

INVENTORY OF FREIGHT TRANSPORTATION IN THE SOUTHWEST/PART II: MOTOR COMMON CARRIER SERVICE IN THE DALLAS-FORT WORTH AREA

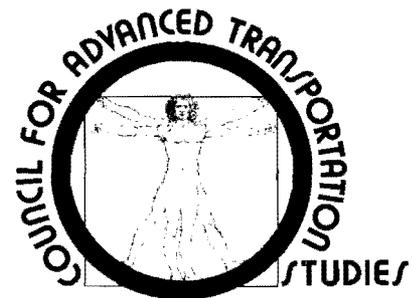
J. Bryan Adair
James S. Wilson

RESEARCH REPORT 5

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DEPARTMENT OF TRANSPORTATION
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WASHINGTON, D.C. 20590



The University of Texas at Austin

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J. BRYAN ADAIR
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16. Abstract <p>This report provides an inventory of existing motor common carrier freight transportation facilities, services, and practices in the twenty-four Texas and two Oklahoma counties surrounding and including Dallas and Fort Worth. As a manufacturing and distribution hub, Dallas-Fort Worth relies heavily on motor common carrier service to develop its economic potential.</p> <p>For inventory purposes, common carriers have been divided into seven categories: general motor freight, agricultural and other ICC exempt commodities, refrigerated commodities, heavy haulers, bulk commodities, and vehicle haulers. Detailed information for each classification of common carrier includes the number of trucks, estimated number of firms represented, intercity loads, total loads, intercity haulage, and total haulage.</p> <p>The inventory also provides estimates for total volume of general freight, delivery time for truckload and LTL shipments, terminal capacities, load factors, seasonal fluctuations, and the pattern of motor common carrier freight movements.</p>					
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EXECUTIVE SUMMARY

Introduction

This is the second in a series of four reports covering existing freight transportation facilities, services and practices in the Dallas-Fort Worth economic area. The report provides information on motor common carrier freight transportation in the area.

Problem Studied

The problem studied by the research effort under which this report was produced is that of determining ways in which freight transportation in the Southwest may be improved. Improvement of freight transportation in the Southwest is the goal of the research effort. The approach to this goal has been (1) to examine the existing freight transportation system, (2) to develop forecasts of the future demands on the system, and (3) to develop recommendations for the improvement of the freight transportation system. In order to provide for detailed examination of transportation problems, an intensive study area surrounding Dallas and Fort Worth was selected within the four-state overall study area. This report presents the results of the examination of one component of the freight transportation system in the Dallas-Fort Worth area.

Results Achieved

The first report in this series presents an inventory of the major users of freight transportation service in the Dallas-Fort Worth area. This second report covers motor common carrier service in the area.

The third report in the series covers air freight service, and the fourth report will cover rail freight transportation service.

In this inventory, motor common carriers have been classified into seven categories:

- (1) General motor freight carriers
- (2) Agricultural and other ICC exempt commodities carriers
- (3) Refrigerated commodities carriers
- (4) Heavy haulers
- (5) Household goods movers
- (6) Bulk commodities carriers
 - a. Coarse solids, aggregate and fill
 - b. Chemicals, cement and lime
 - c. Petroleum products
 - d. Milk and bulk foods
- (7) Automobile and other vehicle haulers

Motor common carriers occupy a significant role in the Dallas-Fort Worth economic area. According to the 1967 Census of Transportation, more than 40 percent of the total manufactured tonnage shipped from the Dallas-Fort Worth area moves by motor common carriers. In many smaller communities, motor common carriers provide the only available common carrier transportation service. Nearly 62 percent of the communities in Texas depend on motor carriers for their common carriage needs.

This report considers each of the categories of motor common carriage and the effects that the economic geography and characteristics of the Southwest have had on their growth and development in the region. The equipment, terminals and traffic patterns of the various types of trucking are also discussed.

Consideration has been given to the quality of motor common carrier service. Estimated shipment delivery times from the Dallas-Fort Worth area to all parts of the adjacent United States are shown for both truckload and less-than truckload shipments. The effects of seasonal fluctuations in volume and of regulations on the motor common carrier industry are also discussed.

Utilization of Results

This inventory of motor common carrier service will be useful to people involved in the provision or use of motor common carrier service. The report should be helpful to persons seeking to acquire information on the motor common carrier industry and to transportation planners. Researchers undertaking a similar project in other geographic areas should also find the report useful.

Conclusions

Motor common carrier service in the Dallas-Fort Worth area is extensive in scope and of generally good quality. Strong demand for the service and competition within the industry have resulted in a high level of service. Most of the problems that exist within the Dallas-Fort Worth area are not unique to the area, but are typical of the problems faced by the industry in the Southwest and across the nation.

A general summary of comparable quantitative findings follows:

report. The research was supervised by Dr. Stanley A. Arbingast, Professor of Resources and Director of the Bureau of Business Research, Dr. Hampton K. Snell, Professor of Transportation, and Charles P. Zlatkovich, Research Associate and Transportation Specialist. The authors were assisted in data collection by Eugene Robinson and Charles W. Adams, Research Associates. This report was edited and prepared for publication by Kathleen Luft. Typing and composition were done by Jewell White and Clinty Sturgill. Offset printing was the work of Robert Dorsett and Daniel Rosas assisted by Robert Jenkins and Salvador Macias.

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December 1973

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Department of Transportation. This report does not constitute a standard, specification, or regulation.

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CHAPTER I

THE DEVELOPMENT OF MOTOR FREIGHT SERVICE IN THE STUDY AREA

Introduction to the Project

The Dallas-Fort Worth area is a dynamic force in the Southwest. Consistent growth has taken place over an extended period of time in most of the region. Many companies have recently moved to the area and more are expected to follow. Anticipation of future growth is demonstrated by the already widely heralded Dallas-Fort Worth Airport.

As major economic centers, Dallas and Fort Worth serve as a focal point for transportation activities. The purpose of this project is to determine ways in which freight transportation service by all modes in the Southwest can be improved. This report deals specifically with the inventory of existing motor freight transportation facilities, services, and practices in the study area.

The overall study area subject to investigation consists of the states of Texas, Oklahoma, Arkansas, and Louisiana. The initial phase reported here focuses on the twenty-four Texas counties and two Oklahoma counties designated by the U.S. Office of Business Economics as the Dallas-Fort Worth Economic Area. The Texas counties included are: Collin, Cooke, Dallas, Delta, Denton, Ellis, Erath, Fannin, Grayson, Hood, Hopkins, Hunt, Johnson, Kaufman, Montague, Navarro, Palo Pinto, Parker, Rains, Rockwall, Somervell, Tarrant, Van Zandt, and Wise. Bryan and Marshall are the Oklahoma counties. (See Figure 1.)

Introduction to the Industry

The history of both Dallas and Fort Worth is a story of the transformation of rural trade centers to modern manufacturing and distribution centers. Owing to their locations, both have long been coordination points for communication, trade, and transportation activities. Just as the growth of any region has always been dependent upon transportation, much of this area's growth has been directly benefited by the availability of increased motor common carrier services.

Service in the intensive study area by motor freight carriers does not stem from a single recorded event. Regulated activity is of course coincident with the enactment of state and federal statutes. However, service existed years before controlling legislation became necessary. Motor freight service in the area dates from the first time some unidentified teamster abandoned his horse-drawn wagon and set out to carry freight in a motor-driven vehicle. Even though a monumental step, this event enjoys little documentation, particularly in comparison with the arrival of the area's first train or the first commercial air service.

Prior to motor freight service, goods were moved by the available alternatives, primarily rail and horse-drawn wagon. As a trade center for the vast southwestern portion of the United States, much of the area's economic expansion was dependent upon its transportation facilities. The development of motor freight transportation greatly aided the fulfillment of the area's economic potential. The flexibility and mobility characteristics of motor common carriers made their utilization vital to the economic growth of the area.

