either case, an existing certificate of public convenience and necessity should be modified to delete that segment. Operating rights on the route segment to receive state support would then be offered to interested carriers on the basis of a competitive, negotiated purchase of service contract. The award would be based on the amount of financial support requested by the carrier and considerations of route continuity for a particular carrier.

Contracts should be negotiated to provide service for a period of of two years. Following a two-year trial period, each subsidized route should be evaluated for essentiality and suitability of contract terms. The contract could then be extended or a new contract should be negotiated with competition again open to all interested carriers.

Routes that are subsidized under a program established consistent with this recommendation should be required to satisfy performance standards promulgated in response to the recommendations that follow regarding terminal facilities and levels of service. Legislative actions required to initiate this recommendation would include the following:

- Appropriation of funds to the Iowa Department of Transportation to support intercity bus operations. (Existing legislation appears to provide sufficient authority for this support.)
- Authority to force the surrender of operating rights for route segments on which service is to be abandoned. (Similar action would need to be taken by the Interstate Commerce Commission for route segments covered by an interstate certificate.)

Standards for Terminal Facilities

Minimum standards should be established covering terminal facilities on routes receiving subsidies from state funds. The amount of subsidy may include funding to effect capital improvements and/or the support of operating costs for bus terminals on subsidized routes that conform to the standards promulgated in accordance with this recommendation.

Although it is not within the scope of this research to establish specific standards for terminal facilities, the proposed rules of the Interstate Commerce Commission under Ex Parte No. MC.95 indicate some areas of concern. The terminal facilities rating criteria presented in Appendix E are also indicative of appropriate subject matter for these standards.

Most of the terminals of interest will be in smaller communities in which joint-use facilities may be satisfactory. This suggests that the framework for such standards must be sufficiently flexible to adapt to a variety of primary uses for such terminals. Standards under these circumstances may be concerned only with minimum conditions regarding seating arrangements for waiting passengers, restrooms, baggage handling and hours of operation. Officials of a local community would participate, desirably, with the Department of Transportation in formulating standards appropriate to the circumstances existing in the community.

Level of Service Standards

Standards should be established for a minimum level of service for operations subsidized by the state. Such standards will vary depending upon the route segment and should be specified in the documents prepared for competitive negotiation of the purchase of service contract. Appropriate contract requirements should include frequency of service and schedule times at key communities as well as at points of connection with other routes. A general objective of such standards will be to provide patrons from a community the opportunity to travel to a regional center or other principal destination, conduct business during normal business hours, and return the same day. If a transfer is required to reach a principal destination, schedules should be coordinated with those of other carriers so as to permit travel without undue delay.

Collection of Data Concerning Intercity Bus Operations

A condition attached to the award of a certificate of public convenience and necessity by the State of Iowa should be the requirement for reporting certain operating data to the state. In addition to generalized system data currently required, this should include a record of passenger ticket sales from specific stations. The Iowa Department of Transportation should develop a data bank on bus passenger movements to aid in their evaluation of future changes in the configuration of a statewide intercity bus route network.

Issuance of Permits for Regional Special Transit Services

It is recommended that publicly supported rural transit services operating in localized areas in conformance with regional transit development programs be precluded from being certificated as common carriers. These services provide for-hire carriage of passengers and therefore require control by the public to assure conformance with statutes covering operations of this nature. However, it is recommended that this control be effected by means of a special services permit rather than by a certificate of public convenience and necessity. The permit would identify the scope of services permitted to include geographical limitations, passengers served (i.e., elderly and/or handicapped persons, those who are financially disadvantaged, etc.), and restrictions on charter operations. Essential differences would be a requirement that a special services permit become void 90 days after the termination of the service covered by the permit and that the operating rights conveyed by such a permit not be transferable. This distinction between a permit and a certificate is felt to be essential in order to preclude the purchase of a collection of operating rights by a public entity operating rural transit services in such a manner as to assemble a bus system that could compete directly with private profit-seeking carriers. Furthermore, it is recommended that the requirement to operate under permit be made mandatory for rural transit services in order to afford the Iowa Department of Transportation with an inventory of such systems and to help assure compliance with safety requirements and operating regulations.

Coordination of Rural Transit Services with Intercity Carrier Services

The integration of all services is essential if a minimum acceptable level of mobility is to be afforded by public transportation for residents of rural areas and small cities. This recommendation entails the coordination of local (community) and rural transit services with intercity bus routes and schedules. Arrival and departure of local services should, to the maximum extent practicable, afford opportunities for transfer from one service to another. The possibility of effecting transfer by payment of a single fare and sharing of revenues by intercity carriers and local services should be investigated with the properties concerned. Planning directed to the implementation of this recommendation is properly included within the scope of regional transportation development plans.

XV. RECOMMENDED PROGRAM FOR COMMUTER AIRLINES

Recommended Planning Program at State Level

The commuter airline program recommended at the state level consists of three parts: (1) monitoring commuter air carrier operations as a separate modal input to the total transportation planning process, (2) long-range planning for the impact of an all-jet fleet in Ozark Air Lines operations, and (3) adjusting state laws and policies to encourage subsidy-free commuter air carrier operations in Iowa.

Monitoring Commuter Air Carriers

The Iowa Department of Transportation Planning and Research Division should immediately commence obtaining data on the commuter air carrier activity at each Iowa airport where service exists in order to credit this activity properly in airport system planning. The Division should insure that all Iowa airports that are eligible become qualified as "commuter service airports" so as to receive a priority through the Federal Aviation Administration for special eligibility for airport funding related to this airport category.

Pursuant to implementing the monitoring function it is recommended that the following actions be taken:

1. Obtain current flight schedules of commuter airlines operating in Iowa and require any changes to be reported. It is imperative to know the level of service that is being offered.

2. Obtain a monthly report of flights scheduled but not flown and the reasons for cancellation of scheduled flights. Reliability is important in this mode. Airport factors or other items that are a part of ongoing programs of the Iowa Department of Transportation should be noted for priority consideration in the state airport system improvement program.

3. Obtain an annual report of the equipment utilized in serving Iowa stations (number of flights by specific aircraft types and models to each city, etc.).

4. Obtain the annual passenger volume at each station and the annual pounds of freight enplaned at each station.

5. Require each commuter air carrier to report its gross financial status on an annual basis similar to intercity bus operators.

6. Arrange for annual airport on-site planning meetings at commuter air carrier airports similar to those conducted at certificated air carrier stations. Progress of improvements is important at these airports. Input from the commuter operator is needed.

Long-Range Planning for Ozark All-jet Fleet

The Planning Division should begin examining a desired route structure by commuter air carriers if Ozark elected to drop service to either Fort Dodge or Ottumwa, or both. Alternative routes should be developed and the necessary legislation prepared to allow the state to establish franchise or contract routes utilizing these cities (or any other Ozark stations losing service) as profitable stations to allow extension of service to communities with marginal demand. This route structure would have to be continually revised as the freeway and expressway system expands or is modified.

Adjusting State Laws and Policies

To enhance the opportunity of commuter air carrier operations in Iowa, the following inexpensive changes are suggested:

1. Any aircraft used regularly in providing at least five scheduled flights per week connecting an Iowa community to Des Moines or to a medium or large hub airport shall not be charged an aircraft registration fee for the portion of the year it is so engaged.

2. All fuel tax on aviation gasoline consumed in providing scheduled service connecting an Iowa community with Des Moines or a medium or large hub airport shall be refunded upon request, provided the scheduled service operates at least 10 round trips per week.

3. That demonstration grants of up to two years duration be developed on a two-thirds local and one-third state contribution to guarantee service initiation providing such service is consistent with the principles and procedures set forth in Chapters XI and XII of this report. All activity above and beyond the state interest in the initiated service would be funded locally. Local funding may be shared by the community, individuals, and the operator or other parties other than the state or federal government. The primary benefit from such service accrues locally, thus justifying the more substantial local contribution to deferring costs for the service.

Recommended Program at the Operating Level

It is not recommended that the state enter into any subsidy contract to underwrite the cost of any commuter air carrier operation currently serving Iowa. Any such program should be consistent with recommendations resulting from the analysis herein set forth. Furthermore, when and if any such contract is initiated, certified accounting should be required of the commuter air carrier.

Level of service standards should be developed if the state becomes involved in the operating level. It is suggested that these standards include a requirement for at least three round trips daily to a terminal hub airport, either Des Moines or a medium or large hub airport in an adjacent state.

It is not recommended that any communities not now having commuter air carrier service be subsidized to initiate service pending a solution to current problems of continuity of service on the Spencer-Pocahontas-Des Moines route. Only one contract for service on an experimental or demonstration route should be active at any time unless a second contract results from the necessity to replace Ozark service at some station.

XVI. SUMMARY OF RECOMMENDATIONS

Recommendations presented in Chapters XIV and XV are summarized below. Those relating to service by intercity buses are as follows:

1. Service on certain segments of the recommended intercity bus route network should be subsidized by the state, if necessary, subject to competitive bids for the award of service contracts and adherence to specified minimum service standards.

2. Minimum standards for the quality of terminal facilities should be established for terminals on routes being subsidized by the state.

3. Minimum standards for levels of service, to include route frequency and schedules, should be established for bus routes being subsidized by the state.

4. Data concerning bus passenger movements at the local level should be made available to the state by certificated carriers.

5. Local rural transit services should be controlled by means of a special services permit that would automatically terminate following suspension of service and would not be transferable, rather than by certificates of public convenience and necessity.

6. Regional transit development plans should consider the coordination of local and rural transit services and intercity bus services.

Recommendations relating to service by commuter airlines are summarized as follows:

1. Data covering all aspects of commuter airline service should be collected so as to permit monitoring of service by these carriers in order to enhance future transportation planning activities.

2. Long-range planning should be implemented to evaluate the potential impact of possible future changes in the role of Ozark Air Lines in Iowa, including conversion to an all-jet fleet and/or the response to deregulation of air carriers, in order to assure continuation of essential access to air transportation at the affected communities.

3. State laws and policies should be modified to reduce the tax burden to carriers providing unsubsidized commuter air service

and to encourage the initiation of commuter service on routes having the long-range potential to be self-supporting.

4. The state should not subsidize any commuter air carrier operation currently serving Iowa and should establish minimum operating standards to assure that future services are responsive to the state interest.

PART 5

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REFERENCES

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APPENDICES

APPENDIX A

BUS INVENTORY DATA AND FORMS

1976 Intercity Bus Study

Bus Terminal Survey Information

Terminal City ____________________ Survey date ______________

Street Address ____________________ Prepared by ______________

Manager's Name ____________________

PARKING

Number of spaces: Bus (loading) ______ Taxi ______

Bus (storage) ______

Auto (long term) ______

Auto (employee) ______

Auto (short term) ______

Type of surface ______________ Condition ______________

Expandability potential ______________________________

Comments (problems) ______________________________

____

ACCESS

Problems encountered by buses ______________________________

____

Patron access problems ______________________________

NEIGHBORHOOD

Type (CBD, fringe, residential, etc.) ______________________________

Type and quality of businesses/homes in same block and in area of terminal ______

____

____

Site expansion possibility ______________________________

Area lighting ______________________________

Pedestrian facilities ______________________________

Comments on location ______________________________

____

____

CONNECTING MODES

Taxi service Yes __ No __ Hours/days of operation ______________

Direct phone ____ Intracity bus service Yes __ No __

Hours/days of operation ______________________________

Nearest stop ______________ Bus schedule ______________

Other forms of public transportation available ______________

Schedule/hours and days of operation ______________________

1976 Intercity Bus Study

Basic Terminal Site Sketch

Include: building outside dimensions, sidewalks, adjacent buildings (condition and present use), alleys, driveways. Identify type and location of bus station signing (identify as a bus station)

Parking areas: type of surface, number of spaces, type of use (employee, long term, short term, itinerant bus, long term bus, taxi stop), other paved areas, doorways and function (bus terminal, car terminal, sidewalk terminal, etc.)

1976 Intercity Bus Study

Vicinity Sketch

Include: buildings and streets within one block radius of terminal, show present use and general condition of buildings, street widths, and/or number of lanes, adverse street grades, parking regulations, driveway into bus station, route of buses in and out of station. Use local streetmap as an attachment.

1976 Intercity Bus Study

Terminal Building Interior Sketch

Include: approximate dimensions of public use rooms, number of seats (type and condition), number of restrooms (number of toilets, sinks, urinals, etc., condition, cleanliness), number of lockers, number/size of ticket counter-space, number of employees (duties, hours they work), hours terminal is open, kinds of food/beverages available, (vending machines, snack bar, cafe, etc.), public phone available (number, location), general condition of terminal. Obtain information on cargo areas, ticket processing space, and office space if possible.

Table A.1. Companies providing intercity bus service between two or more Iowa communities

Mr. Leo Fuller, Superintendent
Continental Trailways
11th and Locust
Des Moines, Iowa 50309

515/243-5971

Mr. Kenneth Balke, Manager
Fort Dodge Transportation Company
East Highway 20, Box 901
Fort Dodge, Iowa 50501

515/576-6221

Mr. R. L. Turpin, District Manager
Greyhound Lines - West
1107 Keo Way
Des Moines, Iowa 50309

515/243-8365

Mr. Bob Damerville
Intercity Airport Transit, Inc.
1135 Army Post Road
Des Moines, Iowa 50309

515/285-9945

Mr. Joseph R. Sherman, President
Iowa Coaches, Inc.
1180 East Roosevelt Extension
Dubuque, Iowa 52001

319/556-5385

Mr. W. J. Keller
Superintendent of Iowa Operations
Jefferson Lines
317 East Court Street
Des Moines, Iowa 50309

515/283-1121

Mr. Louie Boben
Midwest Coaches, Inc.
216 North Second Street
Mankato, Minnesota 56001

507/345-4885

Mr. Warren L. Wiley
Missouri Transit Lines, Inc.
104 North Clark Street
Moberly, Missouri 65270

816/263-2933

Mr. M. J. Reid
Reid Bus Line
707 Hill Street
Harlan, Iowa 51537

712/755-5950

Mr. Mike Hillard, President
River Trails Transit Lines, Inc.
200 Main
Dubuque, Iowa 52001

319/583-0517

Mr. Lawrence Tjossem, Manager
Scenic Hawkeye Stages, Inc.
Paine and Dudley
Decorah, Iowa 52101

319/382-3639

Mr. R. C. Smith
Scenic Stage Line, Inc.
606 Portland Avenue
Morrison, Illinois 61270

815/772-7226

Mr. Arnold Fletcher
Sedalia-Marshall-Booneville
Stage Lines, Inc.
5805 Fleur Drive
Des Moines, Iowa 50321

515/285-5121

Table A.2. Selected Iowa bus stations

Ames

Jack Carter
Union Bus Depot
826 Second Street 50010

515/232-2404

(Greyhound, Jefferson)

Atlantic

Gladys King
Greyhound Bus Depot and Travel
612 Walnut Street 50022

712/243-3270

(Greyhound)

Burlington

Ken Hoenig
Continental Trailways Bus Station
300 South Main 52601

319/752-5453

(Continental Trailways)

Carroll

Ann Cook
Greyhound Bus Depot
Highway 30 West 51401

712/792-9138

(Greyhound)

Cedar Rapids

Jack Hatt
Continental Trailways Bus Station
126 Fourth Avenue, N. E. 52402

319/365-1609

(Continental Trailways)

Cedar Rapids (continued)

R. W. Knoot
Greyhound Bus Depot
420 Second Street, S. E. 52401

319/364-4167

(Greyhound, Iowa Coaches, Jefferson, Missouri Transit, Scenic Hawkeye)

Clarinda

Bev Swanson
Continental Trailways Bus Depot
City Hall 51632

712/542-3513

(Continental Trailways)

Clinton

Mike Maxa
Greyhound Lines
602 South First Street 52732

319/243-7214

(Greyhound, River Trails, Scenic Stage)

Council Bluffs

Jim Borghoff
Council Bluffs Bus Depot
623 West Broadway 51501

712/322-4544

(Continental Trailways, Greyhound, Reid Lines)

Davenport

Pat McConkey
Continental Trailways Bus Station
102 South Harrison Street 52801

319/322-3571

(Continental Trailways)

Table A.2. (continued)

Davenport (continued)

Dick Bauersfield
Greyhound Terminal
420 West Third Street 52801

319/326-5127

(Greyhound, River Trails, Scenic Stage)

Decorah

Tom Haugen
Decorah Bus Depot
Paine and Dudley 52101

319/382-4586

(Scenic Hawkeye)

Des Moines

Don Culley
Continental Trailways Bus Depot
11th and Locust Streets 50309

515/243-3126

(Continental Trailways, Jefferson, SMB)

R. L. Turpin
Union Bus Depot
1107 Keosauqua Way 50309

515/243-5283

(Greyhound, Jefferson, SMB)

Dubuque

Ron Rickena
Union Bus Station
458 Central Avenue 52001

319/583-3397

(Greyhound, Iowa Coaches, River Trails)

Fort Dodge

Cindy Balke
Union Bus Station
Seven South 11th Street 50501

515/276-6071

(Greyhound, Fort Dodge Transportation, Iowa Coaches)

Iowa City

Thelma Courier
Union Bus Depot
404 East College Street 52240

319/337-2552

(Continental Trailways, Greyhound, Missouri Transit)

Marshalltown

Jerry Koscielski
Greyhound Bus Depot
114 North Center Street 50158

515/752-4623

(Greyhound)

Mason City

LaVonne Willford
Union Bus Depot
124 Fourth Street, S.W. 50401

515/423-8341

(Jefferson, Scenic Hawkeye)

Muscatine

Ron Cunningham
Trailways Bus System
319 Grandview Avenue 52761

319/263-5524

(Continental Trailways)

Table A.2. (continued)

Osceola

Minnie West
Jefferson Bus Depot
130 South Fillmore 50213

515/342-4535

(Jefferson)

Ottumwa

Helen Kelley
Union Bus Depot
405 East Second Street 52501

515/684-8045

(Continental Trailways, Greyhound, Missouri Transit)

Sioux City

D. T. Babe
Union Bus Depot
311 Sixth Street 51101

712/255-7678

(Greyhound, Iowa Coaches, Midwest Coaches, SMB)

Spencer

Margaret Weiskercher
Greyhound Bus Lines
Tangney Motor Hotel
605 Grand Avenue 51301

712/262-2010

(Greyhound, Scenic Hawkeye)

Waterloo

Nadine Behne
Union Bus Terminal
1115 Washington 50702

319/234-2833

(Greyhound, Iowa Coaches, Jefferson, Scenic Hawkeye)

West Union

Judson Conner
Conner Rexall Drug
Vine and Elm 52175

319/422-3151

(Scenic Hawkeye)

Table A.3. Bus companies serving study cities and study cities served by bus companies

Bus companies serving study cities

Continental Trailways

- Burlington
- Cedar Rapids
- Clarinda
- Council Bluffs
- Davenport
- Des Moines
- Iowa City
- Muscatine
- Ottumwa

Greyhound

- Ames
- Atlantic
- Carroll
- Cedar Rapids
- Clinton
- Council Bluffs
- Davenport
- Des Moines
- Dubuque
- Fort Dodge
- Iowa City
- Marshalltown
- Ottumwa
- Sioux City
- Spencer
- Waterloo

Fort Dodge Transportation

- Fort Dodge

Iowa Coaches

- Cedar Rapids
- Dubuque
- Fort Dodge
- Sioux City
- Waterloo

Jefferson

- Ames
- Cedar Rapids
- Des Moines
- Mason City
- Osceola
- Waterloo

Midwest Coaches

- Sioux City

Missouri Transit

- Cedar Rapids
- Iowa City
- Ottumwa

Reid Lines

- Council Bluffs

River Trails

- Clinton
- Davenport
- Dubuque

Scenic Hawkeye

- Cedar Rapids
- Decorah
- Mason City
- Spencer
- Waterloo
- West Union

Scenic Stages

- Clinton
- Davenport

Sedalia-Marshall-Booneville Stages

- Des Moines
- Sioux City

Table A.3. (continued)

Study cities served by bus companies

Ames

Greyhound
Jefferson

Atlantic

Greyhound

Burlington

Continental Trailways

Carroll

Greyhound

Cedar Rapids

Continental Trailways
Greyhound
Iowa Coaches
Jefferson
Missouri Transit
Scenic Hawkeye

Clarinda

Continental Trailways

Clinton

Greyhound
River Trails
Scenic Stage

Council Bluffs

Continental Trailways
Greyhound
Reid Lines

Davenport

Continental Trailways
Greyhound
River Trails
Scenic Stage

Decorah

Scenic Hawkeye

Des Moines

Continental Trailways
Greyhound
Jefferson
Sedalia-Marshall-Booneville

Dubuque

Greyhound
Iowa Coaches
River Trails

Fort Dodge

Fort Dodge Transportation
Greyhound
Iowa Coaches

Iowa City

Continental Trailways
Greyhound
Missouri Transit

Marshalltown

Greyhound

Mason City

Jefferson
Scenic Hawkeye

Muscatine

Continental Trailways

Osceola

Jefferson

Ottumwa

Continental Trailways
Greyhound
Missouri Transit

Sioux City

Greyhound
Iowa Coaches
Midwest Coaches
Sedalia-Marshall-Booneville

Table A.3. (continued)

<u>Spencer</u>
Greyhound
Scenic Hawkeye
<u>Waterloo</u>
Greyhound
Iowa Coaches
Jefferson
Scenic Hawkeye
<u>West Union</u>
Scenic Hawkeye

Table A.4. Daily and monthly bus use time distributions

		Daily travel as a percent of total monthly travel												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
	Exp[a]	2.1	3.3	2.3	2.3	2.7	2.7	2.9	4.6	3.0	2.2	2.9	2.7	2.8
Sun	Non-exp[a]	13.9	17.5	13.8	11.7	13.3	11.2	10.1	11.5	13.5	12.1	18.5	10.1	13.1
	Total	16.0	20.8	16.1	14.0	16.0	13.9	13.0	16.1	16.5	14.3	21.4	12.8	15.9
	Exp	2.5	2.3	3.1	2.7	3.1	2.7	3.6	4.5	3.6	2.4	2.0	3.9	3.0
Mon	Non-exp	10.0	11.1	12.0	11.5	13.6	11.1	9.5	10.9	13.6	10.0	9.1	14.2	11.4
	Total	12.5	13.4	15.1	14.2	16.7	13.8	13.1	15.4	17.2	12.4	11.1	18.1	14.4
	Exp	1.8	1.9	2.8	2.2	2.1	3.0	3.2	3.9	2.8	2.1	2.3	3.2	2.6
Tues	Non-exp	9.3	8.2	11.5	8.5	8.9	11.7	8.1	11.1	8.7	9.3	9.6	12.1	9.8
	Total	11.1	10.1	14.3	10.7	11.0	14.7	11.3	15.0	11.5	11.4	11.9	15.3	12.4
	Exp	1.9	1.9	2.6	2.0	1.8	3.4	3.0	3.1	2.6	2.3	2.1	2.6	2.4
Wed	Non-exp	11.7	9.4	12.2	9.1	8.8	11.3	7.7	8.7	8.8	11.0	13.1	12.3	10.3
	Total	13.6	11.3	14.8	11.1	10.6	14.7	10.7	11.8	11.4	13.3	15.2	14.9	12.7
	Exp	2.4	2.4	1.8	2.2	2.8	3.0	3.7	3.5	2.4	2.0	2.3	1.9	2.5
Thu	Non-exp	13.3	11.0	8.9	14.4	11.5	10.1	11.3	9.9	9.2	12.5	9.3	8.1	10.8
	Total	15.7	13.4	10.7	16.6	14.3	13.1	15.0	13.4	11.6	14.5	11.6	10.0	13.3
	Exp	2.4	2.9	2.8	3.5	2.2	3.2	4.7	2.9	3.1	2.5	1.9	2.5	2.9
Fri	Non-exp	15.9	16.1	13.8	17.6	12.4	13.0	13.7	11.9	14.6	19.5	12.6	12.5	14.5
	Total	18.3	19.0	16.6	21.1	14.6	16.2	18.4	14.8	17.7	22.0	14.5	15.0	17.4
	Exp	2.6	3.0	3.3	2.8	2.9	3.5	5.8	4.1	3.3	2.4	2.9	3.2	3.3
Sat	Non-exp	10.2	9.0	9.3	9.7	13.8	10.1	12.6	9.5	10.2	9.5	11.5	10.8	10.5
	Total	12.8	12.0	12.6	12.5	16.7	13.6	18.4	13.6	13.5	11.9	14.4	14.0	13.8

Monthly travel as percent of total annual travel	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	7.26	6.42	7.72	7.39	7.43	9.15	10.45	10.34	7.43	8.28	8.27	9.87

[a] Express and non-express.

Source: Bus passenger records for one year obtained from Des Moines Union Bus Depot for the period October 1975 through Sepember 1976.

Based on a total of 166,126 embarking and disembarking passengers.