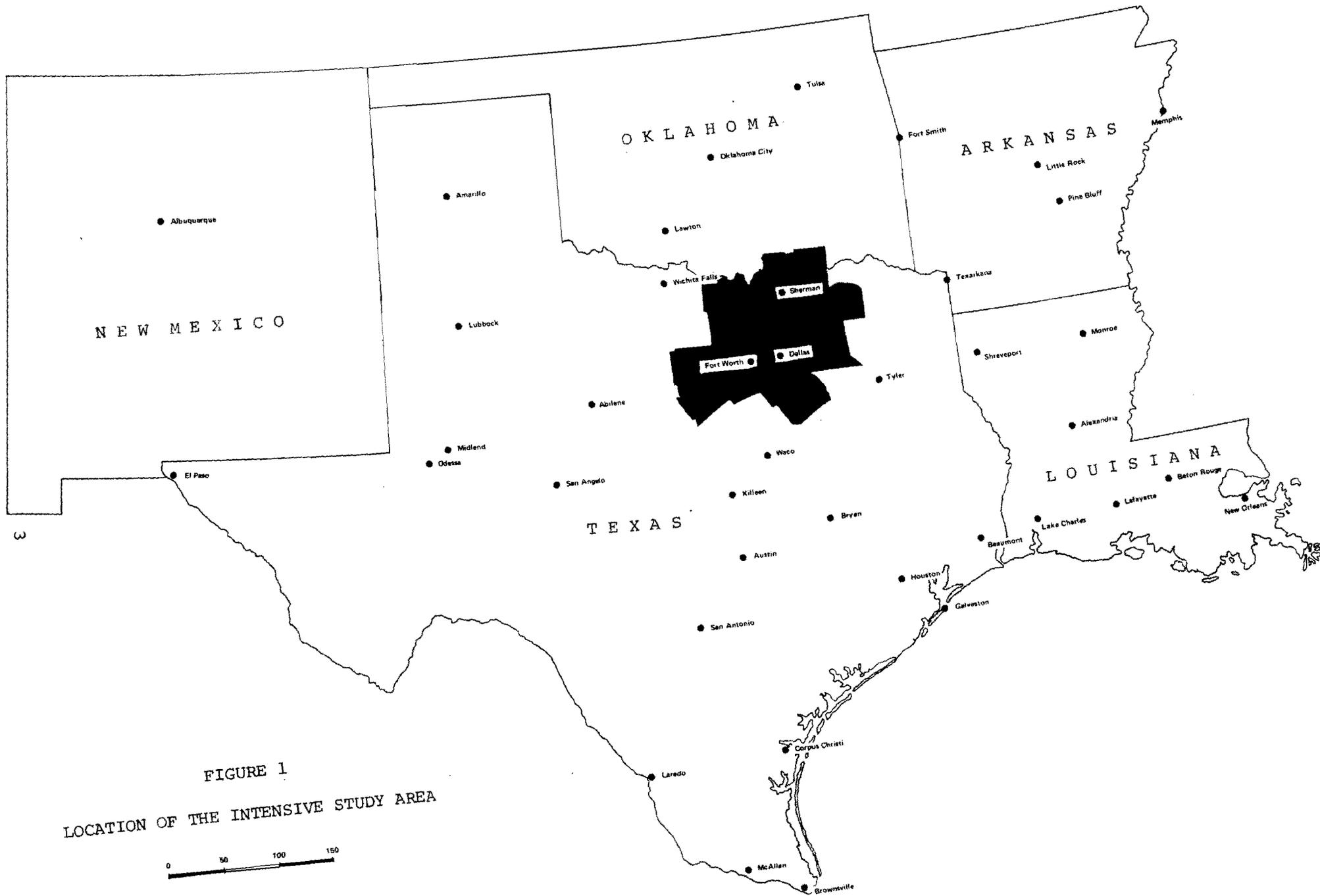
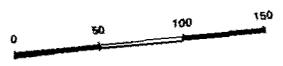


FIGURE 1
 LOCATION OF THE INTENSIVE STUDY AREA



A large portion of the total freight moved in the study area was transported by animal power until surprisingly late in the twentieth century. Photographs of business districts reveal that even though automobiles were well developed in the years immediately following World War I, freight movement was still largely accomplished with animal-drawn vehicles. By the early 1930's the extensive use of the automobile necessitated the building of better roads in the state. Consequently, over-the-road trucking between cities became more attractive to both shippers and potential carriers. Further, the development of reliable truck equipment designed for intercity use stimulated the development of a larger-scale trucking industry.

Specialized trucking operations in Texas first addressed the agricultural and petroleum industries. The state has always had a significant share of the national agricultural market, a market which requires a highly developed transportation system for distribution. Most of the industrialization in the state prior to World War II was associated with petroleum, which demanded the early development of heavy machinery transportation. In any case, early truck usage was largely restricted to local cartage, primarily in distributing goods in urban areas, in transporting agricultural products to market, and in re-supplying the farm. In Texas this activity was somewhat more extensive spatially than in other areas because of the geographic dispersion of railroads and the long distances between points.

Beginning in the 1930's, trucking businesses began to specialize in particular operational areas. This step was prompted in part by the need for special equipment and skill, but the need to aim for a specific group of customers and to cater to their needs was equally important. In effect, early freight specialization was initially a result of market dictations. Even though specialization became a reality in that period, trucking equipment

used in the 1930's was similar, no matter what the area of specialization of the various equipment users.

Specialization was further established with the passage of legislation placing trucking operations under the control of the Texas Railroad Commission in intrastate commerce and the Interstate Commerce Commission in interstate commerce. Authorities stipulated who could operate where, and what could be carried.

The continuing technological improvement of truck and freight-handling equipment in combination with increasingly defined regulatory controls provides most of the parameters for today's intercity truck operations. No matter what the cause, the growth of truck transportation has been spectacular. In 1910, a total of 140 buses and trucks were registered in all of Texas. As of March 1973, a total of 369,486 trucks were registered in the twenty-four counties in the Texas portion of the study area alone. Of these, some 19,228 were large combination units, 25,773 were farm trucks, and the remaining 324,485 were classified as commercial trucks.¹ About 75 percent of this growth has occurred since the beginning of World War II.

There are good reasons for these increases: The study area is centrally located. Its economy has experienced long-lived expansion. The Dallas-Fort Worth Metroplex is a transportation hub for both surface and air services. Four interstate highways serve the area. In addition, rail and air facilities contribute significantly to complete goods-movement service for the Metroplex. Not only is the area marked by a great need for goods movement, it also enjoys

¹Texas Highway Department, Motor Vehicle Division. 1972 registration figures.

the physical facilities that give it immediate access to both the markets on its borders and beyond.

In Texas some 62.2 percent of the state's communities depend entirely on trucks and buses for their goods-movement needs.² To date the development of motor common carrier service has paralleled the area's rapid economic expansion. As this growth extends geographically away from the established facilities into the more rural areas, the need for additional services should continue to increase in the absence of other alternatives.

According to the 1967 Census of Transportation for Production Area 20,³ motor carriers transported more than 40 percent of the total tonnage manufactured in the area. On the basis of ton-miles, motor common carriers handled 44 percent of the area total. Even though diluted by the commodities that contract and local cartage carriers hauled, this information strongly testifies to the importance of motor common carrier service in the area.

The Southwest not only encompasses a vast geographical area, it also supports a broad array of economic activities. The developing area long ago outgrew the distribution capabilities of its rail carriers. To date the newer modes such as air freight have not grown large enough, nor are they suited to fill the demand for the area's goods-movement requirements. In view of past and present utilization of available modes, motor carriers best supply a large part of the area's required transportation needs. Given the high cost and specialized requirements of private fleet ownership and operation, motor common carriers stand out as a major form of freight transportation in the study area.

²Texas Moves by Truck & Bus, Texas Motor Transportation Association, 1973, p.2.

³Production Area 20 consists of the standard metropolitan statistical areas of Dallas and Fort Worth, Texas, as defined in 1967.

CHAPTER II

MOTOR COMMON CARRIERS OF GENERAL FREIGHT

Introduction

The motor common carrier segment of the transportation industry should not be characterized by simplistic descriptions or definitions. The carriers, equipment, methods, and policies available encompass a spectrum of activities of unlimited variety. The broad range of activities for which motor trucks are used follows naturally, given the degrees of flexibility which motor carriers are able to employ. No other mode of goods movement is marked by such flexibility. Other modes enjoy specific advantages of marked importance, but none is so versatile at this point in time.

The needs which some motor common carriers fulfill are extremely specialized. For the purpose of this discussion, "motor common carriers" will indicate haulers of general commodities. Those carriers who must employ specialized equipment or handling techniques will be considered "specialized motor common carriers."

The motor common carrier operates for hire to the general public over designated routes according to advertised tariffs. Given the degrees of flexibility available to interested shippers, each user is free to choose that carrier which can best provide his transportation needs. The industry is therefore very competitive for the right and opportunity to serve profitable accounts. Owing to this flexibility and the resultant competition, there is often significant duplication and overlapping in the accomplishment of the various desired activities. Competition primarily affects the quality of service rendered, not the regulation of prices.

As one of the service industries, the motor common carrier group is dependent upon the customers that it serves. Public carriers must be able and prepared to handle all types of accounts wherever the public requires. Patterns of operation are heavily influenced by customer needs. In comparison to private carriers, motor common carrier activity often reflects customer dictates rather than the most economical methods of operation.

Type of service provided.

As a group, general-commodity motor common carriers share certain operational characteristics. All utilize trucks or tractor-trailer combination units for the transportation of consignments. All operate over public highways. Special equipment for handling piggyback and containerized shipments is available in most distribution centers such as Dallas-Fort Worth. Both the equipment and the operating conditions vary depending upon the services rendered.

General haulers characteristically maintain or share fixed terminal facilities for the handling of LTL (less-than-truckload) and transfer shipments of freight. The operation of such facilities varies to conform to physical and managerial constraints. Terminal activities range from extensive mechanization to total commitment to manual labor. Many terminals are modified to expedite particular commodities which are commonly handled. In most cases terminals serve only as work space for the sorting of the various shipments. (In addition to freight-handling activities, most office, dispatch, and maintenance functions are also carried out at the central terminals.) Storage is normally limited to temporary delays in route and damaged or unclaimed freight. Those companies that do not operate terminal facilities usually maintain dispatch offices and deal in volume or truckload quantities over the available routes in the area.

There are two distinct types of motor common carrier operations within the intensive study area. The most visible is the standard distribution function. The permitted carriers pickup and deliver goods for their customers in the area. There is, however, a less visible aspect of motor common carrier service taking place with particular intensity in many of the major Dallas terminals. Considerable freight is handled in the form of break-bulk or freight-consolidation operations. As a major national distribution center, Dallas handles much freight that neither originates nor terminates in the area. These functions are carried out simultaneously at the same terminal facilities.

Daily freight movements generally fit a standard pattern. Volume shipments characteristically do not cross the central terminal docks, but are forwarded directly from the shipper to the receiver. LTL shipments all are handled across the docks while in route. As a rule, local deliveries are made in the morning prior to noon. Local pickups are made in the afternoon until the time that the shippers close. Outbound freight is then worked in the evening for dispatch the same night to the appropriate destinations. Delivery time is dependent upon necessary handling, connections, and distances traveled.

The shipments handled include everything from single packages of little weight or volume to truckload consignments. Individual carriers experience different handling needs depending upon the accounts that they serve.

Major users of the service.

Motor common carrier service is utilized by every segment of the economy. Given the great mobility and adaptability of not only individual carriers, but also the overall system, it is only natural that motor common carriers reach more shippers than any other mode of goods movement in the area. Not only

is the service the most convenient under urban conditions, it is also the only common-carrier freight service available in some locations. As a public service industry, motor common carriers are available to all shippers within the areas served. The level of usage by individual customers is determined by their particular needs. Most shippers utilize general common carriers in some phase of their operation.

Regulatory and other limitation on the service.

Motor common carriers are responsible to the various interstate and intrastate regulatory bodies. At the federal level the Interstate Commerce Commission exercises permit and operational authority. The Texas Railroad Commission and similar agencies in other states exert parallel authority for like operations under state jurisdiction. The certificates which carriers individually hold determine the market areas which they may serve. General commodity carriers are normally characterized by regular-route, scheduled service with nonscheduled service available.

Daily operations are also subject to other federal and state regulatory bodies. The U.S. Department of Transportation exercises nationwide control over operational safety requirements. The various other federal agencies influence other aspects of each operation. On the local level, specific state and local bodies control the restrictions for which they are responsible. For example, the City of Dallas does not allow truck traffic on specific state arteries in the central business district (CBD). It also limits truck operations within the CBD to the hours of 9:30 A.M. to 3:30 P.M.

No significant physical barriers to truck operation exist within the study area. There are no obstacles in the region such as mountains or large bodies of water which cannot easily be traveled around. Instead, the geography of Texas works to the advantage of truck transportation. Given the great

number of points to be served within the area, trucks have few problems reaching the many destinations.

A severe constraint upon motor common carriers is the schedule of the shipper that is served. Many businesses will only receive freight in the morning and ship packages in the afternoon. If this were not the case, motor common carriers could operate with greater freedom and efficiency. However, in most cases it is the customer's needs that are fulfilled first.

Motor common carriers must follow the tariffs to which they subscribe. Other operations such as local cartage and contract carriers can set their own rates, but not the common carriers. Rates and schedules must be honored as written until properly amended.

The scope of this report.

In an inventory of this type some parameters must be placed on the collection and reporting of the data studied. Many entities in the Dallas-Fort Worth area perform the definitive functions of motor common carriers. For various reasons some of these operations are not formally classified or listed as motor common carriers. On the other hand, some carriers listed as motor common carriers of general freight do not in reality perform such a function.

For the purpose of this reporting, a basic set of constraints has been followed to determine the body which is discussed as "motor common carriers of general freight" in the intensive study area. The paramount criterion is that the company must stand ready to serve the general public's need to ship general freight (i.e., freight that does not require specialized handling). This implies that the public can readily locate and utilize the carrier's services. This distinction is made because some permitted carriers in the area do not exercise their operational rights. Other carriers operate

without sufficient exposure or impact to make the general public aware of their services. The second major limitation is that the carrier must hold permits from the appropriate authorities to operate in the area observed.

A limited number of carriers are known to the public and legally transport consignments through the area in route to some other destination. Carriers such as these, which neither load or unload in the study area, are not considered in the scope of this study. A means of accurately measuring such activity was not available at the time of this data collection.

Several other distinctions should be made regarding the data collected. The various companies contacted were most cooperative in providing the information which they had available. Some problems arose, however, in the interpretation of that data because of significant variations in company standards and definitions. Some companies reported local equipment inventories as requested; other companies insisted that systemwide inventories were all that existed. When one company said "trailer" it meant a forty-foot-long unit; others took the same word "trailer" to mean everything from a twenty-six-foot-long "pup" or half of a double unit to full length single units. Many of the data sought were simply not available from all of the companies considered. Regretfully, some of the information that was obtained was simply inaccurate.

Of the thirty-nine companies discussed in this report, twenty-one participated in interviews with the research staff. Information on those companies not interviewed was obtained from a variety of sources. Observation, industry reports, Interstate Commerce Commission reports, Texas Railroad Commission reports, trade association reports, and estimation were all sources of information for unsurveyed items. The wide range of sources was further utilized in an attempt to correct erroneous data and to double-check data that seemed unclear.

Existing Carriers in the Area

Routes and/or areas served.

As a single entity, the intensive study area takes on the characteristics of the dominant forces within its boundaries, Dallas and Fort Worth. With regard to motor common carrier service to and from the area, activity in Dallas predominates over all of the region. As one of the major national distribution centers, Dallas illustrates the entire spectrum of services available in the area.

As a group, the various carriers serving Dallas hold the necessary permits to reach every state in the forty-eight adjacent states and Alaska. In the case of service to the nation's major industrial and commercial centers, considerable duplication is available. On the other hand, service to various less developed regions, primarily isolated sectors of the western states, is limited. Service to Canada and Latin America is simply a matter of compliance with various legal requirements and interline arrangements. When use is made of containerized intermodal equipment, connections are available with considerable capacity for international service outside North America.

Within the boundaries of Texas, intrastate carriers blanket the state. Isolated pockets do exist with limited or no regular service. Despite such conditions, however, no area with passable roads is beyond the possible scope of service.

Although too numerous to mention, the available routes generally follow the major intercity thoroughfares. For intercity or interstate travel to or from Dallas, the vast majority of motor common carriers are able to utilize the extensive Interstate Highway System to facilitate their interarea movements. State and other federal highways are traveled as needed in those areas where interstate roadways do not exist or do not satisfy service and permit

requirements. All carriers must comply with their permitted route authorities in every area. At the local level all forms of public and private highways are traveled to accomplish the pickup and delivery of goods consignments.

The structure of intercity routes is determined primarily by operational permits. Most permits explicitly designate the available routes of travel between the points served. In the event of interstate facilities that parallel permitted routes, their alternate usage is permissible so long as the route is at all points less than twenty miles from the designated route. The determination of local routes varies widely. All are based on internal needs rather than imposed by regulatory authority. Local routes must follow all zoning constraints, but may be established in any form the carrier desires. The range extends from no formal route structure to elaborate computer-designated service patterns.

Physical facilities and equipment.

Dallas is the location of thirty-nine of the eighty identified motor common carrier terminals in the intensive study area. These thirty-nine terminals not only form the highest concentration of fixed-goods movement facilities in the area, they also handle the greatest quantity of freight. In every case except one the remaining forty-one terminals are satellite units for the larger central terminals in Dallas.

The terminals studied range in size from a minimal several thousand square feet to one of the largest single terminals in the world. The bigger terminals exceed 100,000 square feet each, with the largest one containing over 300,000 square feet of work space.

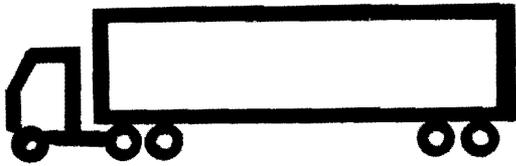
The physical features of the terminals observed do not fit a simple description. Of those studied, only three could be classified as new facilities. Some companies utilize older sites which are still quite

adequate; others have outgrown facilities less than ten years old. The newer facilities tend to be larger in size and have more mechanization, while older locations are generally more confined because of outdated building design and land constraints. Work space averages approximately 550 square feet per door. This average, however, obscures the extremes of 175-300 square feet per door in some of the older terminals, as compared to instances of over 1,100 square feet per door in several of the newer units.

In a like manner, no consensus as to optimal physical layout could be made from observation of the terminals studied. Management-labor relationships and policies appear to be as important as physical facilities in the determination of output. The most modern facilities with the best equipment are surpassed in output per manhour by operations in some of the older, more outdated terminals. The highest work standard witnessed was performed with minimal mechanization, and the company reported a zero turnover rate for the past five years.

An additional measure of activity beyond work space per door is the actual number of doors available for loading at each terminal. Because only one LTL truck per door can be worked at any given time, the number is of importance. The number of doors at the various terminals observed during this inventory once again spanned a broad range. Several outlying stations maintained only two operating doors. In dramatic contrast, the largest terminal utilizes 290 doors and is entertaining plans for future expansion. The 290-door terminal is an exception to the rule. Of the eighty terminals identified, only nine were reported to have more than 100 doors with available work space.

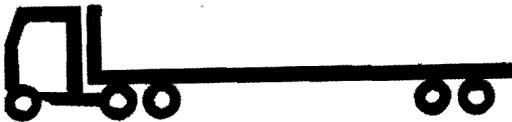
FIGURE 2
VEHICLES COMMONLY EMPLOYED BY MOTOR CARRIERS
IN THE MOVEMENT OF GENERAL FREIGHT



STANDARD HIGH CUBE VANS



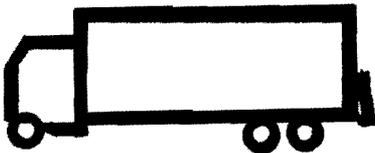
DOUBLES



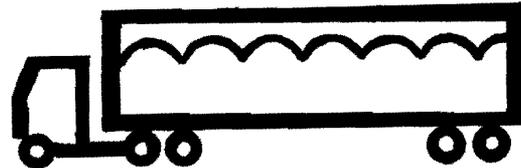
FLAT BEDS



REEFERS



BOBTAILS WITH
LIFT GATES



OPEN TOPS

Owing to the nature of general-freight motor common carrier operations, little variation was noted in the inventory of equipment employed by the observed carriers. Even though a limited amount of specialized equipment such as flat bed trailers and refrigerated vans was available, most carriers keep few such pieces of equipment on hand.