Table A.5. Non "on-time" arrivals and departures as a percentage of total arrivals and departures - by month

			On time	Late time (minutes)								Total non-on-time
				0-5	6-10	11-15	16-20	21-60	61-120	121-240	241+	
January	Exp	Arv	73.8	2.7	5.4	3.3	2.0	8.7	3.3		0.7	26.2
		Dep	68.5	2.0	5.4	2.7	3.3	14.8	3.4			31.5
	Non-exp	Arv	72.1	1.7	8.5	5.6	2.9	8.1	1.0			27.9
		Dep	72.6	1.2	5.0	5.8	3.7	10.2	1.5			27.4
	Total	Arv	72.5	2.0	7.8	5.1	2.7	8.3	1.5		0.1	27.5
		Dep	71.8	1.4	5.1	5.1	3.6	11.3	1.8			28.2
February	Exp	Arv	80.6	1.2	4.1	4.7	2.4	4.7	1.2	0.6	0.5	19.4
		Dep	65.7	1.2	6.5	7.1	3.6	14.2	1.2	0.6		34.3
	Non-exp	Arv	76.6	0.9	9.6	4.8	1.4	5.0	1.6		0.2	23.4
		Dep	74.8	1.4	5.6	6.5	2.6	6.9	1.4	0.4	0.4	25.2
	Total	Arv	77.5	1.0	8.3	4.8	1.6	4.9	1.5	0.1	0.3	22.5
		Dep	72.7	1.4	5.8	6.7	2.9	8.6	1.4	0.3	0.2	27.3
March	Exp	Arv	76.1		6.4	4.3	2.1	9.0	1.1	1.1		32.9
		Dep	53.9		4.5	5.1	7.3	24.7	2.2	2.2		46.1
	Non-exp	Arv	78.7	0.9	6.3	3.1	3.1	4.9	2.0	0.8		21.1
		Dep	74.3	0.8	5.3	5.9	3.3	7.4	2.1	0.5	0.3	25.7
	Total	Arv	78.1	0.8	6.3	3.4	2.9	5.9	1.8	0.8		21.9
		Dep	69.6	0.6	5.1	5.7	4.2	11.4	2.2	0.9	0.2	30.4
April	Exp	Arv	78.2	1.2	7.1	1.2	4.7	5.9	1.8			21.8
		Dep	61.1	0.6	7.8	4.8	8.4	16.2	1.2			38.9
	Non-exp	Arv	85.0	0.7	5.6	4.9	1.9	1.9				15.0
		Dep	75.4	2.5	4.8	6.2	4.9	6.0	0.2			24.6
	Total	Arv	83.5	0.8	5.9	4.0	2.6	2.8	0.4			16.5
		Dep	72.2	2.0	5.5	5.9	5.7	8.3	0.4			27.8
May	Exp	Arv	62.9	1.1	4.3	8.1	5.4	16.1	2.2			37.1
		Dep	46.2	1.6	5.5	7.1	8.3	27.5	3.8			53.8
	Non-exp	Arv	69.5	1.7	11.1	7.6	3.5	5.3	0.8	0.3	0.1	30.5
		Dep	64.2	1.7	6.3	7.5	6.0	11.1	2.1	0.5	0.5	35.8
	Total	Arv	74.3	1.1	7.8	6.1	3.2	6.5	0.7	0.3		25.7
		Dep	67.0	1.5	5.1	6.1	6.0	11.7	2.2	0.3	0.1	33.0
June	Exp	Arv	73.6	0.4	1.9	4.5	1.5	15.6	2.6			26.4
		Dep	55.9	0.8	6.1	2.3	3.4	26.6	4.9			44.1
	Non-exp	Arv	71.8	1.7	8.9	6.0	3.5	6.1	1.9	0.1		28.2
		Dep	64.0	1.9	6.9	7.1	3.3	14.0	2.6		0.1	36.0
	Total	Arv	71.9	1.4	7.1	5.6	3.0	8.9	2.1	0.1		28.1
		Dep	61.4	1.6	6.7	5.9	3.4	17.7	3.3		0.1	38.6
July	Exp	Arv	71.7	1.0	5.0	4.2	3.1	14.4	0.5			28.3
		Dep	54.6	2.1	8.1	6.0	5.5	22.5	1.3			45.4
	Non-exp	Arv	67.1	2.5	11.6	4.4	2.7	9.7	1.6	0.4		32.9
		Dep	60.1	3.4	6.4	6.4	6.3	14.7	2.2	0.4		39.9
	Total	Arv	68.7	2.0	9.3	4.3	2.9	11.3	1.3	0.3		31.3
		Dep	58.2	3.0	7.0	6.3	6.0	17.4	1.9	0.3		41.8
August	Exp	Arv	77.9	0.8	4.7	5.0	3.9	6.6	0.8	0.3		22.1
		Dep	59.0	0.6	5.8	9.9	6.9	15.7	1.9	0.3		41.0
	Non-exp	Arv	76.5	1.9	7.8	3.3	3.5	6.3	0.7			23.5
		Dep	67.1	2.0	7.0	4.6	5.3	13.1	0.9			32.9
	Total	Arv	77.0	1.5	6.7	3.9	3.6	6.4	0.8	0.1		23.0
		Dep	64.3	1.5	6.6	6.4	5.9	14.0	1.2	0.1		35.7

Table A.5. (continued)

			On time	Late time (minutes)								Total non-on-time
				0-5	6-10	11-15	16-20	21-60	61-120	121-240	241+	
September	Exp	Arv	71.5	1.8	4.1	6.8	3.2	11.8	0.5	0.5		28.5
		Dep	56.7	1.3	9.8	7.6	4.0	19.6	0.4	0.4		43.3
	Non-exp	Arv	82.4	2.3	7.4	1.6	1.6	4.3	0.2	0.2		17.6
		Dep	71.2	1.8	6.3	6.9	3.8	9.4	0.3	0.3		28.8
	Total	Arv	79.5	2.2	6.5	3.0	2.0	6.3	0.2	0.2		20.5
		Dep	67.3	1.7	7.2	7.1	3.9	12.2	0.4	0.4		32.7
October	Exp	Arv	69.0	0	8.6	6.7	4.3	10.0	1.4			31.0
		Dep	55.9	1.5	8.3	5.9	7.8	18.6	1.5	0.5		44.1
	Non-exp	Arv	79.6	1.2	6.9	3.4	1.6	5.6	1.2	0.3	0.2	20.4
		Dep	69.1	1.6	6.5	5.3	5.0	9.8	2.0	0.3	0.5	30.9
	Total	Arv	77.3	0.9	7.2	4.2	2.2	6.6	1.3	0.2	0.1	22.7
		Dep	66.0	1.5	6.9	5.4	5.7	11.9	1.9	0.4	0.4	34.0
November	Exp	Arv	61.9	2.1	7.4	3.7	3.2	16.4	2.1	1.6	1.6	38.1
		Dep	40.0	1.6	12.8	4.3	8.6	25.7	4.3	1.1	1.6	60.0
	Non-exp	Arv	67.8	0.8	8.9	5.1	3.6	10.1	2.8	0.7	0.2	32.2
		Dep	61.8	1.2	5.8	8.3	3.1	15.1	3.0	1.8		38.2
	Total	Arv	66.4	1.1	8.6	4.8	3.5	11.6	2.6	0.9	0.5	33.6
		Dep	56.6	1.3	7.5	7.3	4.4	17.6	3.3	1.6	0.4	43.4
December	Exp	Arv	48.6	2.4	8.1	7.3	4.9	23.1	4.9	0.8		51.4
		Dep	37.4		7.0	4.5	7.4	34.6	8.2	0.8		62.6
	Non-exp	Arv	65.1	2.1	12.0	4.0	3.4	11.1	1.5	0.3	0.6	34.9
		Dep	56.2	1.6	7.5	7.5	4.6	18.6	2.2	0.7	0.3	43.0
	Total	Arv	60.7	2.2	10.9	4.9	3.8	14.3	2.4	0.4	0.4	39.3
		Dep	51.2	1.2	7.4	7.4	5.3	22.8	3.8	0.8	0.2	48.8

Table A.6. Non "on-time" arrivals and departures as a percentage of toal arrivals and departures - by day of the week (for the entire year)

			On time	Late time (minutes)								Total non-on-time
				0-5	6-10	11-15	16-20	21-60	61-120	121-240	241+	
Monday	Exp	Arv	76.5	1.8	4.5	2.5	3.0	9.1	2.3	0.2		23.50
		Dep	60.9	1.9	8.4	3.6	5.8	16.0	3.5	0.2		39.1
	Non-exp	Arv	78.2	1.9	8.3	3.1	2.0	5.4	1.1	0.1		21.8
		Dep	73.1	1.8	5.6	5.7	3.7	8.0	1.8	0.1	0.2	26.9
	Total	Arv	77.2	1.7	7.5	2.9	2.3	6.7	1.4	0.1		22.8
		Dep	70.0	1.8	6.3	5.3	4.2	10.0	2.2	0.2	0.1	30.0
Tuesday	Exp	Arv	72.9	1.9	6.4	6.3	2.7	9.5	0.2			27.1
		Dep	54.7	1.4	6.4	6.0	10.6	18.7	1.6			45.3
	Non-exp	Arv	74.8	0.9	9.4	5.3	2.6	5.0	1.8	0.3	0.2	25.2
		Dep	69.2	2.1	5.7	7.3	4.3	9.5	1.2	0.3	0.3	30.8
	Total	Arv	74.3	1.0	8.5	5.5	2.6	6.5	0.9	0.2	0.1	25.7
		Dep	64.4	1.9	6.3	7.1	5.4	13.1	1.4	0.2	0.2	35.6
Wednesday	Exp	Arv	66.4	1.9	6.0	6.9	3.5	13.3	1.4	0.7		33.6
		Dep	55.3	1.1	8.5	5.1	5.5	21.3	2.5	0.6		44.7
	Non-exp	Arv	74.3	1.6	9.2	4.0	2.4	7.2	1.2	0.1	0.1	25.7
		Dep	69.0	1.5	5.4	6.2	5.5	10.4	1.6	1.0	0.2	31.0
	Total	Arv	72.7	1.5	8.3	4.9	2.4	8.4	1.3	0.2	0.1	27.3
		Dep	66.0	1.4	6.1	5.8	4.9	13.0	1.7	0.9	0.1	34.0
Thursday	Exp	Arv	69.8	1.0	4.9	4.3	3.0	12.8	2.4	1.8		30.2
		Dep	54.2	0.5	5.9	5.6	4.1	24.5	3.3	2.0		45.8
	Non-exp	Arv	72.1	1.3	9.6	5.4	3.4	6.1	1.9	0.3		27.9
		Dep	65.6	1.9	7.5	6.7	4.3	11.5	1.9	0.7		34.4
	Total	Arv	71.4	1.1	8.4	5.0	3.6	7.9	2.0	0.7		28.6
		Dep	62.6	1.5	7.0	6.4	4.4	14.7	2.3	1.0		37.4
Friday	Exp	Arv	62.8	1.0	4.1	6.0	4.9	13.7	2.6	0.3	1.1	33.8
		Dep	51.2	1.6	7.4	7.4	5.8	22.2	2.7	0.7	1.0	48.8
	Non-exp	Arv	65.9	1.3	8.7	6.4	4.6	10.7	1.7	0.5		34.1
		Dep	61.7	1.2	6.6	7.0	4.4	16.1	2.4	0.4	0.2	38.3
	Total	Arv	68.1	1.5	8.3	5.8	4.0	10.3	1.4	0.5	0.3	31.9
		Dep	59.3	1.1	6.6	7.3	4.8	17.7	2.3	0.4	0.4	40.7
Saturday	Exp	Arv	66.3	0.7	5.9	5.2	3.6	15.5	2.2		0.7	33.7
		Dep	54.2	0.6	5.6	5.1	7.0	25.7	1.3	0.2		45.8
	Non-exp	Arv	71.9	1.9	9.0	4.9	3.2	7.4	1.6	0.1	0.2	28.1
		Dep	63.5	1.9	5.6	7.0	4.7	14.9	1.9	0.2	0.3	36.5
	Total	Arv	70.5	1.5	8.0	4.9	3.5	9.8	1.7		0.3	29.5
		Dep	60.9	1.5	5.5	6.3	6.6	16.8	1.8	0.2	0.2	39.1
Sunday	Exp	Arv	74.2	1.1	6.2	4.0	3.9	8.8	1.6	0.3		25.8
		Dep	58.6	1.1	8.2	6.6	5.7	16.3	3.7			41.4
	Non-exp	Arv	81.3	1.6	6.8	2.3	1.5	5.2	1.0	0.3		18.7
		Dep	72.0	2.2	6.6	6.0	3.9	7.5	1.2	0.5	0.2	28.0
	Total	Arv	79.6	1.5	6.6	2.8	2.1	5.8	1.4	0.3		20.4
		Dep	68.1	1.9	6.9	6.6	4.6	9.6	1.8	0.3	0.1	31.9
Total	Exp	Arv	69.8	1.3	5.4	5.0	3.5	11.8	1.8	0.5	0.3	30.2
		Dep	55.6	1.2	7.2	5.6	6.4	20.7	2.7	0.5	0.1	44.4
	Non-Exp	Arv	74.1	1.5	8.7	4.5	2.8	6.7	1.5	0.2	0.1	25.9
		Dep	67.7	1.8	6.1	6.6	4.4	11.1	1.7	0.4	0.2	32.3
	Total	Arv	73.4	1.4	7.9	4.6	2.9	7.9	1.5	0.3	0.1	26.6
		Dep	64.5	1.6	6.4	6.4	5.0	13.6	1.9	0.5	0.2	35.5

Table A.7. Summary table of "on-time" arrivals and departures

			Late time (minutes)								Total
		On time	0-5	6-10	11-15	16-20	21-60	61-120	121-240	241+	non-on-time
Exp	Arv	70.5	1.2	5.6	5.0	3.4	11.9	1.9	0.4	0.2	29.5
	Dep	54.6	1.1	7.30	5.6	6.2	21.7	2.9	0.5	0.1	45.4
Non-exp	Arv	74.4	1.5	8.71	5.6	2.7	6.5	1.3	0.3	0.1	26.6
	Dep	67.6	1.8	6.1	6.5	4.3	11.4	1.7	0.4	0.2	32.4
Total	Arv	74.0	1.4	7.7	4.5	2.8	7.8	1.4	0.3	0.1	26.0
	Dep	65.0	1.6	6.3	6.3	4.8	13.7	2.0	0.4	0.1	35.0

APPENDIX B

IOWA DEPARTMENT OF TRANSPORTATION
INTERCITY BUS USER CHARACTERISTICS SURVEY

03513

INTERCITY BUS PASSENGER SURVEY

The Iowa Department of Transportation is conducting a survey as a part of its efforts to identify the transport needs of our citizens. Your answers will help us to determine how well your needs are met at present and how to better serve you in the future.

Please fill out this questionnaire concerning intercity bus service to the best of your knowledge. If there is any question that you do not want to respond to, please leave it blank and proceed to the next question.

When you have completed the questionnaire, please use the attached postage-paid return envelope and send it to the Iowa Department of Transportation. Thank you for your cooperation.

Trip Characteristics

1. At what city did you begin the bus portion of your trip? Iowa 60.9%, Non-Iowa 39.1%
2. At what city will you end the bus portion of your trip? Iowa 57.3%, Non-Iowa 42.7%
3. How did you get to the bus from your point of trip origin?
   Auto 73.0 Urban bus 4.7 Taxi 8.5 Other (specify) Walk 7.2%, Other 6.6
4. What is the main purpose of this trip?
   Work/Business 9.9 School 3.6 Visit Friends/Relatives 50.1
   Personal Business 6.6 Recreation/Vacation 14.6 Other(specify) Visit/Rec 5.0
   Medical 2.5, Other 7.7
5. How often do you travel by intercity bus?
   Once a year or less 43.9% 2 to 6 times a year 35.6% 7 to 12 times a year 8.6
   12 to 25 times a year 4.4 Over 25 times a year 5.8
6. How do you normally make this trip? Auto 34.3 Bus 41.2 Plane 4.1 Train ____
   Other (specify) ____
7. If this bus service was not available, would you have been able to take this trip today?
   Yes 31.1 No 66.7

Ride Characteristics

1. Please rate this bus service according to the following characteristics. Please place a checkmark ✓ on the space along the scale at that point which best describes your satisfaction with that aspect of the bus service provided.

	Very Good	Good	Fair	Poor	Very Poor
Schedule Information	42.6	40.1	9.1	6.0	2.2
Bus Terminal Conditions	22.3	43.7	25.3	6.6	2.2
Comfort in Vehicle	28.6	46.2	19.2	4.4	1.6
Dependability of On-time Arrival	34.1	38.5	17.9	5.8	3.8
Pleasantness of Trip	34.1	45.3	16.5	3.0	1.1
Total Time Spent Riding	25.9	42.4	24.5	4.4	2.8
Cost of Trip	23.4	43.8	26.5	4.4	1.9
Attitude of Bus Personnel	46.5	40.4	9.9	2.5	0.8
Baggage Service	36.5	47.8	9.9	3.6	2.2

(OVER)

INTERCITY BUS PASSENGER SURVEY
Page Two

2. Would an intercity express bus service which stopped only at larger cities have served you better on this trip? Yes 41.2 No 51.4

3. Do you have any suggestions for improving this service? ___

User Profile

1. Do you have a valid driver's license? Yes 66.1 No 30.9
2. How many cars (include pickups and campers) are in your household?
   0 23.2 1 32.7 2 28.2 3 9.5 4 3.1 5 or more 3.4
3. Was one of your family cars available for this trip? Yes 39.6 No 51.4
4. How many people are in your party? 1 70.0 2 18.6 3 6.4 4 1.9 5 or more 2.2
5. How many children under 12 are traveling with you? 0 91.4 1 6.1 2 1.7 3 0.8 4 or more ___
6. Your sex is: Male 25.8 Female 70.9
7. In which age bracket are you? Under 18 21.1 18-24 19.8 25-40 16.2 41-64 26.1 65 or over 22.8
8. In which income group does your household fall?
   Under $5,000 per year 25.8 $15,000 to $19,999 per year 11.10
   $5,000 to $9,999 per year 21.4 Over $20,000 per year 15.1
   $10,000 to $14,999 per year 15.1 *Unanswered* 11.2
9. Your marital status is: Married 28.0 Single 47.1 Widowed 18.0 Other ___
10. Please check that category which best fits your occupation:
    Sales 2.2 Clerical 3.9 Service Worker 4.7
    Student 23.5 Homemaker 11.4 General Labor 5.0
    Craftsman 0.5 Retired 17.5 Professional/Technical 19.1
    Business Owner/Manager 1.4 Other (specify) ___
11. Check the highest level of education completed:
    Grade School 10.5 Attended High School 14.1 High School Graduate 20.8
    Attended College 21.1 College Graduate 16.9 Post Graduate 13.0

THANK YOU FOR YOUR COOPERATION

APPENDIX C

DOCUMENTS RELATIVE TO BUS COMMON CARRIERS

CHAPTER 325
MOTOR VEHICLE CERTIFICATED CARRIERS

325.1 Definitions. When used in this chapter:

1. The term "motor vehicle" shall mean any automobile, automobile truck, motorbus, or other self-propelled vehicle, including any trailer, semitrailer, or other device used in connection therewith not operated upon fixed rails or track, used for the public transportation of freight or passengers for compensation between fixed termini, or over a regular route, even though there may be occasional, periodic, or irregular departures from such termini or route; except those owned by school corporations or used exclusively in conveying school children to and from schools.

2. The term "motor carrier" shall mean any person operating any motor vehicle upon any highway in this state.

3. The term "highway" shall mean every street, road, bridge, or thoroughfare of any kind in this state.

4. "Board" means the transportation regulation board of the state department of transportation.

5. "Department" means the state department of transportation.

6. The term "charter" means the agreement whereby the owner of a motorbus lets the same to a group of persons as one party for a specified sum and for a specified act of transportation at a specified time and over an irregular route.

7. The term "charter carrier" means a person who engages in the business of transporting the public by motorbuses under charter. The term "charter carrier" shall not be construed to include taxicabs or persons, firms, or corporations having a license, contract or franchise with an Iowa municipality with a population of more than fifteen thousand people as shown by the last federal decennial census, to carry or transport passengers for hire, or a municipality with a population of more than fifteen thousand people as shown by the last federal decennial census, engaged in the business of carrying or transporting passengers for hire, provided however, that municipality or the person, firm or corporation having a license, contract or franchise with an Iowa municipality comply with sections 325.26, 325.28, 325.29, 325.31 and 325.35, or school bus operators when engaged in transportation involving any school activity or regular route common carriers of passengers.

325.2 Special powers of board. The board is hereby vested with power and authority, and it shall be its duty to:

1. Fix or approve the rates, fares, charges, classifications, and rules and regulations pertaining thereto, of each motor carrier, except that any carrier transporting livestock or unprocessed agricultural or horticultural products shall be exempt from tariff-filing requirements and the issuance of freight receipts if such carrier does not transport any other property for compensation.

2. Regulate and supervise the accounts, schedules, and service of each motor carrier.

3. Prescribe a uniform system and classification of accounts to be used, which among other things shall provide for the setting up of adequate depreciation charges, and after such accounting system shall have been promulgated, motor carriers shall use no other.

4. Require the filing of annual and other reports.

5. Supervise and regulate motor carriers in all other matters affecting the relationship between such carriers and the traveling and shipping public.

325.3 General powers. The board shall also have power and authority by general order or otherwise to prescribe rules and regulations applicable to any and all motor carriers. The department is hereby authorized and empowered to prescribe and enforce safety regulations in the operation of motor carriers, require a periodic inspection of the equipment of every motor carrier from the standpoint of enforcement of safety regulations, and such equipment shall be at all times subject to inspection by properly authorized representatives of the department.

325.4 Statutes applicable. All control, power, and authority over railroads and railroad companies now vested in the board insofar as the same is applicable, are hereby specifically extended to include motor carriers.

325.5 Rates. All charges made by any motor carrier for any service rendered or to be rendered in the public transportation of passengers or property, or in connection therewith, shall be just, reasonable and nondiscriminating, and every unjust, unreasonable, or discriminating charge for such service or any part thereof is prohibited and declared unlawful.

325.6 Certificate of convenience and necessity. It is hereby declared unlawful for any motor carrier to transport over a regular route or between fixed termini any person or property, for compensation, from any point or place in the state of Iowa to another point or place in said state irrespective of the route, highway or highways traversed, including the crossing of any state line of the state of Iowa, or the ticket or bill of lading issued and used for such transportation, without first having obtained from the board a certificate declaring that public convenience and necessity require such operation. No carrier of passengers shall operate as a charter carrier in this state unless already possessed of a certificate of convenience and necessity as a common carrier of passengers and operating in this state as such common carrier or possess a certificate of convenience and necessity to engage in the business of a charter carrier.

The board may allow the provision of temporary service for which there is an immediate and urgent need to point or points requested by the application for a certificate of public convenience and necessity upon a finding that no carrier has operating authority to serve those points or no carrier is currently serving those points and upon meeting the requirements of this chapter and the rules and regulations of the board. Such temporary authority, unless suspended or revoked for good cause, shall be valid for such time as the board shall specify but not more than an aggregate of one hundred eighty days, and shall create no presumption that the corresponding application will be granted thereafter.

325.7 When certificate to be issued. Before a certificate shall be issued, the board shall, after a public hearing, make a finding that the service proposed to be rendered will promote the public convenience and necessity if such finding be made, it shall be its duty to issue a certificate.

The board may issue a certificate, without holding a public hearing, if the service proposed will promote the public convenience and necessity and the service would not be provided if the expense of a public hearing was placed upon the applicant.

If a certificate is to be issued without a public hearing, the board shall publish notice of its action, at its own expense, in the same manner as provided in section 325.13. Written objections to the issuance of a certificate without holding a hearing may be filed within ten days of last publication of notice notwithstanding the provisions of section 325.16. If no objections are filed within ten days of last publication of the notice, the board may proceed to issue the certificate in the manner provided in section 325.18.

325.8 Financial ability of applicant. No certificate of convenience and necessity shall be issued until the applicant has made a satisfactory showing as to his financial ability to carry out the terms and conditions imposed.

325.9 Conditions. When the certificate is granted, the board may attach to the exercise of the rights therein conferred such terms and conditions as in its judgment the public convenience and necessity may require, which shall include the right and duty to transport newspapers.

325.10 Amendment or revocation. For just cause, the board may at any time alter, amend, or revoke any certificate issued.

325.11 Rules of procedure. The board shall adopt rules governing the procedure to be followed in the filing of applications and in the conduct of hearings.

325.12 Application for certificate. All applications shall be in writing and, in addition to the other information required, shall contain the following:

1. The name of the individual, firm, or corporation making the application.

2. The principal office or place of business of applicant.

3. A complete description of the route over which the applicant proposes to operate.

4. A schedule setting forth in detail the service which the applicant proposes to furnish.

5. A complete description of the equipment which the applicant proposes to use in furnishing the service.

6. A financial statement from which the board can determine whether or not the applicant is able to engage in the undertaking proposed in the application.

325.13 Time of hearing--notice. Upon the filing of the application, the board shall fix a date for hearing thereon and cause a notice addressed to the citizens of each county through or in which the proposed service will be rendered, to be published in some newspaper of general circulation in each county, once each week for two consecutive weeks.

325.14 Service of notice--place of hearing. Said hearing shall not be held less than ten days from the date of the last publication and at the office of the board unless a different place is specified in the notice.

325.15 Objections to application. Any person, firm, corporation, city, town, or county whose rights or interests may be affected shall have the right to make written objections to the proposed application.

325.16 Filing of objections. All such objections shall be on file with the board at least five days before the date fixed for said hearing. The board may permit objections to be filed later, in which event the applicant shall be given reasonable time to meet such objections.

325.17 Testimony receivable. It shall consider the application and any objections filed thereto and may hear testimony to aid it in determining the propriety of granting the application.

325.18 Granting application. It may grant the application in whole or in part upon such terms, conditions, and restrictions and with such modifications as to schedule and route as may seem to it just and proper. The actual operation of such motor vehicles or vehicle shall not begin without a written statement of approval from the department to the effect that the safety provisions have been complied with.

325.19 Expense of hearing. The applicant shall pay all the costs and expenses of the hearing and necessary preliminary investigation in connection therewith before his application shall be granted.

325.20 Deposit to cover expense. The board shall have the right to require the applicant to deposit with it at the time the application is filed, an amount of money to be determined by the board to secure the payment of the said costs and expenses.

325.21 Juridicial Review. Juridicial review of the decisions and actions of the board may be sought in accordance with the terms of the Iowa administrative procedure Act. Such petitioners must file with the clerk of the district court a bond for costs in the sum of not less than five hundred dollars.

325.22 to 325.24 Repealed by 65 GA, Ch 1090, §211, effective July 1, 1975.

325.25 Transfer of certificate. No certificate of convenience and necessity shall be sold, transferred, leased, or assigned until the motor carrier shall have operated thereunder for at least ninety days' continuous service, nor shall any contract or agreement with reference to or affecting any such certificate be made except with the written approval of the board. Nor shall any person be permitted to take over any such certificate unless he or it shall possess all the qualifications of and meet all the requirements and assume all the obligations imposed upon an original applicant.

325.26 Liability insurance and bond--proof of solvency. No certificate shall be issued until and after the applicant shall have filed with the board an insurance policy, policies, surety bond, or certificate of insurance, in form to be approved by the board, issued by some company, association, reciprocal or interinsurance exchange or other insurer authorized to do business in this state. The minimum limits of liability of any policies or surety bond shall, for each motor vehicle thereby covered, be as follows:

1. Passenger motor carriers.

a. To cover the assured's legal liability as a motor carrier for bodily injury or death resulting therefrom as a result of any one accident or other cause, twenty-five thousand dollars for any recovery by one person and subject to said limit for one person one hundred fifty thousand dollars for more than one person.

b. To cover the assured's legal liability as a motor carrier for damage to or destruction of any property other than that of or in charge of the assured, as a result of any one accident or other cause, ten thousand dollars.

c. To cover the assured's legal liability as a motor carrier for loss of or damage to property of passengers as a result of any one accident or any other cause, one thousand dollars.

d. Any common carrier of passengers coming under the provisions of this chapter, furnishing satisfactory proofs to the board of such carrier's solvency and financial ability to cover the assured's legal liability as provided for herein and make payments to such persons as may be entitled thereto as a result of such legal liability, or when such common carrier deposits with the board, surety satisfactory to it as to guarantee for such payments, such common carrier will be relieved of the provisions of this section requiring liability insurance, surety bond or certificate of insurance; but such common carrier shall, from time to time, furnish such additional proof of solvency and financial ability to pay as may be required by the board.

2. Freight motor carriers.

a. To cover the assured's legal liability as a motor carrier for bodily injury or death resulting therefrom, as a result of any one accident or other cause twenty-five thousand dollars for any recovery by one person and subject to said limit for one person fifty thousand dollars for more than one person.

b. To cover the assured's legal liability as a motor carrier for damage to or destruction of any property other than that of or in charge of the assured, as a result of any one accident or other cause ten thousand dollars.

c. To cover the assured's legal liability as a motor carrier for loss of or damage to property in the possession or custody of the assured while for the purpose of or being transported, except property of the assured as a result of any one accident or other cause ten thousand dollars. Such insurance policy, policies, surety bond, or certificate of insurance shall bind the obligors thereunder to make compensation for injuries to persons, excluding injury to or death of the applicant's employees while engaged in the course of their employment, and loss of or damage to property resulting from the operation of such motor carrier and for which such motor carrier would be legally liable. Such insurance policy, policies, surety bond, or certificate of insurance shall also provide that any person, firm, association or corporation having a right of action against such motor carrier for injuries to persons or loss of or damage to property, when service cannot be obtained on the motor carrier within this state, may bring action for recovery directly upon such insurance policy, policies, surety bond, or certificate of insurance and against such insurance company, association, reciprocal or interinsurance exchange or other insurer or bonding company. No other or additional policies, bonds, or certificates shall be required of any motor carrier by any city, town or other agency of the state.

325.27 Powers of cities. Cities may by ordinance adopt general rules of operation, and to designate the streets or routes over which motor carriers shall travel; provided, however, that the exercise of the power granted in this section shall be reasonable and fair.

325.28 Safe and sanitary condition of vehicle. Every motor vehicle and all parts thereof shall be maintained in a safe and sanitary condition at all times, and shall be at all times, subject to inspection by the members of the department.

325.29 Driver of vehicle. Every driver employed by a motor carrier shall be at least eighteen years of age, in good physical condition, of good moral character, shall be fully competent to operate the motor vehicle under his charge, and shall hold a regular chauffeur's license from the department.

325.30 Riding on outside part. On passenger-carrying motor vehicles passengers shall not be permitted to ride on the running boards, fenders, or on any other outside part of the vehicle.

325.31 Distinctive markings on vehicle. There shall be attached to each motor vehicle such distinctive markings or tags as shall be prescribed by the board.

325.32 Additional rules. The board shall promulgate such other safety rules and regulations as it may deem necessary to govern and control the operation of motor vehicles upon the highways and the maintenance and inspection thereof.

325.33 Cancellation of certificate. For violation of any provision of this chapter or of any rule or regulation promulgated thereunder by any motor carrier, the board may, in addition to other penalties herein provided, revoke and cancel the certificate of such motor carrier. In the event of any flagrant and persistent violation of safety regulations by the holder of a certificate or his agent, upon the request of the department the board shall suspend such certificate of necessity until the safety regulations prescribed by the department are complied with or the board may revoke the certificate at its discretion.

325.34 Misdemeanor--penalty. Every owner, officer, agent, or employee of any motor carrier, and every other person who violates or fails to comply with, or who procures, aids, or abets in the violation of any provision of this chapter, or who fails to obey, observe, or comply with any order, decision, rule, or regulation, direction, demand, or requirement or any part or provision thereof, of the department, or who procures, aids, or abets any corporation or person in his failure to obey, observe, or comply with any such order, decision, rule, direction, demand, or regulation or any part or provision thereof, shall be guilty of a misdemeanor and upon conviction shall be punished by a fine not exceeding one hundred dollars or by imprisonment in the county jail for a period of not to exceed thirty days.

325.35 Certificate conditioned on fee. No motor vehicle engaged in the transportation of property under a certificate of convenience and necessity issued under the provisions of this chapter shall be operated on the highways of this state unless there shall have been paid to the board for the administration of this chapter an annual fee in the amount of five dollars; provided, however, that the fee herein provided shall not be imposed on any tractor or truck tractor; provided, however, that the fee herein provided for each semitrailer shall be in the amount of six dollars.

For the purposes of this section the terms "tractor or truck tractor" shall mean every self-propelled vehicle designed and used primarily for drawing other vehicles and not so constructed as to carry a load other than a part of the weight of the vehicle and load so drawn.

It shall be a misdemeanor, punishable by a fine of not to exceed one hundred dollars or by imprisonment in the county jail not to exceed thirty days, for any motor carrier to operate any motor vehicle for which the annual fee has not been paid and the board may revoke the certificate of convenience and necessity of any such violator.

325.36 Use of fees. All moneys received under the provisions of this chapter shall be remitted to the treasurer of state and credited to the general fund of the state.