The vast majority of local pickup and delivery activities are handled by single-unit van or bobtail trucks with lift gates attached. Larger tractor-trailer (van) units are utilized in pickup and delivery when volume or large LTL shipments require additional space. Over-the-road activity is performed

by one of three tractor-trailer combination types in most cases: standard high-cube vans, double vans, or open-top vans. A limited number of flatbed and refrigerated trailers are also available for use as needed.

Vehicle inventories were attained primarily by direct interview with company officials. A considerable number of vehicles are known to operate in the study area. A larger group may in fact exist that was not reported. Many carriers did not include pool vehicles of units based in other cities when indicating the scope of their company's activity in the study area. Where applicable, available data from regulatory agencies have been used to adjust inventory levels to reflect realistic activity. Such corrections were not available in all cases, owing to various reporting limitations.

The Texas Highway Department's Motor Vehicle Division reports 19,228 nonfarm truck tractors and 25,469 trailers registered as of March 31, 1973, in the Texas portion of the study area. Of these vehicles, 2,618 tractors and 4,653 trailers are known to be operated by the thirty-nine companies studied. In addition, 842 single unit trucks (bobtails) were reported in use by the indicated carriers.

Of the 2,618 tractors recorded, 968 were reported as city units. These units are characteristically double axle tractors (one drive and one front axle). City units are primarily used to ferry both company and interline vans between loading spots and the central terminals throughout the day. The remaining 1,650 tractors are predominantly triple-axle units to accommodate the heavier, consolidated highway loads. Those companies which utilize double trailers (one semitrailer followed by a full trailer, both of abbreviated length) are able to employ double-axle trailers owing to better weight distribution. The increased acceptance of multiple trailers should increase the number of the lighter double-axle tractors.

Of the trailers inventoried, 805 were reported as local units, with the remaining 3,848 trailers designated for intercity traffic. Were carrier-reporting methods standardized, additional highway trailers would quite likely be reported. Some companies simply did not report pool and other trailers used in the area but not assigned locally. Most companies also did not indicate the size of their units. Trailers range in size from twenty-foot pups (one half of a double) to forty-five-foot single units. Of the available vans, the shorter units are used in local pickup and delivery work more often than the larger units. For the purpose of this study, no distinction is made with regard to trailer size aside from the minimum requirements for registration purposes. All reported trailers are larger than the state registration minimum which indicates that the units are pulled by a tractor with a load capacity of more than 1,000 pounds.

Volumes and Patterns of Movements

Total overall volume.

The volume of general freight moved by motor common carriers in the Metroplex area is indeed significant. Not every carrier moves mountains of freight individually, however. The smaller carriers may handle no more than fifty tons per day. On the other hand, the largest carrier interviewed moves an average of 4,660 tons per day through its Dallas facilities alone.

On the basis of averages available from the carriers, approximately 24,565 tons of freight are worked daily by motor common carriers of general freight in the study area. On an annual basis, tonnage for the intensive study area totals 6,141,150 tons.

The commodities which make up the general freight tonnage are innumerable. Specialized commodities such as petroleum and refrigerated goods are excluded.

Nonperishable foodstuffs, carpets, motor vehicle hardware, tires, paper products, and general retail merchandise are commonly handled. Some companies obviously handle more goods of a particular type than others.

Well-documented data were available from the largest two intrastate carriers with respect to truckload and shipment sizes. There are in addition ICC reports from 1969 for the Southwest Region (Texas, Arkansas, Oklahoma, and Louisiana) that serve as a basis for comparison.¹ None of the primary data should be taken as fact for the industry as a whole, but rather should be viewed as examples of the traffic handled by two of the more successful carriers in the area.

Data collected from the primary sources in 1973 reveal the following patterns: The average pickup and delivery truck collects 9,801 pounds of LTL freight per dispatch. Average shipment sizes vary from sixty-eight to over 700 pounds for the carriers interviewed. The two carriers with the largest share of the Texas market and the best documentation average 473 and 599 pounds for outbound LTL shipments and 700 and 621 pounds per inbound shipment.

LTL shipments are characteristically smaller than volume movements. The largest mover of freight in the area averaged 21,593 pounds per outbound LTL movement. Data for the size of inbound traffic are not available. Volume shipments were 29,151 pounds outbound and 35,396 inbound for the second-largest carrier.

The ICC data indicated an average load size of 24,639 pounds for all shipments in its 1969 study. Trailers with an average capacity of 2,300 cubic

¹"The Cost of Transporting Freight by Class I and Class II Motor Common Carriers of General Commodities, Southwest Region-1969," Interstate Commerce Commission, Bureau of Accounts.

feet were used. Actual loads averaged twenty-five pounds per utilized cubic foot of space. At that time the average size of all shipments (volume shipments included) was 953 pounds for the entire region.

Origins and destinations of movements.

The 1967 Census of Transportation indicates that the overwhelming majority of goods produced in the study area are shipped to points within Texas, Oklahoma, Arkansas, and Louisiana. On the whole, the data collected in this study support the earlier findings. The 1969 ICC data indicate that an average shipment moved 327 miles in the Southwest Region, where the study area is located.

The majority of goods shipped from the study area reach their ultimate destination within the four-state region. Exact percentages are not available, however, on this distribution pattern. Houston, East Texas, Texas south of San Antonio, and the Oklahoma City area appear to be the largest destination points in the region.

Beyond this region the major midwestern cities serve as recipients of a large quantity of outbound freight. As major distribution and manufacturing centers, St. Louis, Kansas City, and Chicago attract the most activity. To the west, Los Angeles and Denver serve as break-bulk points, just as New Orleans, Birmingham, and Atlanta do to the east and south. Some portions of the eastbound goods are carried directly to the New York-Boston area for distribution.

All areas of the nation and the world serve as ultimate points of distribution, but the enumerated points are the main outlets for goods originating in the study area.

Inbound activity to the observed terminals on the whole mirrors the outbound operations. Most of the regional distribution centers served by Dallas

also reflect the activity in Dallas. Not only do the receiving centers return the equipment which originated in Dallas, they also act as collection points for the area which they serve. These centers in turn generate loads to be shipped to the study area for distribution.

Within the four-state region, South Texas, Oklahoma City, and Houston contribute heavily to the traffic toward Dallas. The twenty-four-county study area generates considerable traffic as well.

Fluctuations in movement.

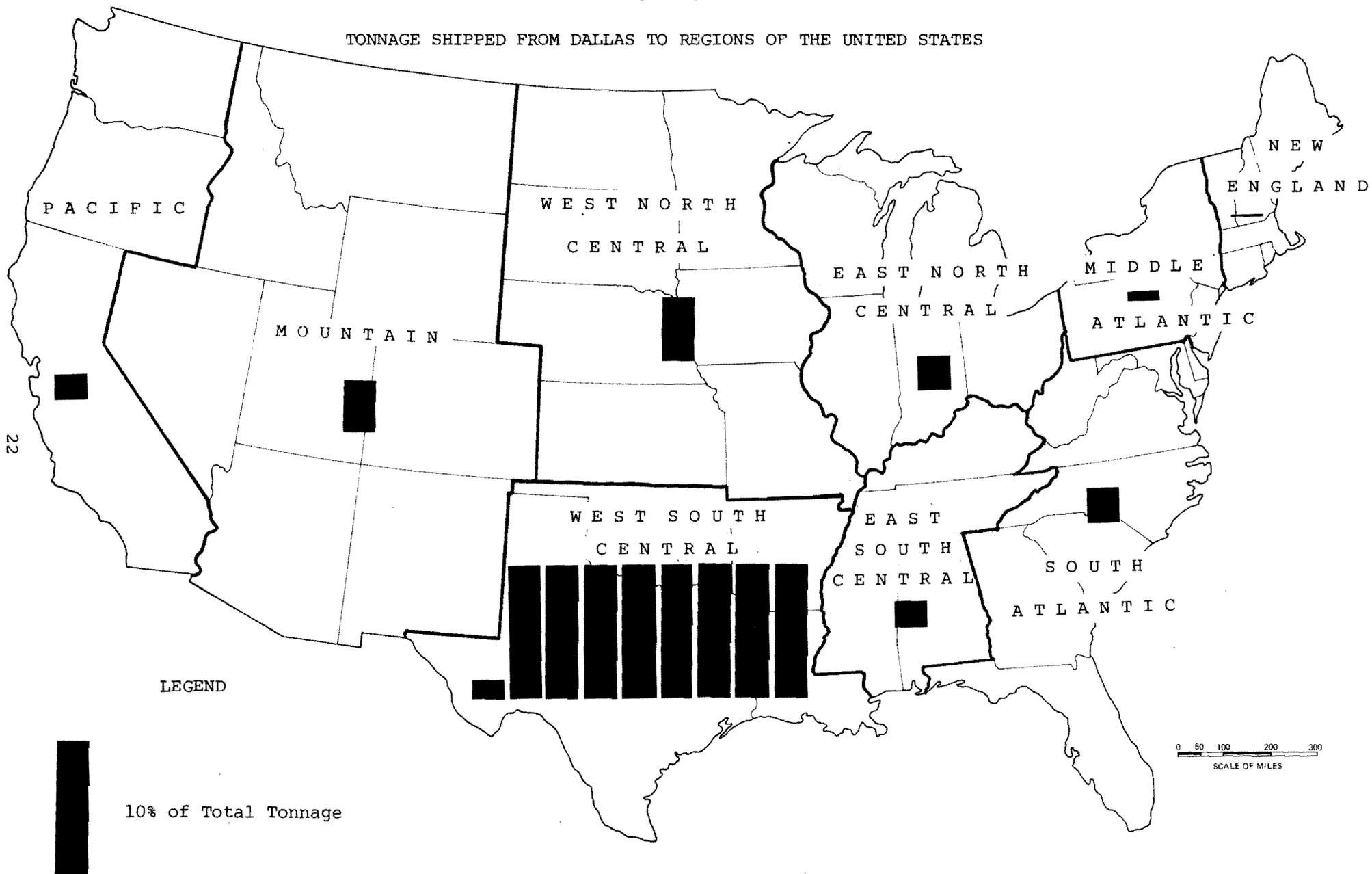
A strong pattern is noticeable in goods movements over time in the study area. The patterns are largely dictated by the shippers who use the service. Most haulers of general freight actively work five days a week, Monday through Friday. They also maintain minimal weekend and holiday operations to handle necessary flows. A deviation from this pattern is evident in the operations of the long-distance interstate carriers who must dispatch on the weekends to meet weekday arrival requirements. On the whole, however, few dispatches are made during weekend and holiday periods.

Monday is the busiest day of the week. It also experiences the heaviest inbound activity of the week. Friday is normally the second-busiest day, with above-average outbound traffic. Tuesday, Wednesday, and Thursday are generally marked by constant activity with an imbalance coming on Tuesday. The day following a holiday shows a marked increase in activity.

On a monthly basis, little variation can be ascertained. Those companies principally involved in consumer products occasionally ship heavily just prior to inventory or billing dates. Production cycles may also dictate alterations in requirements on a seasonal basis. These activities do not, however, generate enough extra freight to appreciably alter the normal distribution pattern of the industry as a whole. The carriers who cater

FIGURE 3

TONNAGE SHIPPED FROM DALLAS TO REGIONS OF THE UNITED STATES



SOURCE: 1967 Census of Transportation, Bureau of the Census



FIGURE 4

MAJOR ORIGIN AREAS FOR SHIPMENTS TO DALLAS

SOURCE: Interviews with Motor Common Carriers



FIGURE 5

MAJOR DESTINATION AREAS FOR SHIPMENTS FROM DALLAS

SOURCE: Interviews with Motor Common Carriers

specifically to accounts that ship according to these patterns do experience noticeable fluctuations.

On a yearly basis, the picture is not precise. Seasonal variations produce marked effects, but industry growth obscures some of the seasonal patterns. Area carriers are in most cases experiencing continued growth, which produces a continual upward trend in their business activity. There are, however, marked peaks and valleys within the calendar year. January is universally taken as one of the slowest months. Business then builds to a late-spring peak. Summer retooling and vacations create a midsummer lull. Activity then picks up from August, reaching a yearly peak in October or late fall. Shipments then taper off with the holiday season to the January low for the following year. As the accompanying chart shows, this pattern differs somewhat from the pattern reported for the national scene. The most noticeable deviation from the national pattern is that the carriers studied seem to experience a greater lull during the summer months than do the carriers in the country when taken as a group. Expectations for growth at a rate of 15 percent or more were commonly expressed by the carriers questioned.

Evaluation of Motor Common Carrier Transportation in the Area

In addition to the objective inventory accomplished in the study, emphasis was also placed on the subjective phase of evaluation. Opinions concerning the quality of available service were solicited from both the motor-carrier industry and the users of common carriers. In all instances participants were also asked to enumerate any particular problems in their dealings with the motor-carrier industry.

Quality of service.

On the whole, the motor common carrier group must be credited with doing a good job in the study area. Users consistently indicate that motor common carrier service is second only to private-fleet operation for the accomplishment of their goods-movement needs. This is not to say, however, that both users and operators do not find fault with the service available. Displeasure exists on both sides of the fence.

Small and heavily restricted carriers recognize their limitations. In both cases restricted operating conditions often leave them dependent upon other carriers to provide adequate service. Whether small, restricted, or both, carriers are sometimes forced to compromise their standards when ultimate delivery is possible only through a second carrier with lesser concern for shipper satisfaction. Large companies experience the same frustrations, but to a lesser degree. Specific carriers such as those affiliated with parent railroads complain of unnatural, outdated route requirements that hamper their attempts to render good service. All carriers experience some form of restriction, but the smaller and especially limited carriers feel that they face a greater challenge to provide better service.

Carriers of every description voiced displeasure with customer shipping patterns. Restrictions imposed by shippers who will only receive or ship during certain hours create difficult scheduling and operating conditions for the carriers concerned. Providing the service that each customer wants is often impossible when all of the conflicting requirements are imposed on one truck.

Physical constraints also hamper service standards. Outdated terminals, equipment, and locations pose serious limitations to numerous companies. In a like manner, outdated and overcrowded highways slow down delivery time and

FIGURE 6

INDEX OF MONTHLY FREIGHT OPERATIONS IN THE UNITED STATES

(1967 activity = 100)

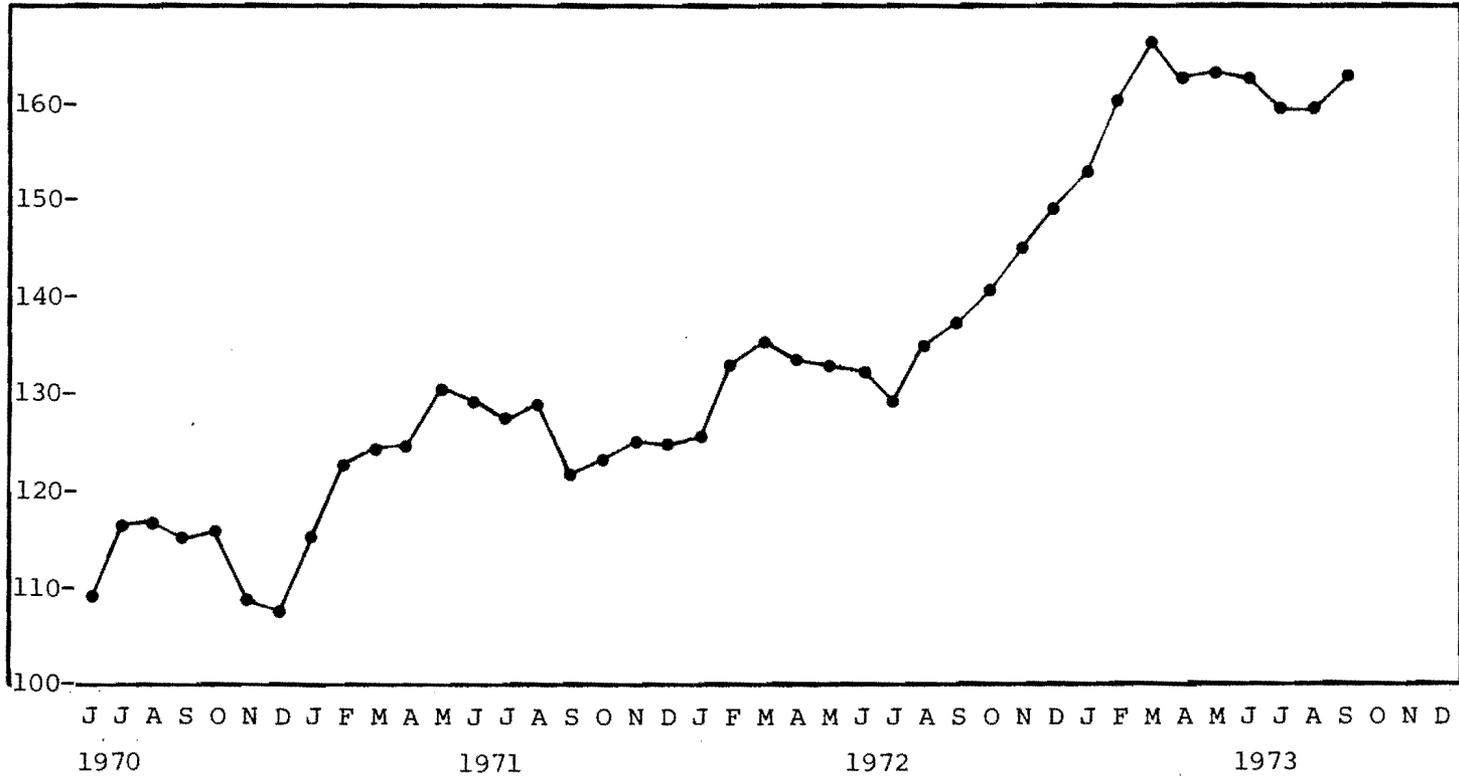


Table 2

INDEX OF MONTHLY FREIGHT OPERATIONS IN THE UNITED STATES
(1967 activity=100)