325.37 Safety equipment and regulations for all truck operators. "Motor carrier" when used in this section and sections 325.38 and 325.39 means carriers holding a certificate under this chapter, truck operators and contract carriers holding permits under chapter 327, liquid transport carriers holding a certificate under chapter 327A, and private carriers.

325.38 Additional requirements. In addition to the requirements set forth in chapter 321, the department, in order to promote safety of operation, shall establish reasonable requirements prescribing standards of equipment for vehicles operated by motor carriers on the highways of this state pertaining to the following:

1. Lighting devices, reflectors, and electrical equipment.

2. Brakes.

3. Glazing and window construction.

4. Fuel systems.

5. Coupling devices and towing methods.

6. Emergency equipment.

7. The following miscellaneous parts and accessories:

a. Tires.

b. Heaters.

c. Windshield wiper.

d. Defrosting device.

e. Rear vision mirrors.

f. Horn.

g. Speedometer.

h. Exhaust system location.

i. Floors.

j. Protection against shifting cargo.

k. Rear end protection.

l. Flags on projecting loads.

m. Television receivers.

n. Buses, drive shaft protection.

o. Buses, standee line or bar.

p. Buses, aisle seats.

q. Buses, marking emergency doors.

325.39 Violations. It shall be unlawful for any person to operate any vehicle subject to the standards prescribed by the department on the highways of this state in violation of such standards.

ARTICLE F
OPERATING AUTHORITY
CHAPTER 4
MOTOR CARRIERS AND CHARTER CARRIERS

820[07,F] - 4.1(325) General information.

4.1(1) General. These rules are subject to such changes, modifications and amendments as the department may from time to time promulgate and adopt under the provisions of Chapter 17A of the Code.

4.1(2) Waiver or suspension of rules. The adoption of these rules shall in no way preclude the department from altering or amending them, pursuant to statute. These rules shall in no way relieve any carriers from any of its duties under the laws of this state. The department may in its discretion on its own motion or upon request for good cause shown, suspend or waive any of the rules.

4.1(3) Person defined. The word "person" when used in the rules of the department will be construed by the department as including any individual, firm, copartnership, joint venture, association, corporation, estate, trust, business trust, receiver or any other group or combination acting as a unit, in the plural as well as in the singular number.

4.1(4) Extension of authority. Any motor carrier holding a certificate of convenience and necessity under Chapter 325, shall not provide a transportation service as a truck operator or as a contract carrier as defined in Chapter 327.

4.1(5) C.O.D. remittance. Upon collection of a C.O.D. bill, the carrier collecting same shall make prompt remittance. Remittance must be made to the consignor or party entitled to receive the amount as shown on the bill of lading within ten days after delivery of shipment to the consignee.

4.1(6) Bill of lading or receipts for freight and baggage. Every motor carrier shall issue in triplicate a bill of lading or a receipt for freight received for shipment, which receipt shall contain the following:

a. Name of motor carrier.

b. Date and place received.

c. Name of consignor.

d. Name of consignee.

e. Destination.

f. Description of shipment.

g. Weight.

h. Rate and charges.

i. Signature of motor carrier or agent.

One copy of such bill of lading or receipt shall be furnished to the consignor, one to the consignee and one retained by the motor carrier. Passenger motor carriers shall issue to passengers a check for baggage tendered to their care.

4.1(7) Passengers and freight. No passenger motor carrier, charter carrier shall transport express, other than newspapers, nor shall any freight motor carrier transport passengers, unless specifically authorized by the department to do so. Express transported on passenger carrying motor vehicles shall be of such character and not greater in amount than can be safely and conveniently transported without causing discomfort or hazard to passengers.

4.1(8) Redemption of passenger tickets. Passenger motor carriers shall provide for the redemption of unused passenger tickets at the place of purchase and at the carrier's main office in accordance with the provisions of Sections 479.99 and 479.100 of the Code.

820[07,F] - 4.2(325) Insurance.

4.2(1) Insurance requirements. Each motor carrier and charter carrier shall at all times maintain on file with the department effective insurance policy, policies or surety bond required by the provisions of Chapter 325 of the Code. Such policy, policies or surety bond shall be written for a period of one year or more. A certificate of insurance may be filed in lieu of a policy as prescribed by the department. Motor carriers and charter carriers operating exclusively in interstate commerce need not file with the department cargo insurance prescribed by Section 325.26 of the Code.

4.2(2) Endorsement of policy. Every policy filed or for which a certificate of insurance is filed with the department shall have attached thereto the prescribed and applicable required endorsement or endorsements.

4.2(3) Certificates of insurance. Certificates of insurance filed with the department for motor carriers or charter carriers in lieu of insurance policies written for the limits as prescribed by Chapter 325 of the Code, shall be in accordance with the forms prescribed by the department.

4.2(4) Reserved for future use.

4.2(5) Cancellation. Thirty days prior written notice shall be given the department on the cancellation of any certificate of insurance or surety bond filed with the department for a motor carrier or charter carrier. Notices of cancellation shall show the correct name and address of the assured as then shown in the policy, the correct name of the insurance company and the correct number of the policy. Specific coverage under a policy may be canceled when the notice of cancellation includes that information.

4.2(6) Reserved for future use.

4.2(7) Surety bond. In case a motor carrier or charter carrier desires to file a surety bond to comply with the requirements of Section 325.26, of the Code, the department upon request will prescribe the form of such bond.

4.2(8) Policies, certificates and bonds to remain on file. Certificates of insurance and surety bonds as prescribed by the department, filed with the department by motor carriers or charter carriers shall remain on file in the office of the department and must not be removed therefrom except with the express permission of the department.

4.2(9) Suspension. Where regular route motor carriers and charter carriers fail to have effective insurance on file with the department or fail to pay the regulatory certificate fee, the department may suspend the authority of such carriers. The suspension shall remain in force and effect until the operator meets the requirements of Section 325.26 (insurance) or Section 325.35 (fees) of the Code, or both. The carrier affected by the suspension order may, upon request, have a hearing before the department.

820[07,F] - 4.3(325) Self-insurance passenger carriers.

4.3(1) Applications for self-insurance. A motor carrier of passengers requesting self-insurance shall: Make application in writing, file a balance sheet for the calendar year immediately preceding the current year up to and including the full quarter preceding the application. The applicant shall furnish any information the department may deem necessary with the application or at any time during the period of self-insurance.

4.3(2) Filing of balance sheets. Upon authorization by the department, a self-insurer shall file with the department, balance sheets within 30 days after the close of each quarter, during the period of self-insurance.

4.3(3) Surety bond. The applicant shall file with the department a surety bond in the penal sum of $1,000.

4.3(4) Authorization. After receipt and consideration of the items and information required by subrules 4.3(1), 4.3(2) and 4.3(3) above, the department may authorize a common carrier of passengers to self-insure.

4.3(5) Cancellation of self-insurance. The department shall have the right to cancel self-insurance at any time it may deem necessary.

820[07,F] - 4.4(325) Marking of equipment.

4.4(1) Manner of marking equipment. Before placing any equipment in service there shall be painted on each side of the equipment and on the headboards, if appropriate, or on some suitable material securely placed on each side of such equipment, in letters and figures large enough to be easily read at a distance of 50 feet and in a color in contrast to the background the following:

a. Markings for all passenger carrying motor vehicles, except as otherwise approved by the department.

(1) Name of motor carrier or charter passenger carrier under whose authority equipment is being operated.

(2) Ia. D.O.T. Cert. ....
(Number of Certificate)
or
Ia. D.O.T. Cert. C.C. ....
(Number of certificate)

b. Markings for all freight carrying motor vehicles operating under intrastate authority:

(1) Name of motor carrier under whose authority equipment is being operated.

(2) Address of motor carrier (city and state).

(3) Ia. D.O.T. Cert. ....
(Number of certificate)

4.4(2) Equipment in service after July 1, 1975. Any passenger or freight carrying motor vehicle placed into service after July 1, 1975, will be required the markings as defined in subrule 4.4(1) above.

4.4(3) Equipment in service July,1, 1976. Any passenger or freight carrying motor vehicles in service as of July 1, 1976, will be marked as defined in subrule 4.4(1) above.

820!07,F1 - 4.5(325) Motor carrier application.

4/25/83

4.5(1) Application for a certificate. Application for a certificate of convenience and necessity to operate as a motor carrier shall be made to the Iowa Department of Transportation, Motor Vehicle Division, State Capitol, Des Moines, Iowa, upon the forms prescribed for that purpose provided by the department. All such applications shall be typewritten.

4.5(2) Deposit. Application for a certificate of convenience and necessity must be accompanied by deposit sufficient to secure the payment of all costs and expenses of hearing and any preliminary investigation necessary in connection therewith. Such deposits shall not be less than $400, the department reserving the right to require such additional deposit as it may deem necessary. Deposit shall be made by certified check, bank draft, express money order or postal money order, payable to the Iowa Department of Transportation. Any unused balance of a deposit will be refunded to the applicant.

4.5(3) Notice of hearing. The applicant will be notified as to the time and place for hearing as soon as named by the department, and furnished with copies of the official notice of hearing, which the applicant shall cause to be published on the same day of the week two consecutive weeks in some newspaper of general circulation published in each county through or in which the proposed service will be rendered. The last publication of said notice must be made not less than ten days prior to the date of hearing. Proof of publication from each newspaper in which the notice was published must be filed with the department five days prior to the date of hearing. Failure to file such proofs shall be grounds for cancellation of the hearing. The applicant shall pay the cost of such publication and shall file receipt from each newspaper showing the cost of publication has been paid. Prior to publication, the applicant shall examine said notice and notify the department of applicant's approval of the form and content of the notice or submit a revised notice to the department.

802[07,F] - 4.6(325) Placing motor vehicles in service.

4.6(1) Annual certificate fee. The annual certificate fee of five dollars for each truck and six dollars for each semitrailer used in intrastate commerce for each year or any part of the year in which the vehicle is used shall be due and payable on or before the first day of January or at the time the vehicle is placed in service and should be remitted in the form of a certified check, bank draft, cashier's check, express money order or postal money order payable to the Iowa Department of Transportation. A complete description of the vehicle on which the fee is paid shall accompany the remittance. (Certificate fees are not payable on tractors or truck tractors).

4.6(2) Fee receipt. The holder of an intrastate certificate shall be furnished a receipt for each certificate fee paid. The receipt shall be carried with the described vehicle at all times. Any vehicle requiring a duplicate fee receipt, which is a matter of record, will be reissued for a charge of $3.00 for each semitrailer receipt and $2.50 for each truck or bus receipt.

4.6(3) Equipment changes or additions. Before placing any additional or replacement bus, truck or semitrailer in intrastate service, the holder of the certificate shall furnish the department a description of such motor vehicles together with the information as to the time placed in service, make of equipment, factory number and year built. The holder of the certificate shall also furnish the department information as to whether or not a current certificate fee has been paid on said motor vehicle by another certificated holder under this chapter, together with information as to time placed in service under present certificated carrier's authority. The holder of the certificate shall pay the department an annual fee on such motor vehicle provided the fee has not been paid for the current year under this chapter.

4.6(4) Commencement of operations. Motor carriers shall begin operating within 30 days after a certificate of convenience and necessity has been issued. Service authorized shall commence within 30 days from the effective date of the certificate, or the operating rights previously granted shall be forfeited unless otherwise ordered by the department.

4.6(5) Interruptions of regular service. All interruptions of regular service, where such interruptions are likely to continue for more than 48 hours, shall be promptly reported in writing or by wire to the department and to the public along the route, with a full statement of the cause of such interruption and its probable duration.

4.6(6) Suspension of motor carrier service. Suspension of service for a period of five consecutive days without prior written notice to the department detailing the reason for the suspension of service, shall be cause for forfeiture of all operating rights.

4.6(7) Unauthorized extensions of certificate. Motor carriers holding a truck operator permit, a contract carrier permit or both shall not avoid or modify exceptions or limitations in a certificate of convenience and necessity by using any authority granted by such permits. The department reserves the right to refuse the issuance of a truck operator permit and/or contract carrier permit to a motor carrier or any entity under direction or control of such motor carrier.

4.6(8) Established route. In all cases where the route or any part of the route of any motor carrier shall be closed by the public authorities for repairs or for any purpose, the detour prescribed by the public authorities as a substitute for such road shall be the authorized route of the motor carrier until such time as the regular route shall be reopened for public travel. No motor carrier shall receive or discharge passengers or freight on a detour. This subrule shall not be applicable to charter carriers.

820[07,F] - 4.7(325) Time schedule.

4.7(1) Time schedule of operation. Time schedules must be printed or typewritten, numbered consecutively, beginning with number 1, and shall show:

a. Name and address of motor carrier.

b. Number of schedule canceled thereby.

c. Time of arrival at and departure from all terminals.

d. Time of departure from all intermediate points.

e. What days each scheduled trip is made.

f. What points, if any, on the route of the carrier to which service cannot be rendered, and reasons therefor.

g. Date issued.

h. Date effective.

4.7(2) Every application for a certificate of convenience and necessity or to change time schedule must be accompanied by a copy of the proposed schedule. Additional copies shall be furnished when requested by the department.

4.7(3) No motor carrier of passengers shall change a time schedule, or reduce, or discontinue a scheduled service until after at least 30 days' notice in writing of such change, reduction, or discontinuance has been given to the department, competitive and connecting passenger carriers, and the traveling public. Shorter notice may be authorized by the department upon special request. The notice to the public shall be given by posting the proposed new schedule or notice of discontinuance, in a conspicuous place at each station or stopping place on the route, and by sending a copy of such notice to the local newspapers and mayors of points affected by such change or discontinuance. After such notice has been given, the proposed new time schedule or discontinuance shall be in full force and effect, unless otherwise ordered by the department.

4.7(4) Reserved for future use.

820[07,F] - 4.8(325) Records and reports.

4.8(1) Records. Every motor carrier shall keep an accurate record of assets and liabilities, cost and depreciation of all equipment and other physical property owned, receipts from operation, operating and other expenses, total amount of freight hauled in pounds by commodity, number of passengers carried, actual miles traveled within and without the state and such other information the department may deem necessary.

4.8(2) Reports. Every motor carrier shall file with the department for the calendar year an annual report, duly verified, in such form as the department may prescribe, on or before March 31 of the year following that for which the report is filed. The department will prescribe the character of the information to be embodied in such annual report and will furnish a blank form therefor.

820[07,F] - 4.9(325) Passenger and freight motor carrier safety rules. The laws of the State of Iowa and all rules and safety regulations promulgated by the U.S. Department of Transportation, Federal Highway Administration, and Bureau of Motor Carrier Safety, as published in parts 390-397, Title 49 C.F.R., and regulations relating to the transportation of hazardous materials as published in parts 170-173 and 177-179 Title 49 C.F.R., not in conflict with the laws of the State of Iowa are hereby adopted as the safety rules and regulations of this department. Parts 170-173 and 177-179 of Title 49 C.F.R. as they pertain to the transportation of hazardous materials shall be effective to regulate and control the transportation of radioactive materials in addition to all other hazardous materials until such time as rules pertaining to the transportation of radioactive materials are promulgated by the Solid Waste Disposal Commission of the Iowa Department of Environmental Quality. When said rules have been promulgated by the Solid Waste Disposal Commission and have been adopted and are effective, they shall take precedence over the rules contained in parts 170-173 and 177-179 of 49 C.F.R. only to the extent to which said parts 170-173 and 177-179 pertain to the transportation of radioactive materials. Copies of the Motor Carrier Safety Regulations promulgated by the U. S. Department of Transportation may be obtained from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402.

820[07,F] - 4.10(325) Reserved for future use.

820[07,F] - 4.11(325) Reserved for future use.

820[07,F] - 4.12(325) Application, transfer, lease, assignment or stock purchase of a certificate of convenience and necessity.

4.12(1) Sale, transfer, lease, assignment or control through corporate stock acquisition. Application for the department's approval of a proposed sale, transfer, lease, assignment or control through corporate stock acquisition of a motor carrier certificate of convenience and necessity must be typewritten, signed and sworn to by parties interested. Proposed sale, transfer, lease, assignment or control through corporate stock acquisition shall not become effective until approved by the department. Such application shall contain:

a. The name and address of the holder of the certificate, the certificate number and the authority granted thereby.

b. The name and address of the person proposing to take over or lease the certificate.

c. A statement as to whether it is proposed to sell, transfer, lease, or assign the certificate or control through corporate stock acquisition, the reasons therefor, and a request that the department approve such proposal.

d. A statement that a financial statement of the person proposed to take over or lease the certificate is attached to the application. Form of financial statement will be furnished by the department upon request.

e. A statement that two copies each of the time schedule and tariff proposed to be placed in effect are attached to the application.

f. The proposed consideration or amount to be paid for the certificate.

g. A description of all property proposed to be sold, transferred, leased, assigned or acquired through stock purchase and the amount to be paid therefor.

h. A statement that a copy of the proposed lease is attached to the application, if it is proposed to lease the certificate.

i. A statement that copies of all contracts, agreements and other stipulations between the parties to the application are attached to the application.

j. A complete description of each bus, truck or combination tractor-truck, semitrailer or trailer to be operated by a person proposing to take over or lease the certificate.

k. A statement that the proposed sale, transfer, lease, assignment or stock purchase is not for the purpose of hindering, delaying or defrauding creditors.

l. A statement, including the name and address of each of the transferor's known creditors, signed and sworn to, certifying that each has been mailed notice of proposed transfer.

m. The date on which it is desired that such proposed sale, transfer, lease, assignment or stock purchase shall become effective.

n. Such other facts as may be necessary to give the department complete information regarding the proposed transaction.

4.12(2) Reserved for future use.

820[07,F] - 4.13(325) <u>Lease of equipment</u>.

4.13(1) Lease defined. Lease, for the purpose of these rules, means a written document providing for the exclusive possession, control and responsibility over the operation of the vehicle or vehicles by the lessee for a specific period of time as if such lessee were the owner. A copy of the lease must be carried in the leased equipment at all times.

4.13(2) Number. No motor carrier or charter carrier may have more than one lease covering a specific piece of equipment in effect at a given time.

4.13(3) Lease of vehicles to shippers or receivers. No motor carrier or charter carrier shall lease vehicles with or without drivers to shippers or receivers.

4.13(4) Identification of equipment. Each lessee shall properly identify each piece of equipment, during the period of the lease, as specified in rule 4.4(325) above.

4.13(5) Conditions. Any lease of equipment by any motor carrier or charter carrier except under the following conditions is prohibited:

a. Every such lease must be in writing and signed by the parties thereto or their regular employees or agents duly authorized to act for them.

b. Every lease shall specify the time the lease begins and the time or circumstances on which it ends.

c. Every lease shall set out specific consideration of method of determining compensation.

d. Every lease shall provide for the exclusive possession, control and use of the equipment and for the complete assumption of responsibility in respect thereto by the lessee for the duration of said lease.

820[07,F] - 4.14(325) Tariffs.

4.14(1) Filing of tariffs, schedules and classifications. Every applicant seeking authority to operate under a certificate of convenience and necessity must file tariffs which comply with the provisions of this rule before authority requested can be issued. All tariffs and schedules, including classifications filed on and after the date of approval hereof, must conform to the following regulations, except as otherwise indicated herein or as otherwise authorized by the department.

The term "tariff" as used herein means a publication stating the rates, fares and charges of a motor carrier, and all rules which said motor carrier applies in connection therewith.

The term "classification" as used herein means a publication stating the ratings (first, second, third, fourth, etc.) which are to be applied in the connection with the rates named in said tariff.

4.14(2) All tariffs and amendments or supplements thereto must be in book, pamphlet, or loose-leaf form of size 8 x 11 inches. They must be plainly printed, or reproduced by a durable process on good quality paper. No alteration in writing or erasure shall be made in any tariff or supplement thereto. A margin of not less than five-eights inch, without any printing thereon must be allowed at the binding edge of each tariff and supplement.

4.14(3) All tariffs and supplements hereafter issued must be filed and posted at least 30 days prior to the effective date thereof, unless otherwise authorized by the department, except the tariffs or supplements issued in connection with new or changed operating authority, or issued to reflect the transfer or leasing of operating authority from one motor carrier to another, may be filed and posted to become effective on less than 30 days' notice, under authority of the department's docket number covering the establishment, changing, transfer or leasing of operating authority.

4.14(4) Issuing carriers or their agents shall transmit to the department, as aforesaid, one copy of each tariff, supplement or revised page. Each copy shall be included in one package accompanied by a letter of transmittal listing all tariffs enclosed and addressed to the Iowa Department of Transportation, Motor Vehicle Division, State Capitol, Des Moines, Iowa 50319. All postage or express must be prepaid.

4.14(5) The title page of each tariff shall contain:

a. Each tariff hereafter issued shall be numbered in upper right-hand corner, beginning with number 1. Such number shall be shown as follows:
Ia. D.O.T. No. ....

When tariffs are issued canceling a tariff or tariffs previously filed, the Ia. D.O.T. number or numbers that have been canceled must be shown in the upper right-hand corner under the Ia. D.O.T. number of the new tariff.

EXAMPLE: Ia. D.O.T. No. 2
cancels
Ia. D.O.T. No. 1

b. Amendments or supplements to a tariff in addition to showing the Ia. D.O.T. number of the tariff amended thereby shall be numbered beginning with the number 1 and such information shall be shown in the upper right-hand corner. Supplements shall also show in the upper right-hand corner the number of any previous supplements canceled thereby and also the numbers of the supplements containing all changes made in the tariff.

EXAMPLE: Supplement No. 5 to
Ia. D.O.T. No. 1
cancels
Supplements Nos. 3 and 4
Supplements Nos. 2 and 5
contain all changes.

c. Name of carrier or name of agent issuing tariff.

(1) Whenever two or more carriers join in a through rate, fare or charge, the names of all participating carriers must be shown. The name of each carrier must be the same as that appearing in its certificate.

(2) If the carrier is not a corporation, and a trade name is used, the name of the individual or partners must precede the trade name.

(3) Whenever two or more carriers join in a through rate, fare or charge, authority by means of proper power of attorney or concurrence, as provided in subrule 4.14(12) and 4.14(13) hereof, must be given the agent or carrier publishing the tariff.

d. A brief description of the districts in which, or points from and to which the tariff applies.

e. Date of issue and date effective.

f. Name, title and street address of officers or agent by whom tariff is issued.

4.14(6) Tariff publication shall contain in the order named:

a. Index arranged alphabetically showing the tariff contains so small a volume of matter that its title page or interior arrangement plainly indicates its contents, the index may be omitted. No index need be shown in tariffs of less than five pages or if the rates or fares to each destination are alphabetically arranged.

b. Explanation of all abbreviations, symbols and reference marks used in the tariff.

c. When a tariff names rates by classes, a classification of articles must be published in the tariff or in a separate tariff of classification. When a rate tariff is governed by any separately published tariff of classification, tariff of classification exceptions, tariff or rules, or other similar publication affecting the provisions of the tariff reference shall be made in the rate tariff to such separate governing tariffs. A rate tariff may not refer to another rate tariff for classification ratings, exceptions to the classification, rules, lists of commodities, list of points assigned rate groups or rate basis, or other governing provisions. All carriers shown as participating carriers in a rate tariff which is governed by separately published governing tariffs, must be named as participating carriers in such separate governing tariffs. Carriers or their agents may not publish class or commodity rates which duplicate or conflict with other rates published by or for account of such carriers.

d. Tables of rates. All rates must be specifically stated in cents or in dollars and cents, per 100 pounds, per mile, per ton of 2,000 pounds per stated truck load or other definable measure. Where rates are stated in amounts per package or bundle definite specifications of the packages or bundles must be shown.

e. Tables of fares. An explicit statement of the fares in cents or in dollars and cents, together with the names or description of the points from and to which they apply. Tariffs containing tables of rates or fares based on distances from point of origin to destination must show the mileage, or indicate a definite method by which such mileage shall be determined.

4.14(7) Commodity rates. Commodity rates, either specific point-to-point rates or based on distance scales, in stated truckload or in less-than-truck-load quantities may be published, and where they differ from the regular class rate basis, the lower rate shall take preference.

4.14(8) Excursion fares. Fares for a round-trip excursion limited to a designated period of not more than three days may be established without further notice, upon posting of tariff one day in advance in a public conspicuous place where tickets for such round-trip excursions are sold and filing the required number of copies thereof with the department. Fares for a round-trip of more than three days and not more than 30 days, and fares for a series of daily round-trip excursions not exceeding 30 days, may be established upon a like notice of three days. No supplement may be issued to any tariff which is published under this rule for the purpose of canceling the tariff.

4.14(9) Tariff changes. All rates, charges and classifications which have been filed with the department must be allowed to become effective and remain in effect for a period of at least 30 days before being changed, canceled or withdrawn, unless otherwise authorized by the department.

All tariffs, supplements and revised pages (including classifications) shall indicate changes from preceding issues by use of the following symbols which must be shown directly in connection with each change:

↓ or (R) to denote reductions
◆ or (A) to denote increases
▲ or (C) to denote changes, the result of which is neither an increase nor a deduction.

4.14(10) Posting regulations. Each carrier must post and file at some designated point at each of its stations or offices all of the tariff or schedules applying from, or to, or at, such station or office and must also post and file at its principle place of business all of its tariffs and schedules. All tariffs or schedules must be kept available for public inspection or examination at all reasonable times.

4.14(11) Applications. Carriers or agents when making application for permission to establish rates, fares, charges, classification ratings or rule on less than statutory (30 days') notice shall use the form prescribed by the department.

4.14(12) Powers of attorney. Whenever a carrier desires to give authority to an attorney and agent to issue and file tariffs and supplements thereto in its stead, a power of attorney in the form prescribed by the department shall be used.

4.14(13) Concurrence notice. Whenever a carrier desires to concur in tariffs issued and filed by another carrier or its agent, a concurrence using the form prescribed by the department shall be issued in favor of such carriers. The original of all powers of attorney and concurrences shall be filed with the department and a duplicate of the original sent to the agent or carrier in whose favor such document is issued.

Whenever a carrier desires to cancel the authority granted an agent or another carrier by power of attorney or concurrence, this may be done by a letter addressed to the department revoking such authority on 60 days' notice. Copies of such notice must also be mailed to all interested parties.

PASSENGERS

AMERICAN BUS LINES, INC., 1805 LEAVENWORTH ST., OMAHA, NEBRASKA 68508
MAILING ADD: P.O. BOX 730, WICHITA, KANSAS 67301

C-12	(Freight 100 lbs.) Shenandoah, Sidney, Tabor, Glenwood, Council Bluffs and the west line of the State. Shenandoah, Norwich and Clarinda.
C-19	Transportation of passengers and a limited amount of freight (300 lbs.) on any one bus at any one time between Keokuk and Burlington and intermediate points, over U. S. Highway 61.
C-135	(Freight 300 lbs.) Des Moines, Norwalk, Prole, Martensdale, Bevington, Patterson and Winterset..
C-236	(Freight 100 lbs.) East line of the State at Burlington, West Burlington, Middletown, Danville, New London, Mount Pleasant, Lockridge, Glendale, Fairfield, Bernard, Batavia, Agency City and Ottumwa. Ottumwa, Bidwell, Munterville, Albia, Georgetown, Melrose, Russell and Chariton.
C-247	(Freight 100 lbs.) Glenwood, Malvern, Hastings, Emerson, Red Oak, Tenville and Villisca.
C-251	(Freight 100 lbs.) Sidney, Hamburg and the South line of the State.
C-252	Chariton, Lucas, Osceola, Murray, Thayer, Talmage, Afton, Creston, Corning, Hoyt, Villisca, Orient and Greenfield, PROVIDED that the transportation of freight be limited to (100 lbs.) on any one vehicle at any one time to points named in this Certificate EXCEPT freight limited to (500 lbs.) between Greenfield, Orient and Creston.
C-262	(Freight 100 lbs.) Villisca and Clarinda.
C-300	(Freight 150 lbs.) Washington, West Chester, Keota, Sigourney, Delta, Rose Hill and Oskaloosa.
C-362	(Freight 100 lbs.) Des Moines, Carlisle, Hartford, Wheeling, Pleasantville, Knoxville, Lovilia and Albia.
C-363	Clarinda, Shambaugh, Braddyville and the south line of the State.
C-380	(Freight 150 lbs.) Oskaloosa, Tracy and Knoxville.

AMERICAN BUSLINES, INC. (Continued)

C-582 (Freight 100 lbs.) Davenport, Buffalo, Montpelier, Fairport, Muscatine, Fredonia, Columbus Junction, Cotter, Ainsworth, Washington, West Chester, Sigourney, Rose Hill, Oskaloosa, Knoxville, Pleasantville, Hartford, Carlisle, Des Moines, Fort Des Moines, Norwalk, Martensdale, Bevington, Patterson, Winterset, Maple Grove, Greenfield, Fontanelle, Bridgewater, Massena, Cumberland, Lyman, Griswold, Carson, Treynor, Council Bluffs and the West line of the State of Iowa, EXCEPT for the transportation of:

(a) Local passengers between Washington and Oskaloosa and points intermediate thereto.

(b) Passengers and freight originating at Oskaloosa and destined to Des Moines.

(c) Passengers and freight originating at Des Moines and destined to Oskaloosa.