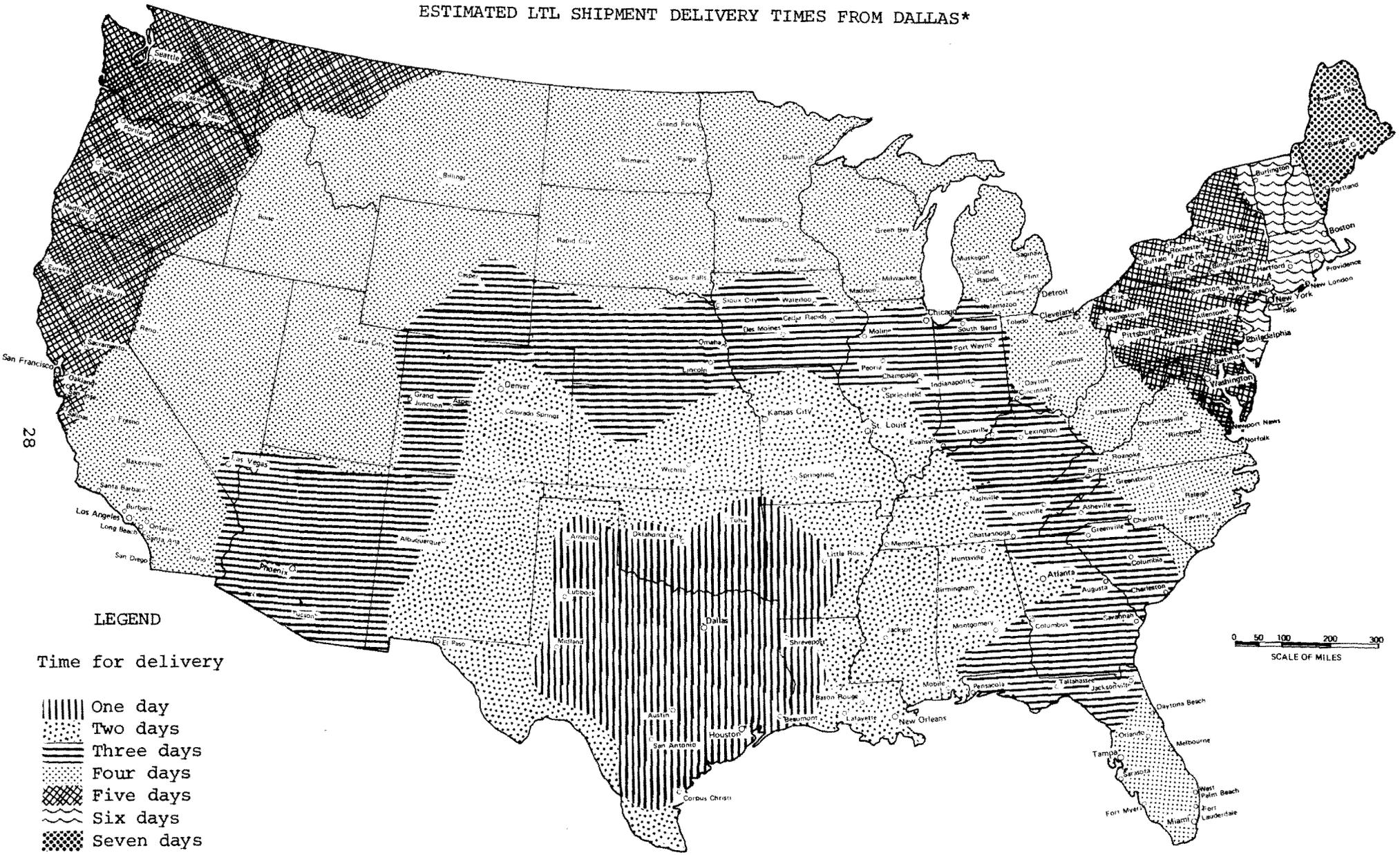
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
70						108.5	116.3	116.5	115.2	115.9	108.3	107.5*
71	115.1	122.5	124.3	124.7	130.3	129.2	127.6	128.7	121.5	123.1	125.0	124.9
72	125.7	133.1	135.6	133.5	132.8	132.5	129.7	134.7	137.6	140.3	145.3	149.2*
73	153.1	160.1	166.0	162.5	163.4	162.2	159.6	159.3	162.6			

* Estimate.

Source: *Traffic World* magazine and American Trucking Associations, Inc.

FIGURE 7

ESTIMATED LTL SHIPMENT DELIVERY TIMES FROM DALLAS*



LEGEND

Time for delivery

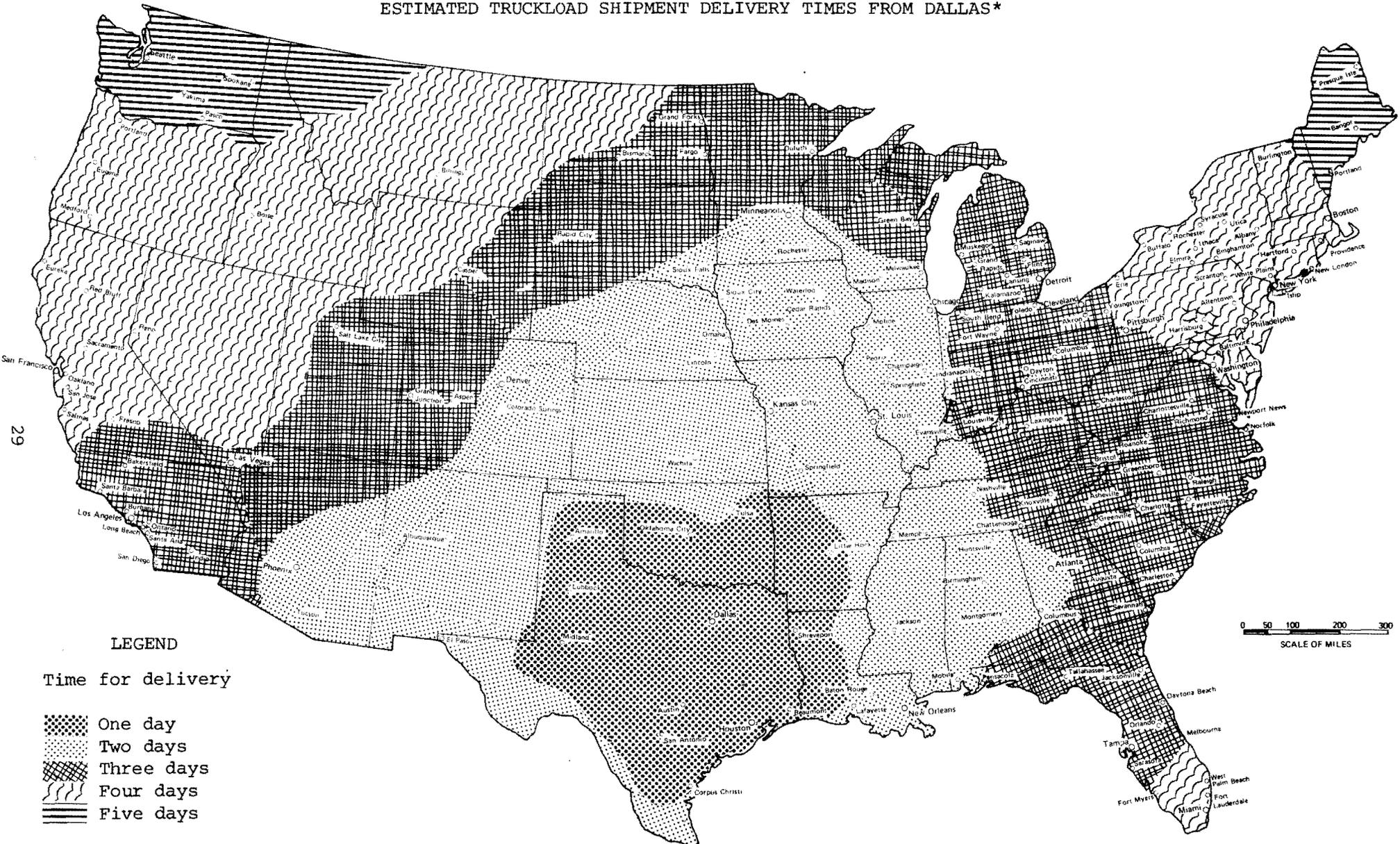
- ▮▮▮▮ One day
- Two days
- ▬▬▬▬ Three days
- ▤▤▤▤ Four days
- ▧▧▧▧ Five days
- 〰〰〰〰 Six days
- ▣▣▣▣ Seven days

*Delivery times may vary according to carriers used.

SOURCE: Dallas Chamber of Commerce, published schedules, and interviews with motor common carriers.

FIGURE 8

ESTIMATED TRUCKLOAD SHIPMENT DELIVERY TIMES FROM DALLAS*



*Delivery times may vary according to carriers used.

SOURCE: Dallas Chamber of Commerce, published schedules, and interviews with motor common carriers.

drastically raise the cost of efficient service.

Even though the industry is extremely labor-intensive, only one carrier indicated that labor problems created significant operational difficulties. All companies acknowledged routine management problems. Employee participation in ownership is common in the study area. A large number of the companies studied were also nonunion.

Quality of service from the user's point of view is largely determined by locations and commodities shipped. The bigger, more accessible users get excellent service. Isolated points of origin and destination that generate limited revenues sometimes receive comparatively poor service. It cannot be disguised that the shipper who distributes large, dense loads receives better attention than the shipper of either small or bulky articles of little weight. For example, a processor of foods has a great deal of difficulty shipping cases of potato chips to isolated areas of Oklahoma, while at the same time a major publisher has absolutely no problem getting service for shipments of books and printed matter. There are clearly premium accounts that carriers strive to serve.

Motor common carrier service does not purport to be the best for every common-carrier need. Air freight is faster. Rail can carry bigger loads more cheaply, particularly over long distances. In some cases, piggyback operations speed up the movement of particularly long shipments and at significant reduction in cost. Motor carriers are, however, in all cases the most flexible, offering door-to-door service. In the long run this flexibility saves much handling and contributes greatly to acceptance of the motor carrier as a mode of transportation. Owing to constant control and minimal handling, motor carriers frequently reported damage claim rates below the 2 percent level.

It is no accident that motor common carriers are so heavily utilized in the study area. The service is not only complete, but good. Because of the competition which exists, standards of quality should remain high.

Problem areas.

The problems experienced by carriers in the study area are hardly unique. Several, however, stood out in the minds of the company officials interviewed. The major categories of concern were cost of operations, customer requirements, and legal constraints.

Cost of operations covers a multitude of sins. Every carrier is to some degree concerned with the highly visible cost factors which are confronted on a daily basis. Rising costs of fuel, labor, and equipment are the most obvious points of concern. There is also considerable feeling for the extra expense created by traffic congestion. Significant costs are incurred when a fleet of trucks is tied up in stalled traffic.

There are other less visible but significant cost factors. The most important barrier to better service is often the lack of funds to build the proper facilities in the right locations. Because of the rapidity of economic expansion in the area, many facilities are not only too small, but also poorly located. Equipment and staffing requirements also suffer when costs get out of hand. Correction of any or all of these needs would improve service.

Customer requirements are difficult for the carrier to control or even influence. There is a great need for public relations and communication. Many of the shippers who create schedule problems are unaware of the carriers' needs, and many carriers are not aware of the specific requirements of their customers. Cooperative give-and-take on both sides would greatly improve satisfaction in both camps.

More attention should be given by the carriers to future planning. Had greater attention been paid to analysis of future industrial, commercial, and business zones years ago, many of the terminals would be better located today. It not only takes time to plan for fixed facilities, it also takes considerable time and planning to expand existing routes and to acquire additional authority. Much effort is needed in this area.

Volumes have been written on the various legal constraints governing common-carrier operations. All carriers would prefer less regulation and paperwork if they thought it possible. While it must be acknowledged that regulation and paperwork are here to stay, it is not unrealistic to push for an updating of the area's route structure.

Most of the foundations for today's route authorizations were laid out in the 1930's. Much has changed since that time. Privileged routes have grown stronger. Specifically restricted carriers such as railroad subsidiaries cannot even utilize the more modern highways in many instances. Not only should old, outdated practices be updated, but new competitive operations should be allowed to grow without prohibitive restraints. Such reform would create many changes, but waiting for another generation to make the improvements will only compound the problem.

Much concern results from the difficulty of handling so great a variety of shipment sizes and types. Any possible standardization would be beneficial. Some carriers would happily refuse some of their less profitable accounts were they not bound to serve all customers. The claim is made not only that the specialty small-package carriers could better serve the customer, but also that both the specialty carrier and the full-size general carrier would be better off.

Standardization of vehicle registration and use requirements would also benefit better service effort. Almost every state has its own size, weight, fuel, and license requirements. The highly mobile interstate fleets must conform to every requirement that they encounter. Whereas Oregon allows triple trailers, Texas will allow only doubles. When one state will allow a 96,000-pound gross vehicle weight, Texas will accept no more than 72,000 pounds. Other states will allow even less. The forty-five-foot van that is legal in one state will exceed the forty-foot limit in other states. It is impossible to design equipment that will fulfill every limitation. As a result, it is a great challenge to insure that every truck meets the standards for the area in which it is operated. Trucks that are parked waiting to fulfill local regulations cannot deliver the goods.

On the whole, the motor common carrier group already provides good service in the eyes of both its peers and its users. It is cheaper than air freight, but more expensive than rail. Air gets goods there quicker, while in most cases rail arrives last. Private motor operations are an alternative, but in most cases only at a significant premium. At this point in time, motor common carrier service is the best available answer for the average shipper's needs.

Package-Express Carriers

Development of the service.

Motor common carriers of general freight do not specialize, they carry a broad range of commodities. In some cases, however, general freight can be better distributed, given certain types of special attention. Package express, package delivery, and parcel delivery are all essentially such types of activities. All distribute small shipments of general freight for the public. Any specialization lies in the size, weight, and handling guidelines imposed

by the applicable tariffs and regulatory bodies.

Small-package carriers originally handled only a limited range of commodities. Service has since been expanded to include all forms of small, general freight. The need for this growth is obvious. In many instances shippers of small parcels are not satisfied by existing general common carrier routes. In most observed cases, the general common carriers involved would rather not bother with the less profitable small shipments. When shipping LTL, both shippers and carriers recognize the danger of loss or damage to small parcels when they are mixed with larger shipments. In addition, shippers of small freight benefit from tariffs tailored to fit their specific distribution needs.

As a group, small-package carriers originally performed a messenger-service function, handling film, magazines, newspapers, and even flowers. The largest package carrier, United Parcel Service (UPS), got its start as a carrier for large department stores in Seattle. Bus express began when drivers personally carried packages for friends and relatives on their regular runs.

The expansion of business outside the large central business districts gave much impetus to the growth of package-carrier service. The creation of shopping centers after World War II expanded the need for the distribution of small packages. Where delivery could once be made on foot, other means were required. In a like manner, the economic growth of rural areas made package express a profitable sideline for the bus operations which served the areas. All package carriers have benefited from the declining expectations most shippers hold of parcel post service.

Today United Parcel Service alone carries more package traffic than the Parcel Post section of the U.S. Postal Service (it does not exceed the total

U.S. Mail package traffic when classes other than parcel post are included). Where as their business was once almost 100 percent in the form of messenger service of goods for department stores, UPS is now nationwide and less than 4 percent of their business comes from department stores. The other carriers have experienced similar expansion. Regional carriers now no longer limit themselves to film and printed materials. They are actively competing for all forms of small-package traffic, particularly intrastate service. The bus lines have gone so far as to design their equipment so that extra cargo space is available for freight.

The growth of these carriers in the study area differs only slightly from the national norm. The most significant deviation is that the Texas Railroad Commission has chosen to restrict intrastate operating rights for truck parcel service to Texas companies. UPS has been allowed only interstate rights in the study area. A second pattern is due to local geography. As in most western states, the great dispersion of population over the vast region has greatly benefited bus express since in many cases it is the only service available.

Nature and scope of operations.

Type of service--Package-carrier operations are, in general terms, motor common carriers of general freight. At the same time, they form a specialized type of carrier. Not all shippers who use the service are the same, but certain generalizations can be made about the service rendered.

Package delivery is accomplished in several ways, of which bus express is perhaps the best known to the public. Packages are carried between regular stops in the space available after luggage is stored. Service is essentially from terminal to terminal. In some cases local carriers perform pickup and delivery service for their customers to and from the depot. Though not so

well known to the general public, the largest form of package express fits the mold of standard common carrier operations. Parcel carriers operate pickup and delivery services out of central terminals. Intercity movements are consolidated and broken in the terminals for redistribution, and these operations are characteristically performed with the aid of automated conveyor systems. In most cases shippers can also pick up and deliver their goods at the terminal if they desire. The majority of this traffic is intercity traffic. Further, this type of carrier also provides local delivery service. Numerous small carriers transmit shipments within commercial districts in addition to the larger, well-known carriers.

Users of package-express services in the area--Parcel carriers cater to shippers with limited shipping requirements. Their needs may be either regular or irregular, but in either case large quantities of goods are not normally shipped via package carriers by individual shippers.

Quick delivery attracts many customers. Businesses which require frequent inventory replacement, frequent orders, or rush orders--such as automobile parts houses and dealers--often use various sectors of the package-express group, since package express is generally quicker than standard general common carrier service. Bus service gives same-day service in most areas less than 500 miles from the point of origin, and many shipments go via bus because this same-day service is possible.

Isolated or less developed areas that do not have full-line common carrier service often rely on package express, particularly bus service, for their small-goods movement needs. A considerable volume of traffic moves both to and from these areas via package carriers in the absence of other public goods-movement facilities.

Many users use package-express service because it insures greater safety for their shipments. Since all shipments are of limited size and weight, the shipper stands a better chance of less damage in route. Since most packages are of the same size, more standardization in handling is possible. In addition, all shipments are treated in a like manner. There is a significant difference between a package-express LTL load and an LTL shipment of full-sized general freight.

For many shippers, the cost of operations dictates that package-express services be utilized. It is often more economical for even the largest companies to ship to small accounts or isolated areas via package express, for such accounts do not justify the expense of operating company equipment. In many cases rush or emergency service is cheaper via package express than via company equipment and employees. Small companies with little capital can best use their resources by using existing package services rather than starting their own transportation facilities.

The final major area of activity is personal use. More and more use is made daily of public carriers to ship personal goods, and in most cases the users find the service superior to available postal-service activity.

Regulatory limitations--Motor common carriers of small general freight are subject to the same regulatory authorities as other carriers of general freight. They must also comply with local zoning and traffic rules. In addition, these more specialized haulers of general freight have their own tariffs to which they must adhere.

The bus-express segment comes under added regulation. Each company must not only comply with ICC and TRRC authority, but also meet special requirements that insure the safety of their principal commodity, human beings. Explosives, flammable liquids, corrosives, and other commodities

which might endanger human safety are prohibited on bus movements.