(d) Passengers and freight originating at Griswold, Carson, Treynor and Council Bluffs and destined to another of these points.

C-602 (Freight 100 lbs.) The South line of the State of Iowa at Keokuk and Montrose, Fort Madison, Wever, Burlington, Mediapolis, Newport, Wapello, Muscatine, Atalissa, West Liberty, Iowa City, North Liberty, Shueyville and Cedar Rapids EXCEPT for the transportation of:

(a) Iowa intrastate passengers or freight originating or interchanged at Keokuk and Burlington and points intermediate thereto and destined to another of those points or for transfer to another carrier at any of those points on any scheduled trip between Keokuk and Burlington and points intermediate thereto, EXCEPT one scheduled trip northbound daily, leaving Keokuk at approximately 10:23 o'clock a.m. and one scheduled southbound trip daily, leaving Burlington at approximately 9:55 o'clock p.m.

(b) Local passengers or freight originating at West Liberty and Iowa City and points intermediate thereto and destined to another of those points, and

(c) Local passengers or freight originating at Iowa City and Cedar Rapids and points intermediate thereto and destined to another of those points.

Please substitute this sheet for sheet No. 2 for the above named carrier. The Commission effective April 25, 1972, amended Certificate No. 582.

Docket No. H-5076
4-27-72

PASSENGERS

AMERICAN BUSLINES, INC. (Continued)

C-656 (Freight 300 lbs.) Leon, Decatur City, Kellerton, Mount Ayr, Dolphus Junction, Redding and the south line of the State.

C-657 (Freight 300 lbs.) Leon, Decatur City, Kellerton, Mount Ayr, Benton, Bedford, New Market and Clarinda.

Keokuk, Mooar, Summitville and Fort Madison EXCEPT for the transportation of passengers or freight originating at Keokuk, Mooar, Summitville or Fort Madison and destined to another of those points.

C-660 (Interstate exclusively - Freight 300 lbs.) The West line of the State, thence via Iowa Highway 3 to the Junction with U. S. Highway 275.

C-680 (Freight 300 lbs.) Burlington, West Burlington, Middletown, and points intermediate thereto, on the one hand and Augusta on the other hand.

Burlington, West Burlington, Middletown and Augusta on the one hand and all points in United States Government Reservation (Iowa Ordinance Plant) located in Flint River, Danville, Union and Augusta Townships, Des Moines County, Iowa, on the other hand, and all points in said Reservation over most convenient route available.

C-720 (Freight 300 lbs.) Mount Ayr, Arispe and Afton via U. S. Highway 169.

The Junction of U. S. Highways 34 and 169, Lorimor and Winterset, via U. S. Highway 169.

C-795 (Freight 300 lbs.) Between Iowa City and Cedar Rapids and intermediate points via U. S. Highway 218 on its through busses, operating in accordance with its through schedules, PROVIDED that local busses shall not be operated between Iowa City and Cedar Rapids.

C-830 (Freight 300 lbs.) Stanton and the Junction of U. S. Highway 34 and Iowa Highway 120. Tingley and the Junction of U. S. Highway 169 and Iowa Highway 259.

C-967 (Freight 100 lbs.) Between Red Oak, Essex and Shenandoah, Iowa.

Please remove Page 3 of the abstract of authority for the above named operator and substitute this sheet. The Commission has issued Certificate of Convenience and Necessity No. C-967.

PASSENGERS
(Intrastate)

GREYHOUND LINES, INC. (GREYHOUND LINES - WESTERN DIVISION), 371 Market St., San Francisco, California 94106
MAILING ADDRESS: Greyhound Tower, Phoenix, Arizona 85077
Interstate Registration File RN-393

C-676 (Freight 200 lbs.)

Route 1: The East line of the State of Iowa at Clinton, thence via DeWitt, Grand Mound, Calamus, Wheatland, Lowden, Clarence, Stanwood, Mechanicsville, Lisbon, Mt. Vernon, Cedar Rapids, Belle Plaine, Chelsea, Tama, Toledo, Montour, LeGrande, Marshalltown, State Center, Colo, Nevada, Ames, Boone, Ogden, Beaver H.S., Grand Junction, Jefferson, Scranton, Ralston, Glidden H.S., Carroll, West Side, Vail, Denison, Arion, Dow City, Dunlap, Woodbine, Logan, Missouri Valley, Loveland, Honey Creek, Crescent, Council Bluffs and the West Line of the State of Iowa at Council Bluffs.

Route 2: The East Line of the State of Iowa at Davenport, thence via Walcott H.S., Stockton H.S., Durant, Wilton Junction, Atalissa, West Liberty, Iowa City, Coralville, Tiffin, Oxford H.S., Homestead, South Amana H.S., Marengo, Ladora, Victor, Carnforth, Brooklyn, Grinnell, Kellogg, Newton, Colfax, Mitchellville, Altoona, Des Moines, Waukee, Adel, Redfield, Dexter, Stuart, Menlo, Casey, Adair, Anita, Wiota, Atlantic, Lewis H.S., Oakland, Council Bluffs and the West line of the State at Council Bluffs.

Route 3: Transferred to River Trails Transit Lines, Inc.

Route 4: Dubuque, Cascade, Monticello, Langworthy, Anamosa, Fairview, Springville, Marion and Cedar Rapids.

Route 5: Junction U. S. Highway 30 and Iowa Highway 150, Tipton, Bennett, New Liberty, Plainview, Maysville and Davenport.

Route 6: Homestead, Amana, Walford, Fairfax and Cedar Rapids.

Route 7: Cedar Falls, Waterloo, Hudson, Traer, Toledo and Tama.

Route 8: Marshalltown, Melbourne, Bondurant and Des Moines.

Route 9: Fort Dodge, Duncombe, Highview, Webster City, Blairsburg H.S., Jewell, Story City, Ames, Huxley, Ankeny and Des Moines.

PASSENGERS

GREYHOUND LINES, INC. (GREYHOUND LINES - WESTERN DIVISION) (Continued)

C-676-Cont.

Route 10: Des Moines, Prairie City, Monroe, Otley, Pella, Oskaloosa, Cedar, Fremont and Ottumwa.

Route 12: Des Moines, Polk City, ~~Madrid~~, Luther and Boone.

Route 13: Denison, Kiron H. S., Odebolt, Early, Storm Lake, Truesdale, Rembrandt, Sioux Rapids, Spencer, Fostoria, Milford, Arnolds Park, Okoboji, Spirit Lake, Superior, Estherville, Armstrong and the North line of the State of Iowa.

Route 14: Missouri Valley, Mondamin, River Sioux, Blencoe, Onawa, Whiting, Sloan, Salix, Sergeant Bluff and Sioux City.

Route 15: Denison, Schleswig, Ida Grove, Arthur and Odebolt.

Route 16: ALTERNATE ROUTE: Junction Iowa Highway 60 and Iowa Highway 160 via Iowa Highway 160 to Junction Iowa Highway 160 and U. S. Highway 69, a distance of approximately one and four-tenths (1.4) miles.

Between Des Moines and Dexter, serving no intermediate points over Iowa Highway 90.

Please substitute these two sheets in your Motor Carrier-Passenger book for the above named carrier. The Commission, effective September 10, 1970, transferred some of the points and revoked some of the points.

Docket No. H-5040
9-11-70

Revised 6-30-75 - Remove Page 1 and 2 from your Passenger Motor Carrier book and substitute these two pages for Greyhound Lines, Inc. to show the addition of the mailing address.

PASSENGERS

FORT DODGE TRANSPORTATION COMPANY, EAST HIGHWAY 20, BOX 901, FORT DODGE, IOWA 50501
Charter Carrier Certificate #9

C-995 (Freight 300 lbs.). To, from and between Spirit Lake, Superior, Estherville, Wallingford, Graettinger, Emmetsburg, Cylinder, Algona, St. Joseph, Livermore, Humboldt, Badger Corner and Fort Dodge, Iowa.

Please add this sheet to your Passenger Carrier Book and remove the sheet of Humboldt Bus Association. The Commission has effective August 26, 1964, approved the transfer of Certificate No. 995 from Eldon H. Collins, DBA Humboldt Bus Association to the Fort Dodge Transportation Company. Charter Carrier Certificate No. 18 held by the Humboldt Bus Association has been revoked.

Docket No. H-4890
9-10-64

Revised 2-26-76 to show the change of street address.

PASSENGERS

INTER-CITY AIRPORT TRANSIT, INC., P.O. BOX 2506, Des Moines, Iowa 50315

C-1088 Passengers by air and their baggage, both accompanied and unaccompanied baggage, between points and places in Ames, Iowa, and the Des Moines Municipal Airport, Des Moines, Iowa, with no service to intermediate or off-route points or places.

RESTRICTED against performing any transportation service under Charter as defined in Chapter 325, Code of Iowa.

(Revised to serve Capital complex, Valley Bank Building, Federal Bldg., and Drake University.)

Please add this sheet to your Intrastate Passenger Book. The Commission, effective July 23, 1974, issued the above numbered Certificate of Convenience and Necessity.

Docket No. H-5104
7/23/74

PASSENGERS

IOWA COACHES, INC., 1180 E. ROOSEVELT EXT., DUBUQUE, IOWA 52001
Interstate Registration No. RN-35

C-75 (Leased from Waterloo, Cedar Falls and Northern Ry. Co.) Waterloo, Jesup and Independence.

C-222 (Freight 100 lbs.) Dubuque, Epworth, Farley, Dyersville, Earville, Manchester, Masonville, Winthrop, Independence, Jesup, Waterloo and Cedar Falls.

Iowa Falls, Alden, Williams, Blairsburg, Webster City, High View, Duncombe and Fort Dodge.

Marquette, McGregor, Giard, Elkader, Strawberry Point, Manchester, Ryan, Coggen, Central City, Marion and Cedar Rapids EXCEPT for the transportation of local passengers and freight between Cedar Rapids and the Junction of Iowa Highway 13 and U. S. Highway 151 and points intermediate thereto; between the Junction of U. S. Highways 20 and 69 and Fort Dodge and points intermediate thereto; Between Waterloo and Cedar Falls and points intermediate thereto; From Cedar Falls to Jesup or Independence, Iowa and from Independence or Jesup to Cedar Falls, and EXCEPT for the transportation of local passengers between Waterloo, Independence and points intermediate thereto.

C-792 (Freight 150 lbs.) Waterloo, Benson, New Hartford Road, Parkersburg, Aplington, Austinville, Ackley, Junction U. S. Highways 20 and 65 and Iowa Falls, Independence and Cedar Falls and Jesup and Cedar Falls, EXCEPT for the transportation of local passengers and freight between Waterloo and Cedar Falls.

C-996 (Freight 300 lbs.) Both ways between Sioux City and Fort Dodge, Iowa and all points and places intermediate thereto over Iowa Highway 5 and U. S. Highway 75 EXCEPT "closed door" operations over U. S. Highway 75 from Sioux City, Iowa to LeMars, Iowa and from LeMars, Iowa to Sioux City, Iowa.

Please substitute this sheet in your Passenger Motor Carrier Book for the sheet of Iowa Coaches, Inc. The Commission has approved and issued Certificate of Convenience and Necessity No. 996 covering the authority transferred from Sioux Lines, Inc., effective May 2, 1962.

Docket No. H-4833
5-28-62

Revised 4-3-75 - Please substitute this sheet in your Passenger Motor Carrier Book for the sheet of Iowa Coaches, Inc. to show the change of street address and addition of the interstate registration number.

PASSENGERS

(CONTINUED)

IOWA COACHES, INC., 1180 E. ROOSEVELT EXT., DUBUQUE, IOWA 52001
Interstate Registration No. RN-35

C-1054 (Freight 300 lbs.) between Fort Dodge, Rockwell City and Sac City, Iowa over U. S. Highway 20 and Junction of U. S. Highways 20 and 71 to Storm Lake and between the Junction of U. S. Highways 20 and 71 and Iowa Highway 5 and U. S. Highway 71 for operating convenience only.

Please add this sheet to your Passenger Carrier Book. The Commission effective December 30, 1968, issued the above named carrier Certificate of Convenience and Necessity No. 1054.

Revised 4-3-75 - Please substitute this sheet in your Passenger Motor Carrier Book for the sheet for Iowa Coaches, Inc. to show the change of street address and addition of the interstate registration number.

12-31-68
Docket No. H-4995

INTRA
PASSENGERS

JEFFERSON LINES, INC., 503 - 6th Avenue N., Minneapolis, MN 55405
RN-644

C-11 (Freight 200 lbs.) Mason City, Manly, Kensett, Northwood, and the North Line of the State.

Mason City, Rockwell, Sheffield, Hampton, Iowa Falls, Hubbard, Colo, Nevada, Ames, Huxley, Ankeny and Des Moines.

Charles City, Floyd, Rudd, Nora Springs and Mason City.

Waterloo, Cedar Falls, Janesville, Waverly, Plainfield, Nashua and Charles City.

Mason City and the Junction of U. S. Highways 69 and 18 EXCEPT for the transportation of passengers and freight locally between Mason City, Clear Lake and Garner.

C-164 (Freight 200 lbs.) The North Line of the State, St. Ansgar, Osage, Orchard, Floyd and Charles City.

C-220 (Freight 200 lbs.) The North Line of the State of Iowa, Lake Mills, Forest City, Garner, Goodell, Belmond, Blairsburg, Jewell, Ames, Huxley, Ankeny, Des Moines, Indianola, Osceola, Van Wert, Leon, Davis City, Lamoni and the South Line of the State, EXCEPT for the transportation of passengers or freight locally (a) between Blairsburg and Des Moines and points intermediate thereto and (b) between Indianola and Osceola and points intermediate thereto.

C-181 (Freight 200 lbs.) Waterloo, Washburn, LaPorte City, Vinton and Cedar Rapids.

C-233 (Freight 100 lbs.) Des Moines, Indianola, Osceola and Weldon EXCEPT for the transportation of local passengers and freight between Des Moines, Indianola and points intermediate thereto.

JEFFERSON LINES, INC., 503 - 6th Avenue N., Minneapolis, MN

C-686 (Freight 300 lbs.) Leon and the North Line of Decatur County via U. S. Highway 69 EXCEPT for the transportation of local or interline passengers or freight between Leon on the one hand and any other point on U. S. Highway 69 to and including Des Moines on the other.

Please substitute this sheet in your Passenger Motor Carrier Book for the sheet of Jefferson Transportation Co. The Commission, effective December 16, 1968, approved the transfer of Certificates of Convenience and Necessity Nos. 11, 164, 220, 181, 233 and 686 to Jefferson Lines, Inc.

Docket No. H-4999
12-18-68
Revised 12-11-73 to show the change in the street address and zip code.

PASSENGERS

MIDWEST COACHES, INC., 216 North 2nd St., Box 226, Mankato, Minnesota 56001

C-869	Sioux City and the Iowa Minnesota State Line over U. S. Highway 75 and Iowa Highway 33.
C-999	(Freight 300 lbs.) Sioux City and Spirit Lake, Iowa via LeMars, Orange City, Sheldon, Spencer and Spirit Lake and all points intermediate thereto. Between the Junction of U. S. Highway 75 and Iowa Highway 10; thence over U. S. Highway 75 to the Iowa-Minnesota State Line and serving the intermediate points of Sioux Center and Rock Rapids, Iowa.
C-1000	(Freight 300 lbs.) Between Sheldon and the Iowa-Minnesota State Line via Iowa Highway No. 33.
C-1010	(Freight 500 lbs.) Between Sioux City, Iowa and the South Dakota State Line via Westfield, Akron, Chatsworth, Hawarden and Inwood, Iowa.

Please substitute this sheet in your Motor Carrier-Passenger book for the above named carrier. The Commission, effective September 10, 1970, amended and extended Certificate of Convenience and Necessity No. 999.

Docket No. H-5040
9-11-70

PASSENGERS

MISSOURI TRANSIT LINES, INC., 104 NORTH CLARK STREET, P.O. BOX 632,
MOBERLY, MISSOURI.

C-18 (Freight 200 lbs.) Ottumwa and Bloomfield.

C-320 (Freight 200 lbs.) The South line of the State, Davis County, Bloomfield and Ottumwa. (Interstate exclusively)

C-605 (Freight 200 lbs.) Ottumwa, Hedrick, Martinsburg, Sigourney, Webster, South English, North English, Parnell, Williamsburg, South Amana, Homestead, Amana, Walford, Fairfax and Cedar Rapids EXCEPT for the transportation of local passengers and freight between: Ottumwa and the Junction of U. S. Highway 63 and Iowa Highway 149 and points intermediate thereto, and the Junction of Iowa Highway 149 and U. S. Highway 6 and Cedar Rapids and points intermediate thereto.

C-761 (Freight 150 lbs.) Iowa City, Solon and Mt. Vernon.

C-774 (Freight 150 lbs.) Mt. Vernon and Cedar Rapids EXCEPT for the transportation of local passengers or freight originating at Cedar Rapids and destined to Iowa City or originating at Iowa City and destined to Cedar Rapids; passengers or freight originating at Mt. Vernon and destined to Cedar Rapids or originating at Cedar Rapids and destined to Mt. Vernon and all points and places intermediate to Cedar Rapids and Mt. Vernon.

C-917 (Freight 300 lbs.) Cedar Rapids and Iowa City and intermediate points over U. S. Highway 218.

ALTERNATE ROUTE: Cedar Rapids and Iowa City over Hunter Airport Road, U. S. Highway 218, unnamed county road, Iowa Highway 153 and U. S. Highway 6.

Iowa City, Kalona, Wellman, Kinross and South English EXCEPT for the transportation of passengers and a limited amount of freight (300 lbs.) originating at Iowa City, Kalona and Wellman and destined to another of those points.

Please substitute this sheet in your Passenger Motor Carrier Book for the above named operator-address change as indicated above.

Docket No. H-4856
8-23-65

PASSENGERS

MALVERN JOHN REID, DBA REID BUS LINES, Harlan, Iowa 51537

C-1043 (Freight 1500 lbs. and not to exceed 150 lbs. per package) Between the Iowa-Nebraska Line at Council Bluffs and Harlan, Iowa and serving the intermediate and off-route points of Weston, Underwood, Neola, Minden, Shelby, Avoca, Corley, Walnut, Marne, Elk Horn, Kimballton, Jacksonville, Irwin, Defiance, Earling, Westphalia, Tennant, Panama, Portsmouth and Persia, Iowa.

Please substitute this sheet for the sheet of the above named operator. The Commission has effective December 1, 1969, amended and extended Certificate of Convenience & Necessity No. 1043.

Docket No. H-5022
12-1-69

PASSENGERS

RIVER TRAILS TRANSIT LINES, INC., 200 MAIN-JULIEN MOTOR INN, DUBUQUE, IOWA 52001

Interstate Registration No. RN-1224

C-608	(Freight 100 lbs.) Dubuque, St. Catherine, St. Donatus, Bellevue, Green Island, Sabula, Almont and Clinton, Iowa.
C-653	(Freight 100 lbs.) Bellevue, Andrew, Maquoketa, Delmar, Charlotte, Goose Lake and Clinton, Iowa.
C-998	(Freight 200 lbs.) Davenport, DeWitt, Welton, Maquoketa, Hurstville, Fulton, Otter Creek, Zwingle, Key West and Dubuque, Iowa.

Please substitute this sheet in your Passenger Motor Carrier Book for the above carrier. The Commission, effective October 31, 1962, issued Certificate No. 998. Certificates 462 and 463 were revoked effective January 9, 1963.

Docket No. H-4850
1-30-63
Revised 1-8-73 to show the change of street address and to add the interstate registration number.

PASSENGERS

SCENIC HAWKEYE STAGES, INC., 703 Dudley St., Decorah, Iowa 52101
RN-224

C-751 (Freight 150 lbs.) Between Lansing, Church, Lycurgus, Waukon, Decorah, Ridgeway, Cresco, Davis Corners, Lourdes, Elma Crossroads, Alta Vista Crossroads, Jericho Crossroads, New Hampton, Williamstown, Frederika Crossroads, Tripoli Crossroads, Bremer Crossroads, Artesian, Waverly Crossroads, Denver and Waterloo EXCEPT for the transportation of (a) local passengers and freight between Denver and Waterloo and points intermediate thereto, and (b) local passengers and freight between Waukon and Decorah and points intermediate thereto.

C-782 (Freight 300 lbs.) West Union, Fayette, Junction Iowa Highways 93 and 267, Sumner, Tripoli, Junction Iowa Highways 93 and U. S. Highway 63, Bremer Corner, Artesian, Junction Iowa Highway 10 and U. S. Highway 63, Denver and Waterloo, EXCEPT local passengers and freight between West Union and Fayette.

C-775 (Freight 150 lbs.) Davis Corners, Saratoga, Riceville, New Haven Crossroads, Osage, Mitchell Crossroads, St. Ansgar Crossroads, Grafton Crossroads, Manly and Mason City EXCEPT for the transportation of passengers and freight originating at Mason City and destined for Manly.

C-754 (Freight 500 lbs.) Between Oelwein and Waterloo and Hazelton and Waterloo EXCEPT that only people working in Waterloo shall be transported between Independence, Jesup and Waterloo and EXCEPT for the transportation of freight originating at Waterloo, Jesup or Independence and destined to another of those points.

C-769 Waverly, Janesville, Cedar Falls and Waterloo, Waverly, Denver and Waterloo EXCEPT for the transportation of passengers originating at or destined to Cedar Falls, and that only people working in Waterloo shall be transported.

Please substitute this sheet in your Passenger Motor Carrier Book for Scenic Hawkeye Stages, Inc. and remove the sheet of DeWees Bus Lines. The Commission, effective April 9, 1962, approved the transfer of Certificates of Convenience and Necessity Nos. 754 and 769 from DeWees Bus Lines to Scenic Hawkeye Stages, Inc.

Docket No. H-4832
4-1062

SCENIC HAWKEYE STAGES, INC., 703 Dudley St., Decorah, Iowa 52101
RN-224

C-1027	(Freight 200 lbs.) Between Mason City, Clear Lake, Ventura, Garner, Britt, Wesley and Algona.
C-217	(Freight 200 lbs.) The North Line of the State near Burr Oak, Burr Oak, Decorah, Waukon, Postville, Clermont, West Union, Fayette, Maynard, Oelwein, Hazelton, Independence, Walker, Center Point and Cedar Rapids.
C-332	(Freight 200 lbs.) Algona, Whittemore, Cylinder, Emmetsburg, Ruthven, Dickens and Spencer.
C-1031	(Freight 100 lbs.) Between Decorah and Postville, Iowa and serving the intermediate points of Calmar, Ossian and Castalia and between Calmar and West Union and serving the intermediate points of Festina and Eldorado.

Please substitute this sheet for sheet No. 2 for the above named carrier. The Commission, effective February 3, 1967, issued Certificate of Convenience & Necessity No. 1031.

Docket No. H-4948
2-6-67
Revised 2-20-75 -- Remove the two sheets for the above carrier from your Passenger abstract book to show the change of the street address and the addition of the zip code and the registration number.

PASSENGERS

SCENIC STAGE LINE, BOX 125, HANOVER, ILLINOIS 61041
Mailing Address: 606 Portland Ave., Morrison, Illinois 61270
Interstate Registration No. RN-845
Charter Carrier Cert. No. 5

C-1076 (Limited amount of freight 100 pounds per parcel, 300 pounds shipment per single bus load) Between Davenport and Clinton, Iowa and serving the intermediate points of Bettendorf, Pleasant Valley, LeClaire, Princeton, Folletts and Camanche, Iowa.

The authority hereby granted by this Certificate of Convenience and Necessity does not permit Charter Carrier service as defined in Chapter 325, Code 1971.

The restrictions contained in this Certificate of Convenience and Necessity shall be applicable to any purchaser, lessee, assignee or successor in the interest of Scenic Stage Line.

Please add this sheet to your Intrastate Passenger Book for the above named carrier. The Commission, effective February 7, 1972, issued Certificate of Convenience and Necessity No. 1076.

Docket No. H-5060
2/8/72
Revised 3-20-73 to show the change in the mailing address.

PASSENGERS

SEDALIA-MARSHALL-BOONVILLE STAGE LINES, INC., 211 East Second Street,
Sedalia, Missouri 65301
(MAILING ADDRESS - 5805 FLEUR DRIVE, DES MOINES, IOWA 50321)
Interstate Registration File RN-738

C-682 (Freight 250 lbs.) Route 1. Manning, Templeton, Dedham, Coon Rapids, Bayard, Bagley and the Junction of Iowa Highways 17 and 141.

Route 2. Des Moines, Grimes, Dallas Center, Minburn, Perry, Dawson Junction, Jamaica Junction, Herndon Junction and the Junction of Iowa Highways 17 and 141.

C-741 (Freight 250 lbs.) Mapleton, Smithland, Hornick, Sloan and Sioux City EXCEPT no service shall be provided in the transportation of local passengers or freight between Sloan and Sioux City, Iowa and points intermediate thereto.

C-752 (Freight 250 lbs.) Mapleton, Ute, Charter Oak, Denison, Manilla and Manning.

Please substitute this sheet for the sheet of Sedalia-Marshall-Boonville Stage Line, Inc. in your Passenger Carrier Book to show the mailing address.

Docket No. H-4805
Revised 4-15-70

Table C.1. Iowa intercity bus routes

Company/route	Rate in dollars per mile - fall 1976 Trip length in miles 50	100	150	200	250	300	350
American (Continental Trailways)							
Davenport-Omaha	0.074	0.073	0.062	0.055	0.054	0.056	-
Omaha-Davenport	0.080	0.071	0.058	0.063	0.061	0.055	-
Burlington-Des Moines	0.065	0.065	0.063	-	-	-	-
Greyhound							
Council Bluffs-Clinton	0.080	0.074	0.064	0.061	0.060	0.059	0.059
Clinton-Council Bluffs	0.082	0.071	0.067	0.064	0.064	0.064	0.058
Council Bluffs-Davenport	0.076	0.072	0.068	0.068	0.065	0.055	-
Davenport-Council Bluffs	0.070	0.072	0.064	0.066	0.065	0.056	-
Iowa Coaches							
Dubuque-Sioux City	0.065	0.065	0.061	0.060	0.058	0.058	-
Jefferson							
Mason City-Cedar Rapids	0.064	0.062	0.063	-	-	-	-
St. Ansgar-Cedar Rapids	0.064	0.063	0.062	-	-	-	-
Lake Mills-Des Moines	0.063	0.063	-	-	-	-	-
Northwood-Lamoni	0.056	0.058	0.050	0.061	-	-	-
Midwest Coaches							
Sioux City-Sibley	0.069	-	-	-	-	-	-
Sibley-Sioux City	0.064	-	-	-	-	-	-
Missouri Transit							
Cedar Rapids-Bloomfield	0.068	0.057	-	-	-	-	-
Bloomfield-Cedar Rapids	0.072	0.065	-	-	-	-	-
Scenic Hawkeye							
Lansing-Waterloo	0.072	0.066	-	-	-	-	-
Waterloo-Lansing	0.069	0.067	-	-	-	-	-
SMB Stage Lines							
Des Moines-Sioux City	0.060	0.066	0.064	0.060	-	-	-
Sioux City-Des Moines	0.076	0.074	0.071	0.060	-	-	-

Source: Iowa DOT, Transportation Regulation Board, Rate Analysis Division.

APPENDIX D

REGRESSION ANALYSIS FOR BUS USAGE

Table D.1. Table of variable values for regression analysis

City	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	Y
Ames	43.6	121.6	21.3	35.9	3.6	15.0	6.4	10.1	25.9	7.1	.2	66	84	38	1273
Atlantic	7.3	38.2	3.9	19.6	6.4	0	.6	8.2	15.8	7.9	.1	19	76	19	279
Burlington	32.4	115.9	13.4	21.3	9.1	.7	1.6	9.5	15.9	6.2	.3	60	73	27	788
Carroll	8.7	50.1	4.2	19.6	6.0	.1	.4	8.9	14.8	7.7	.1	26	59	15	200
Cedar Rapids	109.0	505.1	53.1	24.2	5.0	4.5	10.1	10.7	20.8	5.7	1.1	239	70	65	3421
Clarinda	5.4	21.4	2.5	24.2	3.6	.3	.3	8.1	9.6	10.8	.4	23	63	17	103
Clinton	34.7	114.9	16.2	19.4	7.5	.7	1.9	10.0	18.9	4.6	.3	51	57	14	445
Council Bluffs	60.3	133.9	29.3	18.9	9.6	1.0	2.0	9.3	14.5	8.0	.6	99	83	70	466
Davenport	99.8	392.2	46.0	22.9	5.0	4.2	7.9	10.8	23.1	7.0	.7	151	74	62	1477
Decorah	7.7	27.7	3.2	18.1	5.3	2.1	.6	8.4	19.7	9.4	.1	23	78	17	380
Des Moines	201.4	1178.7	103.9	23.9	6.0	9.0	19.7	10.7	23.5	6.1	2.5	522	85	90	7426
Dubuque	62.3	221.9	29.5	24.4	7.5	3.5	4.4	10.2	18.7	7.6	.6	130	92	21	1927
Fort Dodge	31.3	145.9	14.5	21.4	5.9	1.1	1.8	9.6	17.5	7.4	.4	67	68	21	625
Iowa City	47.7	160.1	24.6	36.5	3.2	14.2	7.6	9.9	21.5	7.2	1.8	642	59	53	2493
Marshalltown	26.5	117.7	12.3	20.3	5.7	.7	1.5	10.0	17.6	6.0	.2	61	79	27	472
Mason City	31.8	134.8	14.4	22.6	6.3	1.0	1.9	9.5	15.9	6.1	.4	98	85	30	1171
Muscatine	23.2	77.5	11.0	20.0	4.5	.5	1.2	9.9	18.8	7.5	.1	28	77	27	391
Osceola	3.1	17.2	1.8	12.7	6.3	0	.1	8.1	7.7	10.6	.1	5	83	18	168
Ottumwa	30.2	93.3	10.9	21.0	10.8	.6	1.2	8.7	12.0	9.2	.4	43	63	30	772
Sioux City	85.9	351.8	42.0	24.7	5.9	3.1	5.5	9.0	16.1	9.2	.9	117	82	41	2310
Spencer	10.4	61.5	5.8	20.4	5.0	.1	.6	9.1	18.5	7.9	.1	21	77	20	349
Waterloo	75.5	312.2	34.0	21.3	7.4	7.9	6.7	10.1	18.3	7.3	.9	144	91	33	1778
West Union	2.6	14.0	1.2	25.2	3.1	0	.1	8.3	17.2	11.5	0	6	46	7	56

APPENDIX E

DETAILED PROCEDURE FOR RATING TERMINAL FACILITIES

Terminal Facilities Rating Criteria

I. Patron Parking rating. (maximum 25 points)

A. Parking spaces available

1. Off-street
Refer to dedicated spaces versus number of monthly boardings graph developed from research interviews.

if adequate	20 points
if less-than-adequate	

$$\text{points} = \frac{\text{current number}}{\text{required number}} \times 20$$

2. On-street metered parking

greater than 10,000 population and CBD or suburban location	5 points
less than 10,000 population and CBD or suburban location	10 points

3. "Adjacent" lot parking

non-metered adjacent lot-with greater than 10,000 population	10 points
non-metered adjacent lot with less than 10,000 population	15 points
metered adjacent lot	5 points

B. Parking lot surface

Rate according to the following scale:

hard surface	4 points
loose or no surface	1 point
good condition	1 point
poor condition	0 point

II. Terminal building waiting and service facility. (maximum 20 points)

A. Size of area and seating accommodations

1. Size of area
Refer to size of waiting area versus number of monthly boardings graph developed from research interviews

if adequate	5 points
if less-than-adequate	

$$\text{points} = \frac{\text{existing seats}}{\text{required seats}} \times 10$$

B. Patron service facilities

1. For stations with less than 500 monthly boardings:

a vending machine with candy, chips and related items	10 points
a coffee or soft drink dispenser	5 points

2. For stations with 500 to 5,000 monthly boardings:

a vending machine with sandwiches, soups and related items	10 points
a vending machine with candy, chips and related items	5 points
no services	0 points

3. For stations with greater than 5,000 monthly boardings:

a restaurant in the building or immediately adjacent	10 points
a vending machine with sandwiches, soups and related items	5 points
no services	0 points

C. Toilet facilities

Assign points according to the following qualitative scale as determined at the field inventory:

good	5 points
fair	3 points
poor	0 points

D. Terminal attractiveness

Assign points according to the age, upkeep, cleanliness, and general atmosphere, recognizing the difference in user expectations between large terminals and small terminals:

very attractive	10 points
	varying points
unattractive	0 points

III. Terminal convenience and appearance. (maximum 35 points)

A. Terminal location

Assign points according to the following scale:

CBD	10 points
fringe	5 points
suburban	0 points

B. Ease of identification and access

Assign points according to the following qualitative scale:

location suitably signed and visible and a stress system compatible with ease of access	5 points
location somewhat poor in terms of the above noted criteria	3 points
location very poor in terms of above noted criteria	0 points

C. Neighborhood environment

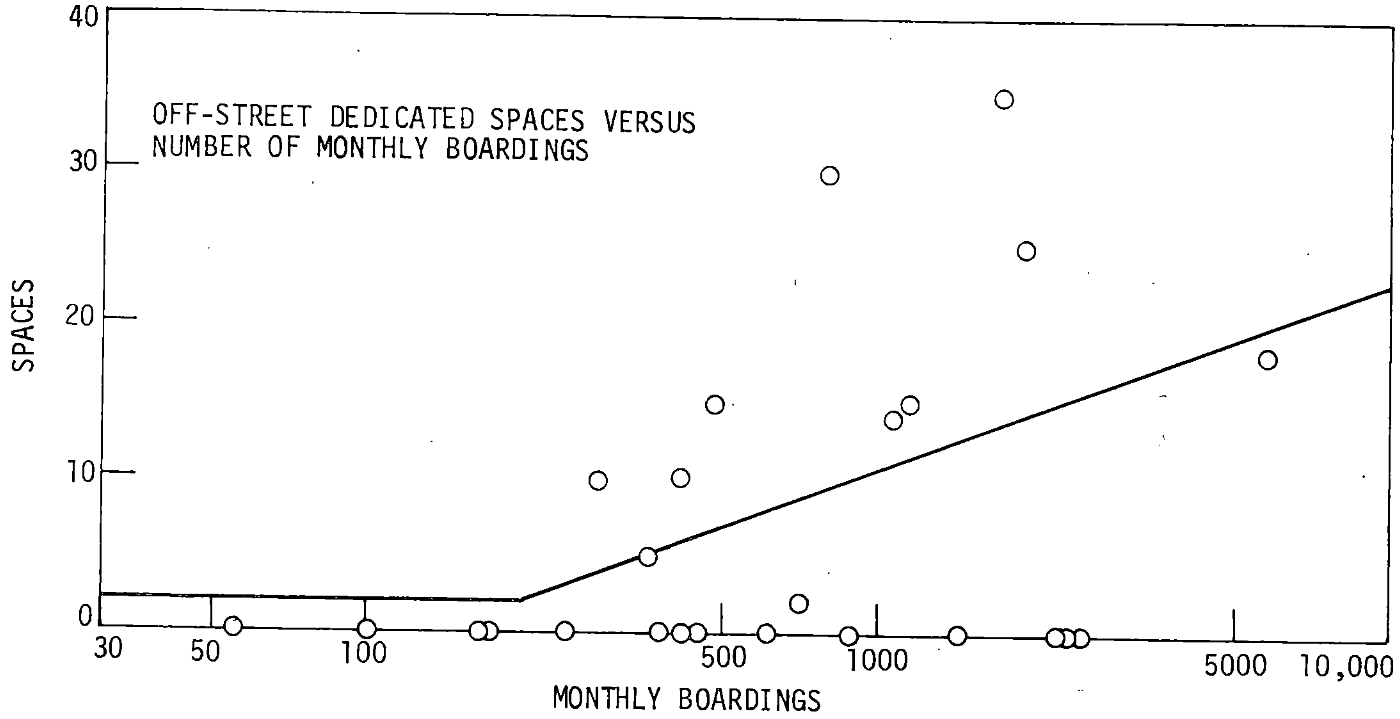
Assign points according to the following qualitative scale:

area including the surroundings are well lighted, buildings are not run down and vacant and the type of land use is compatible with a secure feeling	5 points
use a sliding scale where undesirable features exist down to a zero value if rated poor.	

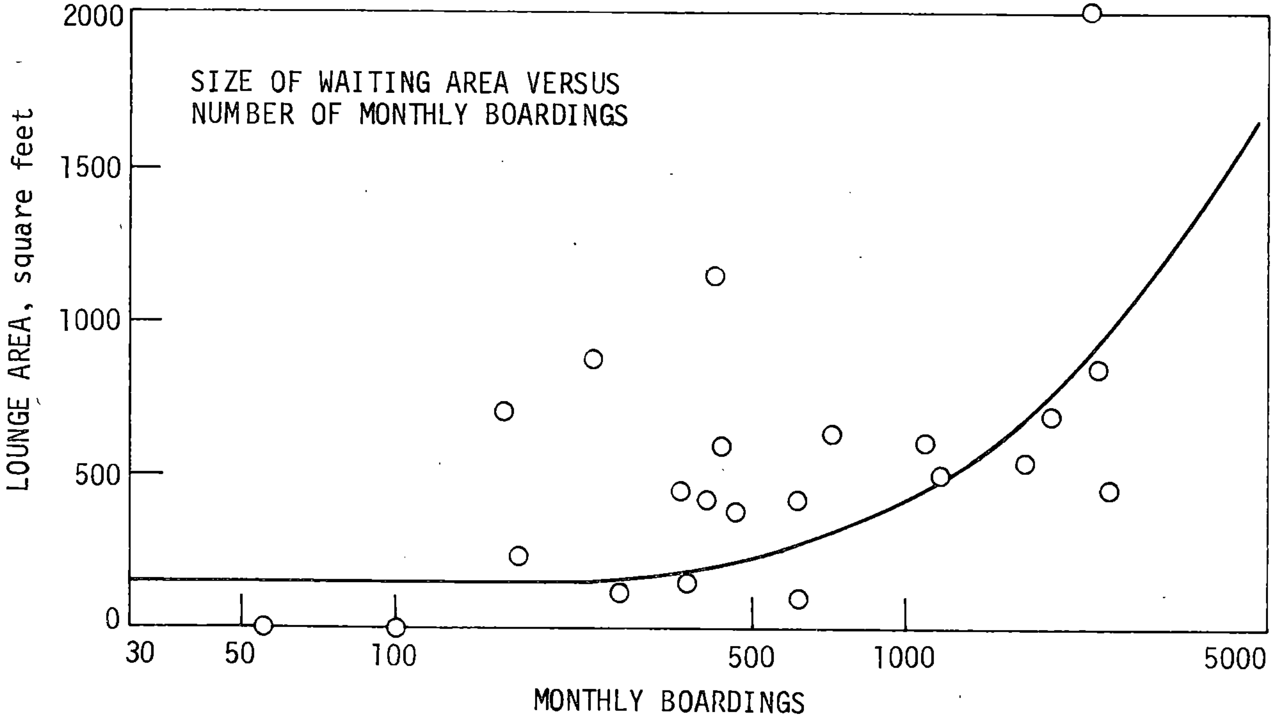
D. Public transit service

Assign points according to the following scale:

twenty-four hour service, either bus or taxi	15 points
all day-light hours of service, either bus or taxi	10 points
no public service available	10 points



OFF-STREET DEDICATED SPACES VERSUS NUMBER OF MONTHLY BOARDINGS


SIZE OF WAITING AREA VERSUS
NUMBER OF MONTHLY BOARDINGS
LOUNGE AREA, square feet
2000
1500
1000
500
0
30
50
100
500
1000
5000
MONTHLY BOARDINGS

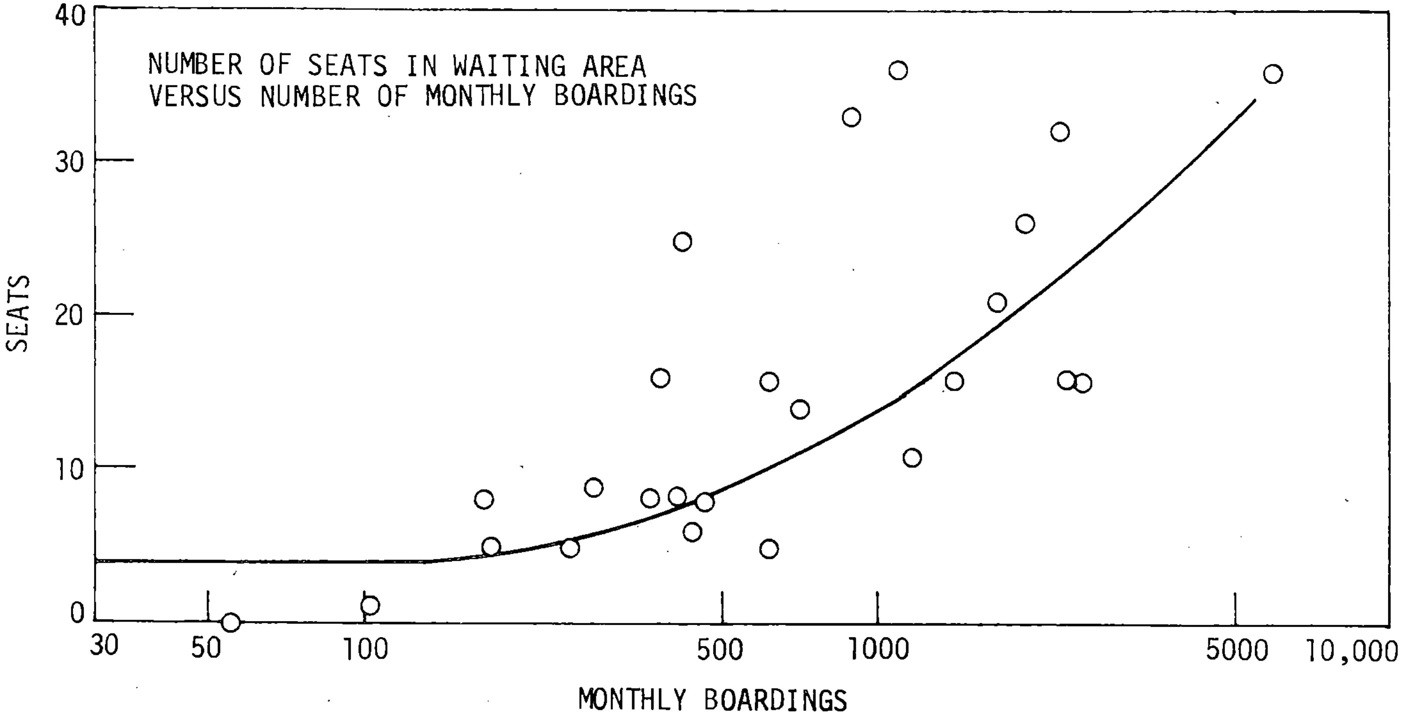

NUMBER OF SEATS IN WAITING AREA
VERSUS NUMBER OF MONTHLY BOARDINGS
SEATS
40
30
20
10
0
30
50
100
500
1000
5000
10,000
MONTHLY BOARDINGS

Table E.1. Terminal facilities rating (X_{13})

City		Parking					Lounge area					Appearance & convenience				Total
Ames		20	-	-	-	5	5	10	10	5	5	5	0	4	15	84
Atlantic		20	-	-	-	2	3	10	5	0	7	5	5	4	15	76
Burlington		20	-	-	-	5	5	10	0	3	6	5	4	0	15	73
Carroll		15	-	-	-	3	5	10	10	3	0	0	0	3	10	59
Cedar Rapids	C	-	5	-	5	5	2	5	0	3	1	10	3	5	15	59
	G	-	5	-	5	5	4	7	5	5	10	5	5	2	15	73
Clarinda		-	-	10	-	4	0	3	5	5	8	5	3	5	15	63
Clinton		-	5	-	5	4	5	7	10	3	0	5	3	0	10	57
Council Bluffs		20	-	-	-	2	5	10	10	0	4	10	4	3	15	83
Davenport	C	-	-	-	10	5	5	10	10	0	6	5	5	4	15	75
	G	-	5	-	-	4	5	10	5	5	8	10	3	4	15	74
Decorah		-	-	15	-	5	4	10	5	5	10	0	4	5	15	78
Des Moines	C	-	5	-	-	4	5	10	10	3	7	10	3	3	15	75
	G	20	-	-	-	5	5	10	5	5	10	5	5	3	15	88
Dubuque		20	-	-	-	5	4	10	10	5	10	5	4	4	15	92
Fort Dodge		-	5	-	-	4	5	10	5	3	6	10	2	3	15	68
Iowa City		-	5	-	-	5	3	6	-	5	7	5	4	4	15	59
Marshalltown		20	-	-	-	1	5	10	10	3	4	5	4	2	15	79
Mason City		20	-	-	-	2	5	7	10	5	10	5	3	3	15	85
Muscatine		20	-	-	-	4	5	10	5	5	6	0	4	3	15	77
Osceola		-	-	10	-	4	5	10	10	3	9	10	3	4	15	83
Ottumwa		2	5	-	-	4	5	10	5	0	5	5	4	3	15	63
Sioux City		-	5	-	5	5	5	10	10	3	8	10	3	3	15	82
Spencer		-	10	-	-	4	5	9	10	5	6	5	4	4	15	77
Waterloo		20	-	-	-	5	4	10	10	5	10	5	3	4	15	91
West Union		-	-	10	-	4	0	0	10	0	7	10	0	5	0	46

APPENDIX F

DETAILED PROCEDURE FOR RATING LEVEL OF SERVICE

Level Of Service Rating Criteria

1. Weekday departure opportunities
   assign 2 points for each departure between 6:00 a.m. and 10:00 p.m.
   assign 1 point for each departure at all other times (the maximum observed points at any station was 76).

2. Competing carrier service
   assign 1 point for each additional carrier over one (the maximum observed points at any station was 5).

3. Travel time
   travel times to Minneapolis, Omaha, Kansas City, and Chicago were calculated using the published bus schedule and the auto travel time at 55 mph over the shortest route. The ratio of bus travel time to auto travel time was calculated, and points assigned on the following basis:
   3 points for any of the four cities with a T ratio less than or equal to 1.2.
   2 points with a T ratio from 1.6 to 1.5.
   1 point with a T ratio from 1.5 to 1.8.
   0 points for any T ratio greater than 1.8.

Weighted Averages For Cities With Two Terminals

The weighted average for a city is based upon the number of monthly boardings at each terminal.

		Rating	Boardings
Cedar Rapids	Continental	59	619
	Greyhound	73	2396

Total monthly boardings = 3015

$$\frac{(59)\ (619) + (73)\ (2396)}{3015} = \underline{\underline{70}}$$

		Rating	Boarding
Davenport	Continental	75	483
	Greyhound	74	894

$$\frac{75\ (433) + 74\ (894)}{1327} = \underline{\underline{74}}$$

		Rating	Boarding
Des Moines	Continental	75	1445
	Greyhound	88	5985

Total monthly boardings = 7430

$$\frac{75\ (1445) + 88\ (5985)}{7430} = \underline{\underline{85}}$$

Table F.1. Level of service rating (X_{14})

City	Departures	Competing carriers	Travel time	X_{14} Value (total)
Ames	28	1	9	38
Atlantic	13		6	19
Burlington	20		7	27
Carroll	8		7	15
Cedar Rapids	52	5	8	65
Clarinda	10		7	17
Clinton	9	1	4	14
Council Bluffs	57	2	11	70
Davenport	49	2	11	62
Decorah	14		3	17
Des Moines	76	3	11	90
Dubuque	12	2	7	21
Fort Dodge	16	2	3	21
Iowa City	42	2	9	53
Marshalltown	18		9	27
Mason City	18	1	11	30
Muscatine	21		6	27
Osceola	9		9	18
Ottumwa	20	2	8	30
Sioux City	28	3	10	41
Spencer	10	1	9	20
Waterloo	24	3	6	33
West Union	4		3	7

APPENDIX G

TRAVEL AGENCIES CONTACTED

Table G.1. Travel agencies contacted

<u>Ames</u>

Jo Knudson*
World Wide Travel Center, Inc.
103 Welch
Ames, Iowa 50010

515/292-8182

Trans-Travel Agency
507 Main
Ames, Iowa 50010

515/232-3131

Dick Hansen*
Travel and Transport, Inc.
6th and Duff
Ames, Iowa 50010

515/232-6640

<u>Burlington</u>

Florence Landwehr†
AAA World Travel
3000 Division
Burlington, Iowa 52601

319/752-4535

(Jim Konvalinka - Bettendorf)

Nancy Wooten*
The Travel Center
513 Jefferson Street
Burlington, Iowa 52601

319/754-5707

<u>Carroll</u>

Paul Fricke*
Jacobsen Travel Agency
225 East 5th
Carroll, Iowa 51401

712/792-4431

<u>Carroll</u> (continued)

Marsha Juergens*
Juergens International Travel
108 West 8th
Carroll, Iowa 51401

712/792-9742

<u>Clinton</u>

Ruth Drews*
Clinton National World Travel
Service
235 6th Avenue South
Clinton, Iowa 53732

319/243-5150

Pat Lawler*
Gateway Travel Agency
200 Howes Building
Clinton, Iowa 52732

319/242-1025

<u>Decorah</u>

Murial Lloyd*
AAA World Travel
106 East Water Street
Decorah, Iowa 52101

319/382-2986

K. H. "Pete" Peterson‡
Minowa Tour and Travel Agency
222 West Water
Decorah, Iowa 52101

319/382-4224

<u>Denison</u>

Curt Yankey‡
Yankey Travel, Inc.
19 North 14th
Denison, Iowa 51442

712/263-5603

Table G.1. (continued)

Dubuque

Ellen M. Crane*
House of Travel, Inc.
2205 Keyway
Dubuque, Iowa 52001

319/556-0440

Harold Workman
Dubuque Travel, Inc.
880 Locust
Dubuque, Iowa 52001

319/556-0202

Harriet Heitzman
Cable Car Travel Agency
391 Bluff
Dubuque, Iowa 52001

319/556-0556

Fort Dodge

Sandy Luckenbill*
AAA World Travel
906 First Avenue South
Fort Dodge, Iowa 50501

515/576-7554

Tom Wolfe*
Travel and Transport Travel Agency
Crossroads Shopping Center
Fort Dodge, Iowa 50501

515/576-7491

Fort Madison

Jenny Sargent
AB Travel Agency
605 Avenue G
Fort Madison, Iowa 52627

319/372-8101

Harlan

Shirley Jensen*
Jacobsen Travel Agency
Harlan, Iowa 51537

712/755-3464

Keokuk

(Fort Madison and Burlington Agencies)

Marshalltown

Kelly Nelson*
AAA World Travel
25B South First Street
Marshalltown, Iowa 50158

515/752-1555

Larry Mersereau*
Tallyho Travel Agency, Inc.
307 West Main Street
Marshalltown, Iowa 50158

515/752-4676

Mason City

AAA World Wide Travel Agency†
520 South Pierce
Mason City, Iowa 50401

515/423-4315

(Jim Konvalinka - Bettendorf)

Jay Allan*
Allan Travel Agency
Hilltop Motel
Clear Lake, Iowa 50428

515/357-5223

Mason City Travel Agency, Inc.
16 First Street SW
Mason City, Iowa 50401

515/423-6012

Table G.1. (continued)

Muscatine

Wally Hageney[*]
AAA World Travel
101 West Mississippi Drive
Muscatine, Iowa 52761

319/264-3230

William Moore[*]
Muscatine Travel Bureau
204 East Second
Muscatine, Iowa 52761

319/263-9131

Ottumwa

Millie Backman[*]
AAA World Travel
103 North Court
Ottumwa, Iowa 52501

515/682-3429

Helen Kelley[‡]
Kelley Travel Agency
405 East Second
Ottumwa, Iowa 52501

515/684-8045

Spencer

Barb Bradley[*]
Four Seasons Travel Service
12 East Fifth Street
Spencer, Iowa 51301

712/262-6398

Darrell Schmidt
Iowa Great Lakes Travel Agency
301 Grand
Spencer, Iowa 51301

712/262-4235

Storm Lake

Virginia Phipps[*]
Nomad Travel Agency
309 East Fifth
Storm Lake, Iowa 50588

712/732-3705

Roberta Hill[*]
Jacobsen Travel Agency
511 East Fifth Street
Newell, Iowa 50568

712/272-3337

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[*] Fully cooperative agency. Provided information in a useful format. Provided physical assistance at own expense. Contributed significantly to the completion of this planning research effort.

[†] Cooperative agency. Data were made available through time and effort contributed by central clearing house level of management. Data were very useful to the study.

[‡] Cooperated but provided limited data. Data available either did not apply to this study or were provided in such a format as to be of limited utility.

APPENDIX H

SURVEY FORMS

Household Mailed Questionnaire Survey Form

(Printed on white paper)

Iowa State University *of Science and Technology* *Ames, Iowa 50011*

Engineering Research Institute
College of Engineering
382 Town Engineering Building
Telephone: 515-294-6778

DATE:_______________

FLIGHT:______________

A public concern has been expressed that additional intercity public transportation may be needed at selected cities in Iowa. The actual use of existing services in Iowa such as this one are being sampled. The views and values of persons such as yourself are needed to compare with a cross-section of the general population of Iowa.

Your flight has been selected in a random sample of airline activity to obtain travel pattern information so public planning for intercity transportation can be made consistent with needs and desires of the traveling public. The Iowa Department of Transportation has contracted with the Engineering Research Institute at Iowa State University to evaluate the most economical and efficient methods of improving intercity passenger public transportation. Your kind assistance in completing this questionnaire and returning it to the Engineering Research Institute staff person on board your flight will ensure that the views of the traveling public are considered in the planning and research necessary to develop adequate public passenger transportation among Iowa cities.

Your responses in completing this questionnaire are confidential. All information will be coded and used in planning research in a manner such that no individual responses can ever be identified.

Your answers are necessary if the final planning decision is to be representative of current travelers. We thank you for your cooperation in completing this questionnaire. After you have completed the questionnaire, return it to the Engineering Research Institute staff person accompanying your flight. Thank you again for your assistance.

Sincerely,

Ken Brewer

Ken Brewer
Professor of Transportation
Engineering

KB/ssa

NOTE: IF YOU HAVE COMPLETED ONE OF THESE QUESTIONNAIRES ON AN EARLIER FLIGHT, PLEASE DO NOT BOTHER TO COMPLETE THIS ONE. INDICATE BELOW THE FLIGHT AND DATE ON WHICH YOU COMPLETED THE PREVIOUS QUESTIONNAIRE AND RETURN THIS FORM TO THE ENGINEERING RESEARCH INSTITUTE STAFF PERSON. THANK YOU.

FLIGHT:________________ DATE:_____________

Page 2 of 5

1. In what city and state did your trip today begin?

2. In what city did you board this aircraft flight?

3. In what city do you plan to leave this aircraft flight?

4. Is the city in the answer to Question 3 the final destination of this trip?

    ____ Yes ____ No

5. If the answer to Question 4 is "yes", how do you plan to travel from the airport to the home, office, business or other place to which you are traveling (private auto, taxi, bus, limousine, train, another plane, walk, etc.)?

6. If the answer to Question 4 is "no", what city and state is the final destination of this trip?

    And when you leave this aircraft flight, will you transfer to another airline to reach this final destination? ____ Yes ____ No

    And if you do not plan to transfer to another airline, please indicate the number of times you expect to have to use each mode listed in order to reach the home, office, business or other place to which you are traveling:

    ____ Taxi ____ Private Auto ____ Rental Car ____ Bus ____ Walk

    ____ Train ____ Other (specify): ____________________

7. What is the travel purpose of your trip today or if this is the return trip what was the purpose for the initial trip?

    ____ Business or associated with employment

    ____ Personal or family affairs including shopping

    ____ Medical, dental or other health

    ____ Social, recreation, visit friends or relatives

    ____ Other (please specify): ____________________

8. Have you ever flown on this commuter airline before?

    ____ Yes ____ No

    If "yes", what was the approximate date of the most recent previous flight?

    ____________________ What is the approximate number of times you have flown on this commuter airline in the past 12 months? ____________

9. Why did you choose to travel by this commuter airline instead of any other means of travel (private auto, rental car, bus, train, major airline, private airplane, charter air taxi, etc.)? (Please try to be specific in your reason.)

Page 3 of 5

10. Suppose an express bus service (non-stop direct route) had been available to connect you directly from the city where you first boarded the commuter airline to the city at which you will depart the commuter airline, would you have considered using such bus service?

____ Yes ____ No

If "no", please indicate, as best you can, why such service would not be suitable:

If "yes", please indicate how much you think you (or your firm if you are being reimbursed for travel expenses on this trip) would consider an appropriate one-way fare for such express bus service: (check the price range listed most nearly representing your judgement):

____ Wont' Ride ____ 0-$4 ____ $5-$9 ____ $10-$19 ____ $20-$39

____ $40-$59 ____ $60-$100 ____ Other (specify)

11. If the state-wide transportation system included <u>express bus service</u> routes connecting a network of selected cities, how favorable would you be to using public transportation funds to support such services? Please check below the boxes which most closely represent your feeling about spending state and local taxes for such transportation.

MY POSITION ON THE USE OF PUBLIC FUNDS FOR EXPRESS BUSES IS:

	Strongly Opposed	Somewhat Opposed	Neutral (Don't Care)	Somewhat Favorable	Strongly in Favor
Using STATE taxes for EXPRESS bus routes					
Using LOCAL taxes for EXPRESS bus routes					

12. If the state-wide transportation system included additional <u>commuter airline routes</u> connecting a network of selected cities, how favorable would you be to using public transportation funds to support such services? Please check below the boxes which most closely represent your feeling about spending state and local taxes for such transportation.

MY POSITION ON THE USE OF PUBLIC FUNDS FOR COMMUTER AIR SERVICE IS:

	Strongly Opposed	Somewhat Opposed	Neutral (Don't Care)	Somewhat Favorable	Strongly in Favor
Using STATE taxes for COMMUTER AIR service					
Using LOCAL taxes for COMMUTER AIR service					

Page 4 of 5

13. How many times in the past 12-month period (to the best of your recollection) have you or members of your household traveled to these cities by each means of travel listed? Disregard travel to your home community. The following travel means definitions are offered to ensure each person responding classifies their travel in a similar manner:

    Auto = personal or private auto available to household or a rental car.
    Commercial Scheduled Airline = Ozark, United, Braniff, American, N. Central, etc.
    Commuter Scheduled Airline = Brower, Mississippi Valley, S-M-B, Mesaba, etc.
    Private Air or Charter Air = an airplane owned or rented or individually hired.
    Bus = Jefferson, Greyhound, Continental, Scenic Hawkeye, Ft. Dodge Trans., etc.

    Also please classify all trips by the following travel purposes:

    Business or associated with employment = Code B
    Personal or family affairs including shopping = Code P
    Medical, dental or other health = Code H
    Social, recreational or visiting = Code S
    Other travel purposes not included in the above = Code X

    FOR EXAMPLE, if 1 personal trip (P) by auto and 2 recreational trips (S) by auto and 2 business trips (B) by a scheduled commerical airline were made to Chicago in the past year, the form should be filled in as follows:

NUMBER OF TRIPS TO COMMUNITY BY THIS MEANS FOR INDICATED PURPOSE:

COMMUNITY:	Auto	Scheduled Airline		Private Air or Charter Air	Bus
		Commercial	Commuter		
Chicago	P-1, S-2	B-2			

Please complete the following table in the same manner. Also, cross through all "communities" for which no trips were made in the past 12-month period.

NUMBER OF TRIPS TO COMMUNITY BY THIS MEANS FOR INDICATED PURPOSE:

COMMUNITY:	Auto	Scheduled Airline		Private Air or Charter Air	Bus
		Commercial	Commuter		
Minneapolis/ St. Paul					
Chicago					
St. Louis					
Kansas City					
Des Moines					
Waterloo/ Cedar Falls					
Sioux City					
Council Bluffs/ Omaha					
Cedar Rapids					
Dubuque					
Mason City					
Ottumwa					
Burlington					
Davenport/ Quad Cities					
Ft. Dodge					
Creston					
Spencer					
Decorah					
Carroll					
Marshalltown					

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14. If you were riding an express bus for the trip you are now making on a commuter airline, and the bus route followed the most direct highway route between the city at which you boarded the commuter airline and the city where you will depart the commuter airline, if the bus were to make one stop at an intermediate city, how many minutes total time to leave the direct highway route, handle passengers and baggage, and return to the direct highway route would you consider allowable and still regard the service as an express bus route? (Check the value most nearly representing your judgement.)

____ No stop ____ 0-4 min. ____ 5-9 min. ____ 10-14 min.

____ 15-19 min. ____ 20-29 min. ____ 30-39 min. ____ 40-49 min.

____ 50-59 min. ____ 60 + min.

15. How many automobiles are owned or are available to your household? ____________

16. How many licensed drivers are in your household and what are the approximate ages of each?

______ Number of drivers ______________________ Age of each driver

17. Are you the head of household? ____ Yes ____ No

If "yes", what is your occupation; if "no", what is the occupation of the head of the household?

____ Professional, technical or manager ____ Farm owner or manager

____ Farm laborer ____ Clerical or sales person

____ Craftworker, equipment operator or laborer ____ Household or service employee

____ Unemployed ____ Other (specify): ______________________________

18. Please check the sex and age group in which you are included: ____ Male

____ Female ____ under 18 years ____ 18-24 yrs. ____ 25-39 yrs.

____ 40-64 yrs. ____ 65+ yrs...

19. Please indicate your approximate annual total household income before taxes by checking the bracket into which you would classify your household:

____ under $5000 per year ____ $5000-$9999 per year ____ $10,000-$14,999 per year ____ $15,000-$24,999 per year ____ $25,000-$49,999 per year

____ $50,000 or more

20. What is the employer's name and address (include city and state) for the head of household?

21. What is your home address (city only)?

22. Do you travel for a business or firm or agency which pays for or reimburses you for travel expenses?

____ Yes ____ No

23. Check the highest level of education you have completed. ____ Technical School

____ Grade School ____ Attended High School ____ High School Graduate

____ Attended College ____ College Graduate ____ Post Graduate

24. If you have any comments or additional information you wish to add, please do so in this space or on the back of this page. Thank you for assisting this planning and research study.

THANK YOU FOR YOUR ASSISTANCE. PLEASE RETURN TO THE RESEARCH STAFF PERSON.

Certificated Air Carrier Waiting Room Survey Form

(Printed on salmon paper)

Iowa State University of Science and Technology Ames, Iowa 50011

Engineering Research Institute
College of Engineering
382 Town Engineering Building
Telephone: 515-294-6778

DATE:______________

LOUNGE:______________

A public concern has been expressed that additional intercity public transportation may be needed at selected cities in Iowa. The actual use of existing services in Iowa such as this one are being sampled. The views and values of persons such as yourself are needed to compare with a cross-section of the general population of Iowa.

This flight lounge has been selected in a random sample of airline activity to obtain travel pattern information so public planning for intercity transportation can be made consistent with needs and desires of the traveling public. The Iowa Department of Transportation has contracted with the Engineering Research Institute at Iowa State University to evaluate the most economical and efficient methods of improving intercity passenger public transportation. Your kind assistance in completing this questionnaire and returning it to the Engineering Research Institute staff person present in the lounge will ensure that the views of the traveling public are considered in the planning and research necessary to develop adequate public passenger transportation among Iowa cities.

Your responses in completing this questionnaire are confidential. All information will be coded and used in planning research in a manner such that no individual responses can ever be identified.

Your answers are necessary if the final planning decision is to be representative of current travelers. We thank you for your cooperation in completing this questionnaire. After you have completed the questionnaire, return it to the Engineering Research Institute staff person available in your lounge prior to boarding your flight. Thank you again for your assistance.

Sincerely,

Ken Brewer
Professor of Transportation
Engineering

KB/ssa

NOTE: IF YOU HAVE COMPLETED ONE OF THESE QUESTIONNAIRES FOR AN EARLIER FLIGHT PLEASE DO NOT BOTHER TO COMPLETE THIS ONE. INDICATE BELOW THE FLIGHT AND DATE ON WHICH YOU COMPLETED THE PREVIOUS QUESTIONNAIRE AND RETURN THIS FORM TO THE ENGINEERING RESEARCH INSTITUTE STAFF PERSON. THANK YOU.

FLIGHT:______________ DATE:______________

Page 2 of 6

1. From what address (include city and state) did your trip originate today?

2. What airline flight and number are you preparing to board today at this city?

3. In what city do you plan to leave this airline?

4. Is the city in the answer to Question 3 the final destination of this trip?

___ Yes ___ No

5. If the answer to Question 4 is "yes", how do you plan to travel from the airport to the home, office, business or other place to which you are traveling (private auto, taxi, bus, limousine, train, another plane, walk, etc.)?

6. If the answer to Question 4 is "no", what city and state is the final destination of this trip?

And when you leave this airline you are preparing to board, will you transfer to another airline to reach this final destination?

___ Yes ___ No

And if you do not plan to transfer to another airline, please indicate the number of times you expect to have to use each mode listed in order to reach the home, office, business or other place to which you are traveling:

___ Taxi ___ Private Auto ___ Rental Car ___ Bus ___ Walk

___ Train ___ Other (specify): ____________

7. What is the travel purpose of your trip today or if this is the return trip what was the purpose for the initial trip?

___ Business or associated with employment

___ Personal or family affairs including shopping

___ Medical, dental or other health

___ Social, recreation, visit friends or relatives

___ Other (please specify): ____________

8. Have you ever flown on this scheduled airline before?

___ Yes ___ No

If "yes", what was the approximate date of the most recent previous flight?

____________ What is the approximate number of times you have flown on this scheduled airline in the past 12 months? ____________

9. Why did you choose to travel by this scheduled airline instead of any other means of travel (private auto, rental car, bus, train, other airline, private airplane, charter air taxi, etc.)? (Please try to be specific in your reason)

10. Suppose an express bus service (non-stop direct route) had been available to connect you directly from this city where you are preparing to board your flight to the city at which you will depart this airline, would you have considered using such bus service?

___ Yes ___ No

If "no", please indicate, as best you can, why such service would not be suitable:

.f "yes", please indicate how much you think you (or your firm if you are being reimbursed for travel expenses on this trip) would consider an appropriate one-way fare for such express bus service: (check the price range listed most nearly representing your judgement):

___ Wont' Ride ___ 0-$4 ___ $5-$9 ___ $10-$19 ___ $20-$39

___ $40-$59 ___ $60-$100 ___ Other (specify)

11. If the state-wide transportation system included express bus service routes connecting a network of selected cities, how favorable would you be to using public transportation funds to support such services? Please check below the boxes which most closely represent your feeling about spending state and local taxes for such transportation.

MY POSITION ON THE USE OF PUBLIC FUNDS FOR EXPRESS BUSES IS:

	Strongly Opposed	Somewhat Opposed	Neutral (Don't Care)	Somewhat Favorable	Strongly in Favor
Using STATE taxes for EXPRESS bus routes					
Using LOCAL taxes for EXPRESS bus routes					

12. Suppose that a third level air carrier (commuter airline) service had been available to connect you directly from this city where you are preparing to board your flight to the city at which you will depart this airline, would you have considered using such commuter airline service? (Commuter airlines typically fly twin-engine aircraft seating from eight to twenty persons.)

___ Yes ___ No

If "no", please indicate, as best you can, why such service would not be suitable:

If "yes", please indicate how much you think you (or your firm if you are being reimbursed for travel expenses on this trip) would consider an appropriate one-way fare for such commuter airline service: (check the price range listed most nearly representing your judgement):

___ Won't Ride ___ 0-$4 ___ $5-9 ___ $10-$19 ___ $20-$39

___ $40-$59 ___ $60-$100 ___ Other (specify)

13. If the state-wide transportation system included additional commuter airline routes connecting a network of selected cities, how favorable would you be to using public transportation funds to support such services? Please check below the boxes which most closely represent your feeling about spending state and local taxes for such transportation.

MY POSITION ON THE USE OF PUBLIC FUNDS FOR COMMUTER AIR SERVICE IS:

	Strongly Opposed	Somewhat Opposed	Neutral (Don't Care)	Somewhat Favorable	Strongly in Favor
Using STATE taxes for COMMUTER AIR service					
Using LOCAL taxes for COMMUTER AIR service					

Page 4 of 6

14. How many times in the past 12-month period (to the best of your recollection) have you or members of your household traveled to these cities by each means of travel listed? Disregard travel to your home community. The following travel means definitions are offered to ensure each person responding classifies their travel in a similar manner:

Auto = personal or private auto available to household or a rental car.
Commercial Scheduled Airline = Ozark, United, Braniff, American, N. Central, etc.
Commuter Scheduled Airline = Brower, Mississippi Valley, S-M-B, Mesaba, etc.
Private Air or Charter Air = an airplane owned or rented or individually hired.
Bus = Jefferson, Greyhound, Continental, Scenic Hawkeye, Ft. Dodge Trans., etc.

Also please classify all trips by the following travel purposes:

Business or associated with employment = Code B
Personal or family affairs including shopping = Code P
Medical, dental or other health = Code H
Social, recreational or visiting = Code S
Other travel purposes not included in the above = Code X

FOR EXAMPLE, if 1 personal trip (P) by auto and 2 recreational trips (S) by auto and 2 business trips (B) by a scheduled commerical airline were made to Chicago in the past year, the form should be filled in as follows:

NUMBER OF TRIPS TO COMMUNITY BY THIS MEANS FOR INDICATED PURPOSE:

COMMUNITY:	Auto	Scheduled Airline		Private Air or Charter Air	Bus
		Commercial	Commuter		
Chicago	P-1, S-2	B-2			

Please complete the following table in the same manner. Also, cross through all "communities" for which no trips were made in the past 12-month period.

NUMBER OF TRIPS TO COMMUNITY BY THIS MEANS FOR INDICATED PURPOSE:

COMMUNITY:	Auto	Scheduled Airline		Private Air or Charter Air	Bus
		Commercial	Commuter		
Minneapolis/ St. Paul					
Chicago					
St. Louis					
Kansas City					
Des Moines					
Waterloo/ Cedar Falls					
Sioux City					
Council Bluffs/ Omaha					
Cedar Rapids					
Dubuque					
Mason City					
Ottumwa					
Burlington					
Davenport/ Quad Cities					
Ft. Dodge					
Creston					
Spencer					
Decorah					
Carroll					
Marshalltown					

Page 5 of 6

15. If you were riding an express bus for the trip you are now preparing to make on a scheduled airline, and the bus route followed the most direct highway route between this city and the city where you will depart this airline, if the bus were to make one stop at an intermediate city, how many minutes total time to leave the direct highway route, handle passengers and baggage, and return to the direct highway route would you consider allowable and still regard the service as an express route? (Check the value most nearly representing your judgement.)

____No stop ____0-4 min. ____5-9 min. ____10-14 min.

____15-19 min. ____20-29min. ____30-39 min. ____40-49 min.

____50-59 min. ____60+ min.

16. If you were riding a commuter airline for the trip you are now preparing to make on a scheduled airline, and the commuter airline was scheduled to make one stop between this city and the city where you will depart this airline, how much time would you be willing to accept for this intermediate stop before you would no longer consider the commuter airline trip a direct flight? The intermediate stop would require time to land, drop off and pick up passengers and baggage, take off and resume flight pattern to your destination city. (Check the value most nearly representing your judgement.)

____No stop ____0-4 min. ____5-9 min. ____10-14 min

____15-19 min. ____20-24 min. ____30-39 min. ____40-49 min.

____50-59 min. ____60+ min.

17. How many automobiles are owned or are available to your household? ____________

18. How many licensed drivers are in your household and what are the approximate ages of each?

______ Number of drivers ____________________ Age of each driver

19. Are you the head of household? ____ Yes ____ No

If "yes", what is your occupation; if "no", what is the occupation of the head of the household?

____ Professional, technical or manager ____ Farm owner or manager

____ Farm laborer ____ Clerical or sales person

____ Craftworker, equipment operator or laborer ____ Household or service employee

____ Unemployed ____ Other (specify): ______________________________

20. Please check the sex and age group in which you are included: ____ Male

____ Female ____ under 18 years ____ 18-24 yrs. ____ 25-39 yrs.

____ 40-64 yrs. ____ 65+ yrs...

21. Please indicate your approximate annual total household income before taxes by checking the bracket into which you would classify your household:

____ under $5000 per year ____ $5000-$9999 per year ____ $10,000-$14,999 per year ____ $15,000-$24,999 per year ____ $25,000-$49,999 per year

____ $50,000 or more

22. What is the employer's name and address (include city and state) for the head of household?

Page 6 of 6

23. What is your home address (city only)?

24. Do you travel for a business or firm or agency which pays for or reimburses you for travel expenses?

_____ Yes _____ No

25. Check the highest level of education you have completed.

_____ Grade School _____Attended High School _____ High School Graduate

_____ Technical School _____Attended College _____College Graduate

_____Post Graduate

26. If you have any comments or additional information you wish to add, please do so in the space below. Thank you for assisting this planning and research study.

THANK YOU FOR YOUR ASSISTANCE. PLEASE RETURN TO THE RESEARCH STAFF PERSON.

Commuter Air Carrier On-board Survey Form

(Printed on blue paper)

Iowa State University of Science and Technology Ames, Iowa 50011

Engineering Research Institute
College of Engineering
382 Town Engineering Building
Telephone: 515-294-6778

A public concern has been expressed that the available bus or air service to Iowa communities for intercity travel needs to be improved. Actual use of the existing bus and air service at selected Iowa cities is being sampled. The views and values of persons actually using such services needs to be compared to a cross-section of the general population of Iowa to ensure that public programs for transportation supported by the state government are representative of the ideas and needs of the state as a whole.

Your household has been contacted seeking your kind assistance in estimating Iowa residents' interest in and need for intercity public transportation. The Iowa Department of Transportation has contracted with the Engineering Research Institute at Iowa State University to evaluate the most economical and efficient methods of improving intercity passenger public transportation. Scheduled bus service and scheduled air service are the primary areas of interest. Your household was selected at random from a large sample of Iowa households. Some member of this household taking a few minutes to complete this questionnaire and return it to us will ensure that the views of Iowa citizens are considered in the planning and research necessary to develop adequate public passenger transportation among Iowa cities.

The responses made by your household in completing this questionnaire are confidential. All information will be coded and used in planning research in a manner such that no individual responses can ever be identified.

Your answers for your household are necessary if the final planning decision is to be representative for Iowa. We thank you for your cooperation in completing this questionnaire. After you have completed the questionnaire refold it as you received it, place it in the return envelope which is enclosed, and drop it in the mail. No postage is needed since the return is prepaid. Thank you again for your assistance.

Sincerely,

Ken Brewer
Professor of Transportation Engineering

KB/ssa

P.S. When you have completed the questionnaire, if you need more room for comments you are making in the last question feel free to use the remainder of the space below for additional comments.

Enclosure

Page 2 of 6

1. How many times in the past 12-month period (to the best of your recollection) have you or members of your household traveled to these cities by each means of travel listed? Disregard travel to your home community. The following travel means definitions are offered to ensure each person responding classifies their travel in a similar manner:

   Auto = personal or private auto available to household or a rental car
   Commercial Scheduled Airline = Ozark, United, Braniff, American, North Central, etc.
   Commuter Scheduled Airline = Brower, Mississippi Valley, S-M-B, Mesaba, etc.
   Private Air or Charter Air = an airplane owned or rented or individually hired
   Bus = Jefferson, Greyhound, Continental, Scenic Hawkeye, Ft. Dodge Trans., etc.

   Also, please classify all trips by the following travel purposes:

   Business of associated with employment = Code B
   Personal or family affairs including shopping = Code P
   Medical, dental or other health = Code H
   Social, recreational or visiting = Code S
   Other travel purposes not included in the above = Code X

   FOR EXAMPLE: if one personal trip (P) by auto and two recreational trips (S) by auto and two business trips (B) by a scheduled commercial airline were made to Chicago in the past year, the form should be filled in as follows:

NUMBER OF TRIPS TO COMMUNITY BY THIS MEANS FOR INDICATED PURPOSE:

Community	Auto	Scheduled Airline		Private Air or Charter Air	Bus
		Commercial	Commuter		
Chicago	P-1, S-2	B-2			

Please complete the following table in the same manner. Also, cross through all communities for which no trips were made in the past 12-month period.

NUMBER OF TRIPS TO COMMUNITY BY THIS MEANS FOR INDICATED PURPOSE:

Community	Auto	Scheduled Airline		Private Air or Charter Air	Bus
		Commercial	Commuter		
Minneapolis-St.Paul					
Chicago					
St. Louis					
Kansas City					
Des Moines					
Waterloo-Cedar Falls					
Sioux City					
Council Bluffs-Omaha					
Cedar Rapids					
Dubuque					
Mason City					
Ottumwa					
Burlington					
Davenport-Quad Cities					
Ft. Dodge					
Creston					
Spencer					
Decorah					
Carroll					
Marshalltown					

Page 3 of 6

2. Suppose that a network of express bus routes were available to connect a bus terminal in your city to a bus terminal in each of the following cities in non-stop service. Indicate how much you would be willing to pay for a one-way fare to ride such a bus service from your city to the listed community. Place a check in one (1) column for each city that indicates the listed price CLOSEST to what you would be willing to pay. For example, if you would pay $40 to ride a bus to Minneapolis/St. Paul but would not even consider riding a bus to any of the other cities, you should place a check under the "$40-$59" column opposite Minneapolis/St. Paul and put checks under the "Won't Ride" column for all the other cities.

	THE AMOUNT I WOULD PAY TO RIDE AN EXPRESS BUS TO THESE CITIES IS:							
COMMUNITY:	Won't Ride	0-$4	$5-$9	$10-$19	$20-$39	$40-$59	$60-$100	Other (write in amount)
Minneapolis/ St. Paul								
Chicago								
St. Louis								
Kansas City								
Des Moines								
Waterloo/ Cedar Falls								
Sioux City								
Council Bluffs/ Omaha								
Cedar Rapids								
Dubuque								
Mason City								
Ottumwa								
Burlington								
Davenport/ Quad Cities								
Fort Dodge								
Creston								
Spencer								
Decorah								
Carroll								
Marshalltown								

3. If you or members of your household would use a non-stop express bus service to important cities, what three (3) cities would you most frequently want to be your destinations, and please estimate the number of bus trips per year you think your household would make to each city. Count each person traveling as one trip.

A. city: ____________________ trips/year: _____

B. city: ____________________ trips/year: _____

C. city: ____________________ trips/year: _____

Page 4 of 6

4. Suppose that a third level air carrier (commuter airline) service was available to you from your city to each of the following cities in a non-stop service. Third level carriers typically fly twin-engine aircraft seating from 8 to 20 persons. Indicate how much you would be willing to pay for a one-way ticket to each of these cities by checking the column for each city which has a heading closest to what you would pay. For example, if you would pay $20 to fly direct to Des Moines, check the "$20-$39" column opposite "Des Moines" in the list of communities. If you would not consider using such a service to a particular city check the "Won't Ride" column for that city.

	THE AMOUNT I WOULD PAY TO RIDE A COMMUTER AIRLINE TO THESE CITIES IS:							
COMMUNITY:	Won't Ride	0-$4	$5-$9	$10-$19	$20-$39	$40-$59	$60-$100	Other (write in amount)
Minneapolis/ St. Paul								
Chicago								
St. Louis								
Kansas City								
Des Moines								
Waterloo/ Cedar Falls								
Sioux City								
Council Bluffs/ Omaha								
Cedar Rapids								
Dubuque								
Mason City								
Ottumwa								
Burlington								
Davenport/ Quad Cities								
Fort Dodge								
Creston								
Spencer								
Decorah								
Carroll								
Marshalltown								

5. If you or members of your household would use a non-stop commuter airline service to selected cities, what three (3) cities would you most frequently want to be your destinations, and please estimate the number of plane trips per year you think your household would make to each city. Count each person traveling each time as one trip (four persons making one flight is four trips).

A. city: ____________________ trips/year: ____

B. city: ____________________ trips/year: ____

C. city: ____________________ trips/year: ____

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6. If you were making a trip on an express bus route from your city to some other community to which you needed to travel, and the bus was scheduled to deviate from the most direct highway route between your home community and your destination city to make one intermediate stop, how much time would you be willing to accept for this intermediate stop before you would no longer consider the route as "express service?" The intermediate stop would require time to leave the direct route, drive to the terminal, drop off and pick up passengers and baggage, and return to the direct highway route to your destination. Check the time interval in the table below which includes the amount of time you would accept for each listed length of trip from your home city. For example, if for a trip of less than 50 miles you would not want any intermediate stop you should place a check under "No stop" for the 0-49 miles trip; if for all other trip lengths you would accept a stop requiring something between 5 and 10 minutes, you should place a check under the "5-9 min." column for all other trip lengths.

TRIP LENGTH FROM YOUR HOME CITY TO YOUR DESTINATION:	TIME FOR ONE INTERMEDIATE STOP THAT I WOULD ACCEPT AND STILL FEEL THAT I WAS RIDING ON AN EXPRESS BUS SERVICE ROUTE:									
	No stop	0-4 min.	5-9 min.	10-14 min.	15-19 min.	20-29 min.	30-39 min.	40-49 min.	50-59 min.	60+ min.
0-49 miles										
50-99 miles										
100-149 mi.										
150-199 mi.										
200-299 mi.										
300+ miles										

7. If you were making a trip on a commuter airline which was scheduled to make one stop between your home community where you boarded the airplane and your destination, how much time would you be willing to accept for this intermediate stop before you would no longer consider the trip a "direct flight?" The intermediate stop would require time to land, drop off and pick up passengers and baggage, take off and resume flight pattern to your destination city. Check the time interval in the table below which includes the amount of time you would accept for each listed length of trip from your home city. For example, if one stop of 15 minutes would be acceptable for trips between 100 and 200 miles, and for trips over 200 miles a stop of 20 minutes is acceptable, but for trips less than 100 miles long you do not want any stops, then you should place a check under the "No stop" column for the first two trip lengths, check the "15-19 min." column for the next two trip lengths, and check the "20-29 min." column for the last two trip lengths.

TRIP LENGTH FROM YOUR HOME CITY TO YOUR DESTINATION:	TIME FOR ONE INTERMEDIATE STOP THAT I WOULD ACCEPT AND STILL CONSIDER THE COMMUTER AIRLINE ROUTE AS A DIRECT CONNECTION:									
	No stop	0-4 min.	5-9 min.	10-14 min.	15-19 min.	20-29 min.	30-39 min.	40-49 min.	50-59 min.	60+ min.
0-49 miles										
50-99 miles										
100-149 mi.										
150-199 mi.										
200-299 mi.										
300+ miles										

8. Do you travel for a business or firm or agency which pays for or reimburses you for travel expenses?

_____ Yes _____ No

9. Check the highest level of education you have completed.

_____ Grade School _____ Attended High School _____ High School Graduate

_____ Attended College _____ College Graduate _____ Post Graduate

_____Technical School

10. If the state-wide transportation system included express bus service routes connecting a network of selected cities, how favorable would you be to using public transportation funds to support such services? Please check below the boxes which most closely represent your feeling about spending state and local taxes for such transportation.

MY POSITION ON THE USE OF PUBLIC FUNDS FOR EXPRESS BUSES IS:

	Strongly Opposed	Somewhat Opposed	Neutral (Don't Care)	Somewhat Favorable	Strongly in Favor
Using STATE taxes for EXPRESS bus routes					
Using LOCAL taxes for EXPRESS bus routes					

11. If the state-wide transportation system included additional commuter airline routes connecting a network of selected cities, how favorable would you be to using public transportation funds to support such services? Please check below the boxes which most closely represent your feeling about spending state and local taxes for such transportation.

MY POSITION ON THE USE OF PUBLIC FUNDS FOR COMMUTER AIR SERVICE IS:

	Strongly Opposed	Somewhat Opposed	Neutral (Don't Care)	Somewhat Favorable	Strongly in Favor
Using STATE taxes for COMMUTER AIR service					
Using LOCAL taxes for COMMUTER AIR service					

12. How many automobiles are owned or are available to your household? ____________

13. How many licensed drivers are in your household and what are the approximate ages of each?

________ Number of drivers ____________________ Age of each driver

14. Are you the head of household? ____ Yes ____ No

If "yes", what is your occupation; if "no", what is the occupation of the head of the household?

____ Professional, technical or manager ____ Farm owner or manager

____ Farm laborer ____ Clerical or sales person

____ Craftworker, equipment operator or laborer ____ Household or service employee

____ Unemployed ____ Other (specify): ____________________

15. Please check the sex and age group in which you are included: ____ Male ____ Female

____ under 18 years ____ 18-24 yrs. ____ 25-39 yrs. ____ 40-64 yrs. ____ 65+ yrs...

16. Please indicate your approximate annual total household income before taxes by checking a bracket into which you would classify your household:

____ under $5000 per year ____ $5000-$9999 per year ____ $10,000-$14,999 per year

____ $15,000-$24,999 per year ____ $25,000-$49,999 per year ____ $50,000 or more

17. What is the employer's name and address (include city and state) for the head of household?

18. What is your home address (city only)?

19. If you have any comments or additional information you wish to add, please do so in this space. Thank you for assisting this planning and research study.

APPENDIX I

METHODS AND PROCEDURES USED IN DEVELOPING ESTIMATING EQUATION FOR COMMUTER AIR CARRIER DEMAND

Initial Analysis

Stepwise multiple regression was the technique used in the development of an equation to estimate commuter airline passenger demand for the 17 study communities. This technique provides a means of choosing independent variables to insure the best prediction possible with the fewest independent variables. The method recursively constructs a prediction equation one variable at a time. The first step is to provide the single variable which is the best predictor. The second variable to be added to the regression equation is that which provides the best prediction in conjunction with the first variable. This process is continued until all the independent variables have entered or until no other variable will make a significant contribution to the equation.

The first step involved the use of all five independent variables and the data from 58 communities that are listed in Appendix J. The resulting prediction equation was:

$$(n = 58):\ \text{ADPE} = -35.61381 + 1.39421\ (\text{POPL}) + 1.96647\ (\text{ISOLATE}) + 1.45053\ (\text{OCCUP}) - 2.08472\ (\text{INCOME}) + 0.40950\ (\text{EDUC}) \quad (1)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\lvert t\rvert$ for regression coefficient
POPL	0.566	0.321	6.03
ISOLATE	0.090	0.393	2.26
OCCUP	0.176	0.429	1.00
INCOME	0.063	0.455	1.58
EDUC	0.238	0.457	0.37

This equation indicated some unfavorable results. First, the large negative constant is undesirable. Also, the negative contribution from INCOME is illogical. Only the regression coefficients for POPL and ISOLATE can be accepted with a high degree of confidence. Finally, the last three variables do not add much to the prediction ability of the estimating equation. A further look at the community data showed that Manhattan, Kansas, and Joplin, Missouri, had high levels of actual enplanements. Since these data may have biased the results, the data from those two communities were deleted in subsequent analysis steps.

The next step consisted of using POPL, ISOLATE, and OCCUP to estimate passenger demand. A second set of three variables was used by replacing OCCUP with INCOME. The resulting prediction equations are as follows:

$$(n = 56): \quad \text{ADPE} = -16.31549 + 0.82819\ (\text{POPL}) + 1.75912\ (\text{ISOLATE}) + 0.07858\ (\text{OCCUP}) \qquad (2)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\lvert t \rvert$ for regression coefficient
POPL	0.530	0.281	5.64
ISOLATE	0.159	0.399	3.19
OCCUP	-0.084	0.399	0.15

$$(n = 56): \quad ADPE = -9.98240 + 0.83898\ (POPL) + 1.71400\ (ISOLATE) - 0.27102\ (INCOME) \qquad (3)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\|t\|$ for regression coefficient
POPL	0.530	0.281	5.61
ISOLATE	0.159	0.399	3.06
INCOME	0.067	0.401	0.38

It was evident from the above two equations that the variables OCCUP and INCOME did not enhance the reliability of each equation to predict average daily passenger enplanements. At this point it appeared that some form of stratification of the data might prove beneficial. An analysis of the residuals revealed that most communities with small ADPE were being overestimated while many communities with large ADPE were underestimated. For this reason, the analysis was altered by grouping communities into two sets: one with ADPE ≤ 15 and the second set with ADPE ≥ 10. All five independent variables were included.

$$(n = 32, ADPE \leq 15): \quad ADPE = 5.77877 + 0.17201\ (POPL) + 0.27338\ (ISOLATE) - 0.23530\ (OCCUP) + 0.17975\ (INCOME) \qquad (4)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\|t\|$ for regression coefficient
POPL	0.365	0.133	2.29
ISOLATE	-0.016	0.169	1.41
OCCUP	-0.112	0.204	1.32
INCOME	0.160	0.222	0.79
EDUC	did not enter because it did not meet significance criteria		

This equation does not exhibit good prediction capability. In addition, all regression coefficients, except POPL, are not significant at the 0.05 level.

$$(n = 34,\ ADPE \geq 10):\quad ADPE = -22.57631 + 0.86799\ (POPL) + 1.85995\ (ISOLATE) - 1.52304\ (INCOME) + 1.91600\ (OCCUP) - 1.02610\ (EDUC) \qquad (5)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\lvert t \rvert$ for regression coefficient
POPL	0.459	0.210	4.37
ISOLATE	0.165	0.336	2.33
INCOME	-0.088	0.379	1.24
OCCUP	-0.031	0.402	1.44
EDUC	-0.065	0.424	1.02

Although this equation accounts for much more variance in the data than does equation (4), only the regression coefficients for POPL and ISOLATE are reliable. Also, the negative contributions for INCOME and EDUC are illogical. A major reason for the negative contributions is probably the high degree of colinearity among many of the variables. This colinearity among variables was also a problem in equation (4).

The results from equation (4) and equation (5) denote that the variables OCCUP, INCOME, and EDUC do not improve the estimating ability of the equation. It was decided to continue using the previous stratification of data but to only include POPL and ISOLATE in the estimation process. From this analysis it was desired to note the changes in form of the equations and any changes in residuals that might occur. One further stratification of the ADPE was made, in addition to the above two groupings. Also, the combined data from all 56 communities were used in the two-variable regression process. These four estimating equations follow.

$$(n = 32, \text{ADPE} \leq 15): \quad \text{ADPE} = 3.04153 + 0.17312 (\text{POPL}) + 0.20600 (\text{ISOLATE}) \tag{6}$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\|t\|$ for regression coefficient
POPL	0.365	0.133	2.43
ISOLATE	-0.016	0.169	1.12

Although this equation is simpler in form than equation (4), a review of the residuals showed that there was no significant change. The ISOLATE regression coefficient also decreased in significance.

$$(n = 34, \text{ADPE} \geq 10): \quad \text{ADPE} = -7.13243 + 0.70171 (\text{POPL}) + 1.95591 (\text{ISOLATE}) \tag{7}$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\|t\|$ for regression coefficient
POPL	0.459	0.210	3.78
ISOLATE	0.165	0.336	2.42

The only advantage equation (7) seemed to have over equation (5) was its simplicity. The residuals as a whole were not altered significantly.

$$(n = 24, \text{ADPE} > 15): \quad \text{ADPE} = 6.96870 + 0.61863 \text{ (POPL)} + 1.36586 \text{ (ISOLATE)} \qquad (8)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\lvert t \rvert$ for regression coefficient
POPL	0.512	0.262	3.20
ISOLATE	0.059	0.330	1.46

A comparison of the results from equation (6) and equation (8) indicates that the equation utilizing the higher ADPE has a much better prediction capability. Equation (8) accounts for 33 percent of the variability in the data, whereas equation (6) explains only 17 percent of the variance. However, the estimating ability is not very substantial; and the regression coefficient for ISOLATE has a fairly poor level of significance.

$$(n = 56): \quad \text{ADPE} = -14.19485 + 0.82458 \text{ (POPL)} + 1.75461 \text{ (ISOLATE)} \qquad (9)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\lvert t \rvert$ for regression coefficient
POPL	0.530	0.281	5.74
ISOLATE	0.159	0.399	3.22

This equation seemed to provide the most useful expression for predicting commuter airline passenger demand that had been developed thus far. Although the coefficient of determination (r^2) was only 0.40, the expression contained only two independent variables, and the regression coefficients for both variables were highly significant.

A further analysis of the community data pointed out a substantial difference in mean values for the ISOLATE variable when the communities were stratified by population. The logical separation occurred at a population of 20,000. The final multiple regression analysis yielded the following two equations:

$$(n = 30, \text{POPL} < 20{,}000): \quad \text{ADPE} = -12.29217 + 1.48459\ (\text{ISOLATE}) + 0.94623\ (\text{POPL}) \qquad (10)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\|t\|$ for regression coefficient
ISOLATE	0.429	0.184	2.67
POPL	0.247	0.257	1.63

This equation produced an interesting change in relation to the nine previous equations. The first variable to enter the equation was ISOLATE. Thus, for the smaller communities in the sample data base, an isolation factor was more strongly correlated with passenger demand than was population. The levels of significance for the ISOLATE and POPL regression coefficients were 0.02 and nearly 0.10, respectively. The explanatory power of the expression was limited to an $r^2 = 0.26$.

$$(n = 26, \text{POPL} \geq 20{,}000): \quad \text{ADPE} = -21.09984 + 0.85418\ (\text{POPL}) + 2.46114\ (\text{ISOLATE}) \qquad (11)$$

Variable	Simple correlation with ADPE (r)	Cumulative r^2	$\|t\|$ for regression coefficient
POPL	0.561	0.315	3.46
ISOLATE	0.281	0.395	1.74

As in equation (9), the above equation accounts for about 40 percent of the variance in the dependent variable data. Although the reliability of the regression coefficients for POPL and ISOLATE decreased, the levels of significance were 0.01 and 0.10, respectively.

An analysis of the residuals was deemed important in comparing equation (9) with equations (10) and (11). Of the 30 communities used as a data base in equation (10), 16 of those communities had reduced residuals in comparison with those resulting from equation (9). The average decrease was 1.24, and the average increase in residual for the other 14 communities was 0.93. Of the 26 communities used as a data base in equation (11), 14 of those communities had reduced residuals in comparison with those resulting from equation (9). The average decrease was 2.06, and the average increase for the remaining 12 communities was 0.84. Thus, equations (10) and (11) produced an overall beneficial effect on the residuals.

Variable Transformations

The variation in correlation as the sample is stratified into two subgroups according to size of city, the low overall correlation, and the degree of intercorrelation among the independent variables suggested that possible nonlinear effects might be occurring. Examination of the residuals did not indicate any obvious pattern, but 45 variable transformations were examined in an effort to obtain a function more strongly correlated to average daily passenger enplanements. Table I.1 lists the transformations.

Table I.1. Regression variable transformations tested

New	Transformation	New	Transformation
X1	1/ISOLATE	X24	$(\mathrm{OCCUP})^2$
X2	ln (ISOLATE)	X25	$(\mathrm{EDUC})^2$
X3	ln (POPL)	X26	$1/(\mathrm{POPL})^2$
X4	EDUC * INCOME	X27	$1/(\mathrm{EDUC})^2$
X5	ln (EDUC)	X28	$1/(\mathrm{INCOME})^2$
X6	ln (INCOME)	X29	$1/(\mathrm{OCCUP})^2$
X7	$(\mathrm{ISOLATE})^2$	X30	$(\mathrm{POPL})^3$
X8	$1/(\mathrm{ISOLATE})^2$	X31	$(\mathrm{EDUC})^3$
X9	ln (OCCUP)	X32	$(\mathrm{ISOLATE})^3$
X10	ISOLATE * INCOME	X33	$(\mathrm{INCOME})^3$
X11	OCCUP * INCOME	X34	$(\mathrm{OCCUP})^3$
X12	OCCUP * EDUC	X35	$1/(\mathrm{POPL})^3$
X13	INCOME * INCOME	X36	$1/(\mathrm{EDUC})^3$
X14	$(\mathrm{POPL})^{1/2}$	X37	$1/(\mathrm{ISOLATE})^3$
X15	$(\mathrm{ISOLATE})^{1/2}$	X38	$1/(\mathrm{INCOME})^3$
X16	1/POPL	X39	$1/(\mathrm{OCCUP})^3$
X17	1/EDUC	X40	POPL * INCOME
X18	1/INCOME	X41	ISOLATE * EDUC
X19	1/OCCUP	X42	ISOLATE * OCCUP
X20	$(\mathrm{OCCUP})^{1/2}$	X43	ISOLATE * POPL
X21	$(\mathrm{EDUC})^{1/2}$	X44	EDUC * POPL
X22	$(\mathrm{INCOME})^{1/2}$	X45	POPL * OCCUP
X23	$(\mathrm{POPL})^2$	Y1	ADPE/POPL
		Y2	ln (ADPE)

Seven sets of regression analyses were performed on the data set. The resulting equations with the associated coefficient of determination and t values of the regression coefficients are shown in Tables I.2 through I.8. Only regression five yields equations which are improved over those resulting from the previous analyses. Table I.9 compares the data values and the predictions for the most reliable equations from both the initial analysis and the transformed variable analysis. All of the equations have substantial residual error at several communities when compared with the Iowa data base points. None of the equations generate a high coefficient of determination. All of the equations shown are reasonable in form with logical signs and significant t values for the regression coefficients. Because of its simplicity in form, its constant term is nearest zero, and its variable measure is analogous to a combined travel resistance and trip generation factor, equation one from transformation regression five [equation (5-1) in Table I.9)] will be utilized in this planning research report to estimate ultimate commuter air carrier demand at a community.

Table I.2. Transformation regression 1 results[a]

Step	R^2	Equation and t values in parentheses
1	0.173	ADPE/POPL = 0.11419 ISOLATE + 0.02506 (3.36)
2	0.184	ADPE/POPL = 0.10445 ISOLATE - 0.00818 POPL + 0.30291 (2.91, 0.86)
3	0.190	ADPE/POPL = 0.10866 ISOLATE - 0.00968 POPL + 0.02810 INCOME - 0.13379 (2.95, 0.98, 0.60)
4	0.198	ADPE/POPL = 0.10884 ISOLATE - 0.01064 POPL + 0.05164 INCOME - 0.02188 EDUC - 0.21583 (2.94, 1.07, 0.91, 0.74)

[a] Variables included - were ADPE/POPL, POPL, ISOLATE, EDUC, INCOME, and OCCUP.

Table I.3. Transformation regression 2 results[a]

Step	R^2	Equation and t values in parentheses
1	0.180	ln (ADPE) = 0.62968 ln (POPL) + 0.79566 (3.44)
2	0.321	ln (ADPE) = 0.83153 ln (POPL) + 0.84511 ln (ISOLATE) - 1.62072 (4.65, 3.31)

[a] Variables included were ln (ADPE), ln (POPL), and ln (ISOLATE).

Table I.4. Transformation regression 3 results[a]

Step	R^2	Equation and t values in parentheses
1	0.180	$\ln (ADPE) = 0.62968 \ln (POPL) + 0.79566$ (3.44)
2	0.321	$\ln (ADPE) = 0.83153 \ln (POPL) + 0.84511 \ln (ISOLATE) - 1.62072$ (4.65, 3.31)
3	0.327	$\ln (ADPE) = 0.85029 \ln (POPL) + 0.83628 \ln (ISOLATE) - 0.20996 \ln (EDUC) - 1.15536$ (4.68, 3.26, 0.71)
4	0.330	$\ln (ADPE) = 0.82344 \ln (POPL) + 0.85128 \ln (ISOLATE) - 0.28924 (EDUC) + 0.29414 \ln (INCOME) - 1.71670$ (4.26, 3.26, 0.83, 0.43)

[a] Variables included were ln (ADPE), ln (ISOLATE), ln (POPL), ln (EDUC), ln (INCOME), and ln (OCCUP).

Table I.5. Transformation regression 4 results[a]

Step	R^2	Equation and t values in parentheses
1	0.182	$ADPE/POPL = 0.00804\ ISOLATE * INCOME - 0.3194$ (3.47)
2	0.233	$ADPE/POPL = 0.00743\ ISOLATE * INCOME + 5.73235 (1/POPL) - 0.32811$ (3.24, 1.88)
3	0.248	$ADPE/POPL = 0.00813\ ISOLATE * INCOME + 4.49074 (1/POPL) - 0.00006 (INCOME)^3 - 0.11429$ (3.40, 1.37, 1.02)
4	0.297	$ADPE/POPL = 0.00716\ ISOLATE * INCOME + 8.09681 (1/POPL) - 0.00015 (INCOME)^3 - 1729.54613 [1/(INCOME)^3] + 0.76981$ (3.00, 2.17, 2.14, 1.89)

[a] Variables included were ADPE/POPL and X1 through X45 (refer to Table I.1).

Table I.6. Transformation regression 5 results[a]

Step	R^2	Equation and t values in parentheses
1	0.401	ADPE = 0.09372 ISOLATE * POPL + 2.81694 (6.01)
2	0.439	ADPE = 0.06755 ISOLATE * POPL + 0.00005 $(\mathrm{POPL})^3$ + 6.22603 (3.29, 1.89)
3	0.460	ADPE = 0.09048 ISOLATE * POPL + 0.00017 $(\mathrm{POPL})^3$ - 0.01189 POPL * POPL + 6.56590 (3.49, 1.95, 1.43)
4	0.469	ADPE = 0.08899 ISOLATE * POPL + 0.00030 $(\mathrm{POPL})^3$ - 0.02743 POPL * POPL + 4.87562 $(\mathrm{POPL})^{1/2}$ - 8.13446 (3.42, 1.76, 1.43, 0.90)

[a] Variables included were ADPE and X1 through X45 (refer to Table I.1).

Table I.7. Transformation regression 6 results[a]

Step	R^2	Equation and t values in parentheses
1	0.312	ln (ADPE) = 0.00400 ISOLATE * POPL + 1.84358 (4.94)
2	0.331	ln (ADPE) = 0.00380 ISOLATE * POPL - 558.23262 $[1/(\mathrm{INCOME})^3]$ + 2.08417 (4.63, 1.23)
3	0.384	ln (ADPE) = 0.00373 ISOLATE * POPL - 2300.75622 $[1/(\mathrm{INCOME})^3]$ - 1.17082 $(\mathrm{INCOME})^{1/2}$ + 7.28441 (4.66, 2.45, 2.10)
4	0.392	ln (ADPE) = 0.00360 ISOLATE * POPL - 2317.19651 $[1/(\mathrm{INCOME})^3]$ - 1.11405 $(\mathrm{INCOME})^{1/2}$ + 0.00005 $(\mathrm{ISOLATE})^3$ + 7.02422 (4.44, 2.46, 1.98, 0.85)

[a] Variables included were ln (ADPE) and X1 to X45 (refer to Table I.1)

Table I.8. Transformation regression 7 results[a]

Step	R^2	Equation and t values in parentheses
1	0.191	$\ln(\mathrm{ADPE}) = 0.29414\,(\mathrm{POPL})^{1/2} + 1.34596$ (3.57)
2	0.333	$\ln(\mathrm{ADPE}) = 0.37420\,(\mathrm{POPL})^{1/2} + 0.58874\,(\mathrm{ISOLATE})^{1/2} - 0.84095$ (4.81, 3.36)
3	0.348	$\ln(\mathrm{ADPE}) = 0.34382\,(\mathrm{POPL})^{1/2} + 0.60780\,(\mathrm{ISOLATE})^{1/2} - 529.43568\,[1/(\mathrm{INCOME})^3] - 0.57034$ (4.18, 3.46, 1.10)
4	0.393	$\ln(\mathrm{ADPE}) = 0.34381\,(\mathrm{POPL})^{1/2} + 0.55359\,(\mathrm{ISOLATE})^{1/2} - 2121.90796\,[1/(\mathrm{INCOME})^3] - 1.09653\,(\mathrm{INCOME})^{1/2} + 4.43543$ (4.28, 3.19, 2.24, 1.94)

[a] Variables included were ln (ADPE), X1 to X3, X5, X6, X8, X9, X14 to X22, X26 to X29, and X35 to X39 (refer to Table I.1).

Table I.9. Predicted ADPE for the 17 study cities using the best estimating equations

	Average daily passenger enplanements (ADPE)				
Community	Eqn. 9	Eqn. 10 or eqn. 11	Eqn. 5-1	Eqn. 5-2	Actual data
Ames	27.35	23.87	15.19	19.40	-
Burlington	24.47	23.46	23.81	23.00	68
Carroll	7.26	8.10	9.56	11.13	-
Clinton	21.68	18.64	15.94	17.83	13
Decorah	2.93	4.19	7.32	9.49	-
Denison	3.03	3.78	6.75	9.07	-
Dubuque	73.12	73.86	62.52	86.93	93
Fort Dodge	27.16	27.53	28.96	26.56	18
Fort Madison	13.14	14.32	14.63	14.87	3
Keokuk	15.72	16.75	16.87	16.53	3
Marshalltown	16.84	14.27	15.47	16.33	-
Mason City	24.58	24.21	25.31	23.79	44
Muscatine	10.03	5.93	9.28	11.50	-
Ottumwa	24.58	24.21	25.31	23.79	19
Pocahontas	5.00	4.45	4.69	7.58	-
Spencer	9.84	10.53	11.25	12.36	5
Storm Lake	5.51	6.62	8.72	10.52	-

Note: Eqn. 9: $ADPE = - 14.19485 + 0.82458\ POPL + 1.75461\ ISOLATE$

Eqn. 10: $ADPE = - 12.29217 + 1.48459\ ISOLATE + 0.94623\ POPL$ $(POPL < 20)$

Eqn. 11: $ADPE = - 21.09984 + 0.85418\ POPL + 2.46114\ ISOLATE$ $(POPL \geq 20)$

Eqn. 5-1: $ADPE = 2.81694 + 0.09372\ ISOLATE * POPL$

Eqn. 5-2: $ADPE = 6.22603 + 0.06755\ ISOLATE * POPL + 0.00005\ (POPL)^3$

APPENDIX J

REGRESSION EQUATION INITIAL DATA

Table J.1. Average daily passenger enplanements (36) and independent variable data (39) used in the regression analysis

	Variables					
	Dependent	Independent				
Community	ADPE = average daily passenger enplanements	POPL = 1970 population (1000's)	INCOME = % families ≥ $15,000	OCCUP = % Persons employed in professional, technical, managerial	EDUC = % persons over 25 with ≥ 4 years college	ISOLATE = miles to nearest hub airport (10's)
Clinton, Ia.	13	35	18.9	21.7	9.7	4
Dubuque, Ia.	93	91	20.0	21.7	10.1	7
Fort Dodge, Ia.	18	31	17.2	24.2	10.6	9
Fort Madison, Ia.	3	14	15.3	22.8	7.6	9
Keokuk, Ia.	3	15	14.5	24.3	8.3	10
Mason City, Ia.	44	30	15.9	24.2	11.0	8
Ottumwa, Ia.	19	30	12.0	22.8	6.6	8
Spencer, Ia.	5	10	18.5	25.8	10.8	9
Dodge City, Ks.	12	14	14.5	25.8	11.4	14
Garden City, Ks.	25	15	17.6	23.6	12.1	19
Goodland, Ks.	8	6	12.1	19.9	7.3	18
Great Bend, Ks.	12	16	15.7	27.8	10.0	9
Hays, Ks.	27	15	14.3	30.4	20.5	13
Hutchinson, Ks.	5	37	12.3	25.5	11.5	4
Independence, Ks.	6	38	11.0	26.5	9.3	9
Lawrence, Ks.	15	46	18.9	34.5	30.0	4
Liberal, Ks.	35	21	16.0	20.6	12.8	15
Manhattan, Ks.	182	59	18.6	31.5	34.5	11
Olathe, Ks.	7	18	18.4	24.1	11.8	2
Salina, Ks.	41	38	14.8	26.2	12.3	8
Carbondale, Ill.	39	23	22.3	39.2	35.4	8
Danville, Ill.	30	43	19.3	21.9	8.5	8
Galesburg, Ill.	17	36	17.1	21.8	9.5	4
Jacksonville, Ill.	2	21	17.0	24.0	11.3	7
Macomb, Ill.	5	20	22.7	30.1	24.0	7
Marion, Ill.	37	21	13.2	27.2	9.1	8
Mattoon, Ill.	17	36	15.4	19.3	7.9	10
Mount Vernon, Ill.	20	16	15.1	22.5	8.7	8
Quincy, Ill.	62	64	13.7	21.0	8.0	11
Sterling/Rock Falls, Ill.	14	26	18.0	16.7	6.7	5
Bemidji, Minn.	37	11	14.7	30.6	15.7	10
Brainerd, Minn.	30	12	13.1	25.8	10.2	11
Chisholm/Hibbing, Minn.	50	22	12.5	23.7	8.9	6
Eveleth, Minn.	2	5	9.3	21.7	7.9	5
Fairmont, Minn.	11	11	13.3	22.9	8.3	10
Grand Rapids, Minn.	7	7	15.4	27.6	11.5	8
Int'l Falls, Minn.	39	6	18.8	23.8	8.1	14
Mankato, Minn.	9	31	19.6	25.6	18.8	7
New Ulm, Minn.	6	13	11.6	22.4	8.0	8
Thief River Falls, Minn.	25	9	13.5	27.1	9.3	9
Winona, Minn.	7	26	14.2	24.8	12.9	4
Worthington, Minn.	9	10	16.4	29.8	10.1	6
Cape Girardeau, Mo.	36	46	15.2	27.6	12.8	11
Jefferson City, Mo.	10	32	23.6	30.6	15.8	10
Joplin, Mo.	134	39	12.0	25.2	8.5	7
Kirksville, Mo.	9	16	14.0	27.0	17.7	13
Rolla, Mo.	2	13	20.6	37.9	27.7	10
Alliance, Neb.	5	7	10.8	29.0	8.6	14
Chadron, Neb.	6	6	11.7	29.5	12.4	9
Columbus, Neb.	7	15	13.9	21.9	8.7	7
Grand Island, Neb.	76	31	12.9	23.8	8.0	9
Hastings, Neb.	14	24	15.0	24.8	9.6	10
Kearney, Neb.	13	19	12.9	24.7	15.2	13
McCook, Neb.	9	8	11.8	27.4	7.3	20
Norfolk, Neb.	15	17	14.3	22.8	7.9	6
North Platte, Neb.	52	19	12.4	22.7	8.3	20
Scottsbluff, Neb.	61	15	14.8	28.5	12.1	16
Sidney, Neb.	6	6	9.2	22.3	6.4	15

APPENDIX K

1975 HIGHWAY INTERCITY TRIP INTERCHANGE

Table K.1. 1975 average daily person trip interchanges by passenger car, pickup, and panel truck

	Destination																				
Origin	Ames	Burlington	Carroll	Clinton	Davenport	Decorah	Denison	Des Moines	Dubuque	Fort Dodge	Fort Madison	Keokuk	Marshalltown	Mason City	Muscatine	Ottumwa	Pocahontas	Sioux City	Spencer	Storm Lake	Waterloo	Total
Ames	-	18	79	7	16	3	31	3029	3	58	28	0	386	58	43	15	0	12	10	6	75	3877
Burlington	0	-	0	9	189	3	0	72	9	3	1783	385	3	0	130	91	3	0	0	3	0	2683
Carroll	67	0	-	1	0	0	229	153	0	88	0	0	10	0	0	0	0	22	6	45	10	631
Clinton	3	24	0	-	1414	0	3	40	166	6	1	3	4	4	7	3	0	1	0	0	16	1695
Davenport	39	159	7	1362	-	6	0	412	304	13	33	31	16	16	1757	43	3	9	4	0	195	4409
Decorah	3	0	0	3	1	-	0	13	13	0	0	0	6	30	0	0	0	0	0	0	85	154
Denison	31	0	241	0	0	0	-	24	0	12	0	0	3	0	0	1	0	66	13	36	3	430
Des Moines	2654	72	111	43	264	12	46	-	51	357	24	30	710	207	40	342	18	159	84	37	406	5667
Dubuque	6	9	0	147	243	16	0	93	-	6	0	3	16	12	24	7	0	4	6	3	219	814
Fort Dodge	67	0	78	7	21	0	7	412	10	-	0	0	34	97	9	6	139	69	46	96	60	1158
Fort Madison	1	1847	0	4	33	0	0	19	0	1	-	701	4	0	9	15	0	0	3	0	3	2640
Keokuk	0	364	0	7	39	0	0	52	0	0	764	-	6	0	19	18	1	0	0	0	0	1270
Marshalltown	397	3	13	3	33	9	4	887	12	22	3	0	-	24	3	7	0	6	0	0	166	1592
Mason City	39	0	0	1	21	33	4	252	7	75	0	0	37	-	0	4	1	10	27	12	184	707
Muscatine	1	120	0	19	1717	0	0	33	10	6	12	3	0	4	-	30	0	1	0	0	10	1966
Ottumwa	7	133	0	1	43	1	0	322	4	4	18	10	9	1	12	-	3	0	0	0	43	611
Pocahontas	0	0	1	0	0	0	0	18	0	180	0	0	0	3	0	0	-	6	22	121	1	352
Sioux City	21	4	33	0	9	0	57	180	6	46	0	0	6	10	0	1	9	-	117	153	18	670
Spencer	12	0	0	0	1	1	6	70	3	60	0	0	3	30	0	0	10	130	-	165	4	495
Storm Lake	3	0	37	0	4	0	30	37	0	78	0	3	0	16	0	0	112	144	193	-	9	666
Waterloo	64	4	3	12	102	78	15	512	192	45	6	1	136	192	33	49	7	3	7	1	-	1462
Total	3415	2757	603	1626	4150	162	432	6630	790	1060	2672	1170	1389	704	2086	632	306	642	538	678	1507	33949

Source: Iowa Department of Transportation, Division of Planning and Research.

APPENDIX L

TRIP PURPOSES FOR INTERCITY HIGHWAY TRIPS

Table L.1. Trip purpose percentages for external-local trips (XI.16)

Community[a]	Business trips[b] (percent of total)	Personal trips[c] (percent of total)	Social-recreational trips[d] (percent of total)
Ames	21.1	18.7	18.7
Burlington	11.2	25.6	20.4
Carroll	20.2	30.6	20.1
Clinton	14.6	28.0	25.0
Davenport[e,f]	14.7	12.1	10.0
Des Moines	15.2	25.9	17.7
Dubuque	18.7	23.2	14.4
Fort Dodge	16.4	29.8	20.1
Fort Madison[e]	11.7	12.6	13.2
Keokuk	8.7	26.6	23.5
Marshalltown	14.5	26.8	18.8
Mason City[g]	16.1	15.8	10.7
Muscatine	15.8	22.9	21.7
Ottumwa	16.8	31.2	20.0
Sioux City	15.9	32.1	24.7
Spencer	19.1	35.5	22.4
Storm Lake	21.2	29.7	17.9
Waterloo	13.7	25.0	28.6

[a] Data were not available from Denison, Decorah, or Pocahontas.

[b] Categorized as "During work."

[c] Categorized as "Transact business" or "Personal business plus shop."

[d] Categorized as "Social plus recreation."

[e] Percentages averaged from Tables A-11 and A-12.

[f] Trip purpose percentages based on all external trips.

[g] Percentages averaged from Tables A-23, A-24, and A-25.

APPENDIX M

COMMUTER AIRLINE ROUTE DIVERSION ESTIMATION

Table M.1. City pair and route demand information and estimates

Potential route	City pair classification[a]	Total highway trip interchange	Business trip purpose percentage	Ground distance (miles)	Diversion percentage	Total daily commuter airline trips
1. Spencer - Des Moines						
a. Spencer - Des Moines	SL	154	19.1	181	13.0	5.09
2. Spencer - Storm Lake - Des Moines						
a. Spencer - Des Moines	SL	154	19.1	181	13.0	5.09
b. Storm Lake - Des Moines	SL	74	21.2	148	3.8	0.80
						5.89
3. Sioux City - Carroll - Des Moines						
a. Sioux City - Carroll	SL	55	20.2	103	0.4	0.05
b. Carroll - Des Moines	SL	264	20.2	91	0.19	0.13
						0.18
4. Council Bluffs (Omaha) - Carroll - Ames - Marshalltown - Muscatine - (Chicago)						
a. Council Bluffs - Carroll	SL	272	20.2	93	0.2	0.15
b. Council Bluffs - Ames	SL	120	21.1	160	6.0	2.03
c. Council Bluffs - Marshalltown	SL	55	14.5	180	12.7	1.35
d. Council Bluffs - Muscatine	SL	0	15.8	273	76.0	0.00
e. Carroll - Marshalltown	SS	23	17.4[b]	105	0.017	0.00
f. Ames - Muscatine	SS	44	18.5[b]	155	0.7	0.08
g. Carroll - Muscatine	SS	0	18.0[b]	221	17.5	0.00
h. Marshalltown - Muscatine	SS	3	15.2[b]	120	0.06	0.00
						3.61
5. (Decorah) - Waterloo - Marshalltown - Des Moines						
a. Waterloo - Marshalltown	SL	302	14.5	59	0.02	0.01
b. Marshalltown - Des Moines	SL	1597	14.5	50	0.01	0.03
						0.04

Table M.1. (continued)

Potential route	City pair classification[a]	Total highway trip interchange	Business trip purpose percentage	Ground distance (miles)	Diversion percentage	Total daily commuter airline trips
6. Mason City - Marshalltown - Des Moines						
a. Mason City - Des Moines	SL	459	16.1	119	0.9	0.89
b. Marshalltown - Des Moines	SL	1597	14.5	50	0.01	0.03
						0.92
7. Mason City - Fort Dodge - Des Moines						
a. Mason City - Des Moines	SL	459	16.1	119	0.9	0.89
b. Fort Dodge - Des Moines	SL	769	16.4	90	0.17	0.28
						1.17
8. Burlington - Ottumwa - Des Moines						
a. Burlington - Des Moines	SL	144	11.2	159	6.0	1.29
b. Ottumwa - Des Moines	SL	664	16.8	83	0.11	0.16
						1.45
9. Des Moines - Ottumwa - Davenport (Quad Cities)						
a. Ottumwa - Des Moines	SL	664	16.8	83	0.11	0.16
b. Ottumwa - Davenport	SL	86	16.8	128	1.5	0.29
c. Davenport - Des Moines	LL	676	15.0[b]	163	1.2	1.63
						2.08
10. Sioux City - Fort Dodge - Waterloo						
a. Fort Dodge - Sioux City	SL	115	16.4	121	1.05	0.27
b. Fort Dodge - Waterloo	SL	105	16.4	108	0.5	0.12
c. Sioux City - Waterloo	LL	21	14.8[b]	228	22.0	0.91
						1.30

Table M.1. (continued)

Potential route	City pair classification[a]	Total highway trip interchange	Business trip purpose percentage	Ground distance (miles)	Diversion percentage	Total daily commuter airline trips
11. Sioux City - Spencer - Mason City - Waterloo						
a. Spencer - Sioux City	SL	247	19.1	96	0.26	0.16
b. Spencer - Waterloo	SL	11	19.1	182	13.5	0.37
c. Mason City - Sioux City	SL	20	16.1	199	22.0	0.95
d. Spencer - Mason City	SS	57	17.6[b]	103	0.015	0.00
e. Sioux City - Waterloo	LL	21	14.8[b]	228	22.0	0.91
						2.39
12. Sioux City - Storm Lake - Mason City - Waterloo						
a. Storm Lake - Sioux City	SL	297	21.2	74	0.06	0.05
b. Storm Lake - Waterloo	SL	10	21.2	168	8.5	0.24
c. Mason City - Sioux City	SL	20	16.1	199	22.0	0.95
d. Storm Lake - Mason City	SS	28	18.7[b]	134	0.17	0.01
e. Sioux City - Waterloo	LL	21	14.8[b]	228	22.0	0.91
						2.16
13. Burlington - Clinton	SS	33	12.9[b]	118	0.05	0.00
14. Spencer - Fort Dodge - Des Moines						
a. Spencer - Des Moines	SL	154	19.1	181	13.0	5.09
b. Fort Dodge - Des Moines	SL	769	16.4	90	0.17	0.28
						5.37

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[a] S = small community, < 50,000 population; L = large community, ≥ 50,000 population.

[b] Average of percentages for both communities.

APPENDIX N

HOUSEHOLD SURVEY TOTAL TRIPS TO DESTINATION COMMUNITIES BY TRIP DISTANCE CATEGORIES

Table N.1. Automobile business trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	427	192	1892	645	-	3156
Chicago	-	-	387	606	1029	1172	385	3579
St. Louis	-	-	-	360	784	489	405	2038
Kansas City	-	-	-	-	2020	549	-	2569
Des Moines	937	1710	1521	1761	-	-	-	5929
Waterloo/ Cedar Falls	-	1870	986	591	-	-	-	3447
Sioux City	-	810	587	562	192	363	-	2514
Council Bluffs/ Omaha	-	339	395	1270	828	230	-	3062
Cedar Rapids	-	1795	1441	368	323	-	-	3927
Dubuque	-	492	366	987	137	-	-	1982
Mason City	-	1061	233	474	248	-	-	2016
Ottumwa	-	798	171	228	163	-	-	1360
Burlington	511	417	220	277	86	47	-	1558
Davenport/ Quad Cities	987	844	399	361	523	7	-	3121
Fort Dodge	48	1633	115	373	285	-	-	2454
Creston	-	28	172	282	77	-	-	559
Spencer	569	749	160	445	27	245	-	2195
Decorah	-	176	108	283	281	-	-	848
Carroll	243	876	100	61	100	-	-	1380
Marshalltown	501	296	495	324	-	-	-	1616
Total	3796	13894	8283	9805	8995	3747	790	49310

Table N.2. Automobile personal business trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	629	240	2395	954	-	4218
Chicago	-	-	634	889	1216	1414	367	4520
St. Louis	-	-	-	482	1003	713	522	2720
Kansas City	-	-	-	-	2095	685	-	2780
Des Moines	1546	2736	2044	2115	-	-	-	8441
Waterloo/ Cedar Falls	-	2710	1108	582	-	-	-	4400
Sioux City	-	1002	516	539	329	380	-	2766
Council Bluffs/ Omaha	-	700	436	1626	819	289	-	3870
Cedar Rapids	-	2658	1861	339	285	-	-	5143
Dubuque	-	699	929	923	141	-	-	2692
Mason City	-	1285	194	319	244	-	-	2042
Ottumwa	-	716	128	133	195	-	-	1172
Burlington	809	956	278	235	101	82	-	2461
Davenport/ Quad Cities	1984	961	664	527	309	73	-	4518
Fort Dodge	65	2073	465	215	304	-	-	3122
Creston	-	28	278	146	54	-	-	506
Spencer	559	793	146	580	30	120	-	2228
Decorah	-	229	189	404	194	-	-	1016
Carroll	379	750	151	45	110	-	-	1435
Marshalltown	825	361	551	326	-	-	-	2063
Total	6167	18657	11201	10665	9824	4710	889	62113

Table N.3. Automobile medical trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	20	10	155	13	-	198
Chicago	-	-	17	36	56	79	37	225
St. Louis	-	-	-	61	15	41	29	146
Kansas City	-	-	-	-	175	8	-	183
Des Moines	56	119	158	110	-	-	-	443
Waterloo/ Cedar Falls	-	129	39	17	-	-	-	185
Sioux City	-	130	37	29	6	12	-	214
Council Bluffs/ Omaha	-	69	65	99	44	6	-	283
Cedar Rapids	-	80	100	27	23	-	-	230
Dubuque	-	13	11	33	7	-	-	64
Mason City	-	68	2	14	12	-	-	96
Ottumwa	-	37	12	2	15	-	-	66
Burlington	73	22	1	8	-	17	-	121
Davenport/ Quad Cities	85	36	35	23	13	1	-	193
Fort Dodge	18	147	21	-	1	-	-	187
Creston	-	-	14	-	-	-	-	14
Spencer	92	65	-	41	-	4	-	202
Decorah	-	-	-	29	6	-	-	35
Carroll	42	64	45	-	20	-	-	171
Marshalltown	25	16	15	21	-	-	-	77
Total	391	995	592	560	548	181	66	3333

Table N.4. Automobile social-recreation trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	409	151	1343	390	-	2293
Chicago	-	-	298	463	567	852	123	2303
St. Louis	-	-	-	290	658	387	350	1685
Kansas City	-	-	-	-	1185	414	-	1599
Des Moines	993	1268	1099	1242	-	-	-	4602
Waterloo/ Cedar Falls	-	1534	505	290	-	-	-	2329
Sioux City	-	438	233	282	156	157	-	1266
Council Bluffs/ Omaha	-	193	97	879	399	200	-	1768
Cedar Rapids	-	1223	1256	165	72	-	-	2716
Dubuque	-	295	244	606	34	-	-	1179
Mason City	-	622	100	165	42	-	-	929
Ottumwa	-	498	158	76	53	-	-	785
Burlington	356	384	60	168	13	9	-	990
Davenport/ Quad Cities	908	575	363	315	223	11	-	2395
Fort Dodge	87	980	120	158	146	-	-	1491
Creston	-	-	155	89	29	-	-	273
Spencer	190	438	147	202	37	65	-	1079
Decorah	-	214	196	306	102	-	-	818
Carroll	123	416	41	33	18	-	-	631
Marshalltown	417	208	221	146	-	-	-	992
Total	3074	9286	5702	6026	5077	2485	473	32123

Table N.5. Automobile miscellaneous trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	18	18	156	19	-	211
Chicago	-	-	18	19	99	91	-	227
St. Louis	-	-	-	13	36	43	17	109
Kansas City	-	-	-	-	180	14	-	194
Des Moines	52	255	67	99	-	-	-	473
Waterloo/ Cedar Falls	-	243	45	51	-	-	-	339
Sioux City	-	42	12	31	35	12	-	132
Council Bluffs/ Omaha	-	18	38	30	54	13	-	153
Cedar Rapids	-	70	64	13	38	-	-	185
Dubuque	-	11	16	50	39	-	-	116
Mason City	-	42	38	14	3	-	-	97
Ottumwa	-	75	3	5	-	-	-	83
Burlington	13	43	7	8	-	-	-	71
Davenport/ Quad Cities	29	31	57	2	43	-	-	162
Fort Dodge	-	93	41	40	10	-	-	184
Creston	-	-	2	13	7	-	-	22
Spencer	41	5	6	47	-	8	-	107
Decorah	-	13	18	8	20	-	-	59
Carroll	-	55	41	-	-	-	-	96
Marshalltown	13	42	9	38	-	-	-	102
Total	148	1038	500	499	720	200	17	3122

Table N.6. Bus business trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	8	4	90	3	-	105
Chicago	-	-	1	15	4	53	-	73
St. Louis	-	-	-	3	7	26	10	46
Kansas City	-	-	-	-	69	5	-	74
Des Moines	54	14	31	14	-	-	-	113
Waterloo/ Cedar Falls	-	50	5	5	-	-	-	60
Sioux City	-	-	24	15	3	6	-	48
Council Bluffs/ Omaha	-	1	-	58	4	2	-	65
Cedar Rapids	-	20	24	6	-	-	-	50
Dubuque	-	2	6	23	-	-	-	31
Mason City	-	15	20	1	-	-	-	36
Ottumwa	-	-	1	-	2	-	-	3
Burlington	3	5	1	5	-	-	-	14
Davenport/ Quad Cities	4	14	3	8	-	-	-	29
Fort Dodge	-	21	2	12	1	-	-	36
Creston	-	1	10	-	-	-	-	11
Spencer	-	2	-	3	-	-	-	5
Decorah	-	6	-	7	-	-	-	13
Carroll	-	5	-	-	2	-	-	7
Marshalltown	20	6	10	-	-	-	-	36
Total	81	162	146	179	182	95	10	855

Table N.7. Bus personal business trips

	Trip distance (miles)							
Destination communtiy	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	26	14	54	15	-	109
Chicago	-	-	8	77	18	32	3	138
St. Louis	-	-	-	4	17	6	19	46
Kansas City	-	-	-	-	32	13	-	45
Des Moines	18	37	72	42	-	-	-	169
Waterloo/ Cedar Falls	-	71	6	16	-	-	-	93
Sioux City	-	3	11	11	6	9	-	40
Council Bluffs/ Omaha	-	7	-	33	13	13	-	66
Cedar Rapids	-	34	51	12	4	-	-	101
Dubuque	-	4	38	19	1	-	-	62
Mason City	-	9	-	4	-	-	-	13
Ottumwa	-	6	1	15	5	-	-	27
Burlington	9	9	5	12	1	4	-	40
Davenport/ Quad Cities	47	44	5	18	14	4	-	132
Fort Dodge	-	22	-	25	7	-	-	54
Creston	-	-	2	5	12	-	-	19
Spencer	-	9	1	4	-	1	-	15
Decorah	-	2	3	3	-	-	-	8
Carroll	3	6	-	-	1	-	-	10
Marshalltown	4	2	8	9	-	-	-	23
Total	81	265	237	323	185	97	22	1210

Table N.8. Bus medical trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	-	-	-	-	-	0
Chicago	-	-	-	1	-	-	-	1
St. Louis	-	-	-	-	-	-	-	0
Kansas City	-	-	-	-	1	-	-	1
Des Moines	-	4	-	-	-	-	-	4
Waterloo/ Cedar Falls	-	1	-	-	-	-	-	1
Sioux City	-	1	-	-	-	-	-	1
Council Bluffs/ Omaha	-	-	28	-	-	-	-	28
Cedar Rapids	-	4	-	-	-	-	-	4
Dubuque	-	-	-	-	-	-	-	0
Mason City	-	-	-	-	-	-	-	0
Ottumwa	-	-	-	-	-	-	-	0
Burlington	-	4	-	-	-	-	-	4
Davenport/ Quad Cities	25	-	-	-	-	-	-	25
Fort Dodge	-	28	-	-	-	-	-	28
Creston	-	-	-	-	-	-	-	0
Spencer	-	-	-	-	-	-	-	0
Decorah	-	-	-	-	-	-	-	0
Carroll	-	-	-	-	-	-	-	0
Marshalltown	-	-	-	-	-	-	-	0
Total	25	42	28	1	1	0	0	97

Table N.9. Bus social-recreational trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	10	19	52	15	-	96
Chicago	-	-	21	24	33	31	-	109
St. Louis	-	-	-	4	27	10	12	53
Kansas City	-	-	-	-	62	27	-	89
Des Moines	31	58	25	60	-	-	-	174
Waterloo/ Cedar Falls	-	73	16	7	-	-	-	96
Sioux City	-	2	11	11	13	10	-	47
Council Bluffs/ Omaha	-	2	9	19	24	12	-	66
Cedar Rapids	-	28	42	7	-	-	-	77
Dubuque	-	17	12	12	1	-	-	42
Mason City	-	30	1	6	-	-	-	37
Ottumwa	-	4	-	1	-	-	-	5
Burlington	4	9	3	12	1	-	-	29
Davenport/ Quad Cities	29	17	8	12	6	-	-	72
Fort Dodge	-	36	15	10	2	-	-	63
Creston	-	-	-	1	4	-	-	5
Spencer	1	3	3	6	-	-	-	13
Decorah	-	4	2	19	3	-	-	28
Carroll	-	4	1	10	-	-	-	15
Marshalltown	6	4	1	5	-	-	-	16
Total	71	291	180	245	228	105	12	1132

Table N.10. Bus miscellaneous trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	-	1	6	7	-	14
Chicago	-	-	1	6	3	2	-	12
St. Louis	-	-	-	3	1	1	1	6
Kansas City	-	-	-	-	6	-	-	6
Des Moines	11	2	-	11	-	-	-	24
Waterloo/ Cedar Falls	-	13	-	-	-	-	-	13
Sioux City	-	-	-	4	-	3	-	7
Council Bluffs/ Omaha	-	-	-	4	7	-	-	11
Cedar Rapids	-	-	1	-	-	-	-	1
Dubuque	-	1	-	3	-	-	-	4
Mason City	-	4	-	-	-	-	-	4
Ottumwa	-	-	-	-	-	-	-	0
Burlington	3	-	-	-	-	-	-	3
Davenport/ Quad Cities	1	-	1	-	-	-	-	2
Fort Dodge	-	5	-	-	3	-	-	8
Creston	-	-	1	-	-	-	-	1
Spencer	-	-	-	6	1	-	-	7
Decorah	-	-	-	-	-	-	-	0
Carroll	-	-	-	-	-	-	-	0
Marshalltown	5	-	-	4	-	-	-	9
Total	20	25	4	42	27	13	1	132

Table N.11. Scheduled air business trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	55	20	285	217	-	577
Chicago	-	-	26	138	419	297	18	898
St. Louis	-	-	-	93	289	143	54	579
Kansas City	-	-	-	-	405	117	-	522
Des Moines	127	242	108	290	-	-	-	767
Waterloo/ Cedar Falls	-	273	162	75	-	-	-	510
Sioux City	-	12	26	66	61	108	-	273
Council Bluffs/ Omaha	-	12	5	149	206	13	-	385
Cedar Rapids	-	218	260	15	7	-	-	500
Dubuque	-	17	85	226	-	-	-	328
Mason City	-	95	-	32	99	-	-	226
Ottumwa	-	149	12	10	16	-	-	187
Burlington	94	85	5	26	9	8	-	227
Davenport/ Quad Cities	68	192	167	62	35	2	-	526
Fort Dodge	1	73	24	71	83	-	-	252
Creston	-	-	16	68	27	-	-	111
Spencer	5	74	17	38	-	69	-	203
Decorah	-	30	43	27	119	-	-	219
Carroll	6	30	16	27	68	-	-	147
Marshalltown	73	69	17	112	-	-	-	271
Total	374	1571	1044	1545	2128	974	72	7708

Table N.12. Scheduled air personal business trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	5	4	31	14	-	54
Chicago	-	-	5	12	63	46	4	130
St. Louis	-	-	-	18	21	25	17	81
Kansas City	-	-	-	-	44	17	-	61
Des Moines	27	44	12	34	-	-	-	117
Waterloo/ Cedar Falls	-	35	10	8	-	-	-	53
Sioux City	-	1	14	12	-	4	-	31
Council Bluffs/ Omaha	-	1	-	14	15	11	-	41
Cedar Rapids	-	18	23	12	-	-	-	53
Dubuque	-	5	16	6	2	-	-	29
Mason City	-	30	2	2	1	-	-	35
Ottumwa	-	3	1	-	-	-	-	4
Burlington	15	6	-	-	7	-	-	28
Davenport/ Quad Cities	12	14	10	8	4	2	-	50
Fort Dodge	-	12	4	11	-	-	-	27
Creston	-	-	2	-	-	-	-	2
Spencer	-	1	-	4	1	-	-	6
Decorah	-	1	2	1	-	-	-	4
Carroll	-	3	-	-	-	-	-	3
Marshalltown	7	4	9	-	-	-	-	20
Total	61	178	115	146	189	119	21	829

Table N.13. Scheduled air medical trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	-	-	1	-	-	1
Chicago	-	-	-	-	2	2	-	4
St. Louis	-	-	-	2	-	1	-	3
Kansas City	-	-	-	-	4	-	-	4
Des Moines	2	1	-	-	-	-	-	3
Waterloo/ Cedar Falls	-	2	-	-	-	-	-	2
Sioux City	-	-	-	1	-	-	-	1
Council Bluffs/ Omaha	-	1	-	1	-	-	-	2
Cedar Rapids	-	-	1	-	-	-	-	1
Dubuque	-	-	-	-	-	-	-	0
Mason City	-	-	-	1	2	-	-	3
Ottumwa	-	-	-	-	-	-	-	0
Burlington	2	-	-	-	-	-	-	2
Davenport/ Quad Cities	-	-	2	-	-	-	-	2
Fort Dodge	-	2	-	-	-	-	-	2
Creston	-	-	-	-	-	-	-	0
Spencer	-	-	-	1	-	-	-	1
Decorah	-	-	-	-	-	-	-	0
Carroll	-	-	-	-	-	-	-	0
Marshalltown	-	-	-	-	-	-	-	0
Total	4	6	3	6	9	3	0	31

Table N.14. Scheduled air social-recreational trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	7	6	24	11	-	48
Chicago	-	-	7	19	20	41	7	94
St. Louis	-	-	-	10	15	17	8	50
Kansas City	-	-	-	-	26	16	-	42
Des Moines	7	33	15	29	-	-	-	84
Waterloo Cedar Falls	-	27	10	4	-	-	-	41
Sioux City	-	5	5	-	5	2	-	17
Council Bluffs/ Omaha	-	3	-	8	9	5	-	25
Cedar Rapids	-	35	11	1	-	-	-	47
Dubuque	-	6	2	4	-	-	-	12
Mason City	-	1	3	3	1	-	-	8
Ottumwa	-	6	1	-	1	-	-	8
Burlington	7	4	1	3	-	-	-	15
Davenport/ Quad Cities	9	16	6	3	3	-	-	37
Fort Dodge	2	10	1	6	2	-	-	21
Creston	-	-	5	-	-	-	-	5
Spencer	-	-	3	4	-	2	-	9
Decorah	-	-	8	1	-	-	-	9
Carroll	3	5	1	1	-	-	-	10
Marshalltown	2	3	4	3	-	-	-	12
Total	30	154	90	105	106	94	15	594

Table N.15. Scheduled air miscellaneous trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	-	-	5	2	-	7
Chicago	-	-	2	-	-	4	-	6
St. Louis	-	-	-	-	-	5	-	5
Kansas City	-	-	-	-	5	-	-	5
Des Moines	5	-	-	2	-	-	-	7
Waterloo/ Cedar Falls	-	5	-	-	-	-	-	5
Sioux City	-	-	-	5	-	-	-	5
Council Bluffs/ Omaha	-	-	-	5	-	-	-	5
Cedar Rapids	-	2	5	-	-	-	-	7
Dubuque	-	2	-	4	-	-	-	6
Mason City	-	4	-	-	-	-	-	4
Ottumwa	-	-	-	-	-	-	-	0
Burlington	-	-	-	-	-	-	-	0
Davenport/ Quad Cities	2	-	-	-	-	-	-	2
Fort Dodge	-	5	-	-	-	-	-	5
Creston	-	-	-	-	-	-	-	0
Spencer	-	-	-	1	-	-	-	1
Decorah	-	-	-	-	-	-	-	0
Carroll	-	4	-	-	-	-	-	4
Marshalltown	1	-	-	-	-	-	-	1
Total	8	22	7	17	10	11	0	75

Table N.16. General aviation business trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	11	1	136	22	-	170
Chicago	-	-	1	89	61	57	14	222
St. Louis	-	-	-	26	92	20	12	150
Kansas City	-	-	-	-	71	86	-	157
Des Moines	20	57	35	119	-	-	-	231
Waterloo/ Cedar Falls	-	117	35	7	-	-	-	159
Sioux City	-	2	25	14	6	81	-	128
Council Bluffs/ Omaha	-	5	2	46	24	80	-	157
Cedar Rapids	-	108	31	1	12	-	-	152
Dubuque	-	4	18	65	-	-	-	87
Mason City	-	49	-	91	4	-	-	144
Ottumwa	-	10	3	83	-	-	-	96
Burlington	32	13	3	80	7	10	-	145
Davenport/ Quad Cities	16	84	31	15	12	-	-	158
Fort Dodge	-	28	5	3	1	-	-	37
Creston	-	1	15	1	4	-	-	21
Spencer	12	16	2	6	78	-	-	114
Decorah	-	2	81	1	3	-	-	87
Carroll	-	15	4	2	3	-	-	24
Marshalltown	8	2	78	2	-	-	-	90
Total	88	513	380	652	514	356	26	2529

Table N.17. General aviation personal business trips

Destination community	Trip distance (miles)							Total trips
	0-49	50-99	100-149	150-199	200-299	300-399	400-499	
Minneapolis/ St. Paul	-	-	1	-	16	-	-	17
Chicago	-	-	-	2	5	21	1	29
St. Louis	-	-	-	3	7	2	2	14
Kansas City	-	-	-	-	19	1	-	20
Des Moines	19	14	4	5	-	-	-	42
Waterloo/ Cedar Falls	-	19	2	8	-	-	-	29
Sioux City	-	1	10	2	-	4	-	17
Council Bluffs/ Omaha	-	8	1	18	5	-	-	32
Cedar Rapids	-	4	21	-	-	-	-	25
Dubuque	-	-	2	10	-	-	-	12
Mason City	-	3	-	-	-	-	-	3
Ottumwa	-	1	7	-	-	-	-	8
Burlington	5	2	-	1	2	-	-	10
Davenport/ Quad Cities	2	4	6	3	-	-	-	15
Fort Dodge	-	25	1	-	-	-	-	26
Creston	-	-	11	1	-	-	-	12
Spencer	1	2	1	-	-	-	-	4
Decorah	-	1	1	4	-	-	-	6
Carroll	-	11	-	-	-	-	-	11
Marshalltown	7	3	2	-	-	-	-	12
Total	34	98	70	57	54	28	3	344

Table N.18. General aviation medical trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	-	1	-	-	-	1
Chicago	-	-	-	-	-	-	-	0
St. Louis	-	-	-	-	-	-	1	1
Kansas City	-	-	-	-	-	-	-	0
Des Moines	-	-	-	1	-	-	-	1
Waterloo/ Cedar Falls	-	-	-	-	-	-	-	0
Sioux City	-	1	-	-	-	-	-	1
Council Bluffs/ Omaha	-	-	-	-	-	-	-	0
Cedar Rapids	-	-	-	-	-	-	-	0
Dubuque	-	-	-	-	-	-	-	0
Mason City	-	-	1	-	-	-	-	1
Ottumwa	-	-	-	-	-	-	-	0
Burlington	-	-	-	-	-	-	-	0
Davenport/ Quad Cities	-	-	-	-	-	-	-	0
Fort Dodge	-	-	-	-	-	-	-	0
Creston	-	-	-	-	-	-	-	0
Spencer	-	-	-	-	-	-	-	0
Decorah	-	-	-	-	-	-	-	0
Carroll	-	-	-	-	-	-	-	0
Marshalltown	-	-	-	-	-	-	-	0
Total	0	1	1	2	0	0	1	5

Table N.19. General aviation social-recreational trips

Destination community	Trip distance (miles) 0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	-	2	9	1	-	12
Chicago	-	-	-	5	1	6	-	12
St. Louis	-	-	-	-	12	2	-	14
Kansas City	-	-	-	-	3	2	-	5
Des Moines	6	4	10	10	-	-	-	30
Waterloo/ Cedar Falls	-	11	1	-	-	-	-	12
Sioux City	-	-	-	3	2	3	-	8
Council Bluffs/ Omaha	-	1	-	1	1	4	-	7
Cedar Rapids	-	12	4	-	-	-	-	16
Dubuque	-	-	1	-	-	-	-	1
Mason City	-	5	-	2	-	-	-	7
Ottumwa	-	-	-	-	-	-	-	0
Burlington	-	10	-	1	-	-	-	11
Davenport/ Quad Cities	10	8	1	3	-	-	-	22
Fort Dodge	-	2	1	4	-	-	-	7
Creston	-	-	1	-	-	-	-	1
Spencer	-	-	-	1	-	-	-	1
Decorah	-	-	3	2	-	-	-	5
Carroll	-	1	-	-	-	-	-	1
Marshalltown	1	1	-	-	-	-	-	2
Total	17	55	22	34	28	18	0	174

Table N.20. General aviation miscellaneous trips

	Trip distance (miles)							
Destination community	0-49	50-99	100-149	150-199	200-299	300-399	400-499	Total trips
Minneapolis/ St. Paul	-	-	1	-	-	-	-	1
Chicago	-	-	-	-	-	-	-	0
St. Louis	-	-	-	-	-	-	-	0
Kansas City	-	-	-	-	-	-	-	0
Des Moines	-	-	-	-	-	-	-	0
Waterloo/ Cedar Falls	-	-	-	-	-	-	-	0
Sioux City	-	-	-	1	-	-	-	1
Council Bluffs/ Omaha	-	-	-	-	1	-	-	1
Cedar Rapids	-	-	-	-	-	-	-	0
Dubuque	-	-	-	-	-	-	-	0
Mason City	-	-	-	-	-	-	-	0
Ottumwa	-	-	-	-	-	-	-	0
Burlington	-	-	-	-	-	-	-	0
Davenport/ Quad Cities	-	-	-	-	-	-	-	0
Fort Dodge	-	-	-	-	-	-	-	0
Creston	-	-	-	-	-	-	-	0
Spencer	-	-	1	-	-	-	-	1
Decorah	-	-	-	-	-	-	-	0
Carroll	-	-	-	-	-	-	-	0
Marshalltown	-	-	-	-	-	-	-	0
Total	0	0	2	1	1	0	0	4