The package-express industry owes its existence to the size of the shipments that it carries. It includes by definition the group of carriers that transports small packages of general freight. Not all companies are bound by the same limitations, but the regulations followed are quite similar, especially in comparison with regulations for the other carriers of general freight. Several package handlers operate with a weight limit of fifty pounds per shipment. Some limit the number of shipments that can be made in a day by each shipper, others do not. Several carriers have a 100-pound limit per shipment as their cut-off point. Two of the area bus companies, one national and one local, accept consignments up to 150 pounds each. In addition, size limitations are placed on each shipment. A total external measurement of 108 inches is the prevalent standard. The buses allow larger items, with a limit of 141 inches total and no side longer than sixty inches. In all cases shipments are small and their size is restricted. The maximum value of shipments allowed without a premium rate is \$250.

Existing carriers in the area.

The study area is blanketed by parcel-express service routes. Within the Metroplex itself, the large truck carriers are able to provide complete pickup and delivery service. Outside the Metroplex, intrastate carriers reach most towns by either direct or radial service. In addition the bus lines contact virtually every community, even though they stop only at designated terminals. Since connections are available to all parts of the United States through the major interstate carriers, the bus lines can serve practically every community in the nation.

The vast majority of all deliveries are accomplished by fifteen companies in the area. Three intrastate and two national bus operations provide

bus service to the study area. Two large interstate package concerns provide conventional interstate truck service. The remaining eight package companies have banded together as a cooperative group, Tex-Pack Express. Tex-Pack provides extensive intrastate and limited interstate service from the study area. Ranked in order of importance, the two interstate carriers are the most significant. Collectively, the smaller carriers produce the second-largest component of total activity. They are followed by the aggregate volume of the bus operations.

Physical facilities utilized by package carriers in the study area range from one-man bus stop operations to the ultramodern and highly automated UPS facility in Dallas. Bus facilities are normally operated as a part of the bus depot, whatever its size. The truck operations tend to be somewhat larger owing to the extensive pickup and delivery activity.

The two largest package-carrier truck operations have 172 and 110 freight doors in their respective terminal facilities. The larger uses a total of 134 local and 52 line vehicles; the second-largest company has 25 local and 35 line vehicles. Collectively, the eight members of Tex-Pack Express have some 40 local and 25 highway units in Dallas.

Bus operations vary greatly in size. The local carrier maintains 26 buses for its route between Dallas and Fort Worth. From its Grand Prairie hub it dispatches 92 movements per day. Both of the major national carriers serve the area. Continental Trailways, with national headquarters in Dallas, predominates in nonlocal traffic. Together the major bus companies dispatch over 300 movements from Dallas-Fort Worth each day.

Equipment used differs significantly from general common carrier equipment. Bus companies utilize the various highway coaches available. Package and luggage space varies from 221 cubic feet (2,200 pounds) to the 330-cubic-foot (3,200 pounds) capacity of the most modern Eagle series of buses. Local

truck operations employ single-unit vans of the 1/2- to 1 1/2-ton capacity range for pickup and delivery work. Occasionally a bobtail truck is employed. Intercity movements are accomplished with modified tractor-trailer units. The large interstate companies also use a limited number of piggyback units for interarea movements as well.

There are, in addition, some fifty small-scale local carriers who perform local pickup and delivery service. They pick up and deliver shipments to and from the various bus depots, and their service is strictly local.

Volumes and patterns of movements.

Total overall volume--Expressions of volume for package-express movements can perhaps be best made in terms of packages moved rather than tons moved. The truck carriers, primarily UPS, predominate in both number of packages and tonnage. Of the over 55,000 packages shipped daily either in or out of the Metroplex, more than 48,000 are carried by truck. In addition, 60,000 package shipments pass through the UPS Dallas break-bulk terminal but do not stay in the area. In comparison, the bus carriers ship an average of 3,300 packages per day. Since records are not kept on inbound volume, it is estimated that a minimum of 2,500 packages per day are shipped into the area via bus.

If weight is considered, the total tonnage per day approximates 500 tons. Of this weight, trucks serve some 420 tons as compared to the approximately 80 tons which are carried via bus daily. Truck shipments average just over seventeen pounds per package, as compared to approximately twenty-three pounds per package for each package shipped by bus.

The commodities that make up these shipments are varied. Auto parts and accessories are the greatest single component. Other commodities include clothing, drugs, books, trailer hitches, bread, data processing cards, general

merchandise, agricultural products, and personal effects.

Origin and destination of shipments--One of the main reasons for the existence of package express carriers is that shippers wish to ship various commodities in the quickest way possible over relatively short distances. For the long shipment, air express is always available to most areas. Up to 500-mile shipments make same-day or next-morning delivery possible in most areas. For these reasons, many of the package shipments are of the short-distance variety.

According to the companies surveyed, other than the two large interstate carriers, more than one half of the shipments remained in Texas. Within Texas, the Houston, San Antonio, and El Paso areas receive the majority of the shipments. In interline and interstate movements, the Atlanta, Chicago, and Los Angeles break-bulk terminals process the majority of the packages originated in the study area. Inbound freight reflects the same patterns as outbound movements in most instances.

Fluctuations in movement--As in larger general-freight patterns, Monday and Friday are the busiest days; Monday for inbound freight, Friday for outbound shipments. Activity during the remainder of the week appears to be fairly constant, with the exception of the weekend. Those operations which are active seven days a week, such as the bus companies, report that Saturday and Sunday traffic is slow.

On a monthly basis, fluctuations are minor. Consumer products affect first-, middle-, and last-of-the-month patterns slightly, because of periodic inventory replacement needs. Over a year the only great deviations from this monthly pattern are the spring shopping peak around Easter and the build-up to Christmas, in all cases the busiest season of the year.

Over a span of years, all package carriers except one experienced strong

growth. Several companies reported that year-end peaks have in recent years become the low point for the following year's operations.

Evaluation of service

Quality of service--Package service is good. Delivery is fast and normally on time. Damage rates are low (published interviews with the Postmaster General indicate that damage rates for the U.S. Postal Service are five times that of UPS). Packages can be shipped dependably at reasonable rates. In general, customers appear to get more service for their money from package carriers than from other means. Service within the Metroplex is excellent primarily owing to competition for the expanding market in the study area.

Problems in improving service--Two attitudes prevail with respect to the criteria necessary for improved service in the study area. The small, principally intrastate carriers feel that there is enough competition now for local and intrastate business. On the other hand, the large interstate carriers contend that the customers cannot receive the best possible service until they are allowed to compete freely for all types of package business. At this time the question of entry into the market seems most critical to industry people. All companies involved recognize that there is significant room for the expansion of service in the future. Coordination will be needed in future years to insure reasonable growth.

CHAPTER III

SPECIALIZED TRUCK-CARRIER OPERATIONS

Introduction

Specialized carriers perform freight services that are not readily or economically provided by common carrier motor-freight lines. A specialized motor carrier is a business that operates specially equipped motor vehicles for compensation, on public roads, over irregular routes, and on irregular schedules. The vehicles have properties requiring specialized equipment in transportation and handling, and the service is performed for the general public. A wide variety of trucking operations fall into the "specialized carrier" category. For the purposes of the Texas Railroad Commission, specialized trucking operations are grouped into the following classifications: (1) oil-field haulers, (2) household-goods haulers, (3) pipeline haulers, (4) haulers of certain agricultural and forest products, and (5) haulers of other commodities that by reason of physical characteristics require special handling equipment. Essentially, specialized carriers are all state or federally authorized freight carriers that do not hold common-carrier motor-freight certificates or contract-carrier permits. The range of commodities handled by specialized carriers of the various classes is great, and in many cases a given carrier may become involved in operations in more than one classification. In all cases, however, some sort of specialized equipment or skill must be necessary for safe loading, unloading, or transport for commodities to be carried by specialized motor carriers.

In everyday practice, specialized-carrier operations are divided into

several categories that are somewhat different from the Railroad Commission breakdown. They tend to be grouped according to specific function or by market served. A number of reasons may exist for this; an obvious one is that the particular services must be advertised. For example, advertisements in the Yellow Pages of telephone directories tend to be grouped according to service provided (dump trucking, livestock hauling, liquid and dry bulk trucking and the like).

Specialized motor carriers are not required to follow specified routes or meet specified time schedules, but are limited in area served and in goods carried. Certificates specify what primary and secondary commodities may be hauled and where goods may be hauled geographically. Some certificates use political subdivision limits as boundaries; others define a radius of operations from some geographic location. Other permits, such as those commonly issued to household movers, may allow transit to and from all points in a given area so long as a particular subdivision is the origin or terminal point of the shipment.

In more than one case, specialized carrier operations developed in Texas because market demands exceeded the capacity or ability of rail carriers. The first significant use of extensive bulk chemical haulage occurred because no rail system served the Mansfield Dam site on the Colorado River north of Austin. As a result, the Texas Railroad Commission issued a truck firm state-wide authority to haul bulk cement. Even though this authority was issued in the late 1930's, haulage of bulk cement did not become commonplace in Texas until the mid-1950's or later. This delay came partly as a result of established habit and partly because of technological incompatibility between bulk-hauling methods, construction equipment, and labor practices.

The hauling of petroleum products over the road rather than by rail was stimulated by the shortage of rail tank cars during World War II. During the war, all tank cars were withdrawn from hauls of less than 200 miles and placed into long-distance service. The resultant experience with trucks as compared to rail transportation of bulk petroleum showed that tank trucks had faster turnaround time, required less expensive loading and unloading installations, could make direct customer deliveries, and provided greater schedule flexibility. These advantages were possible because truck service was not dependent upon fixed rail facilities and schedules.

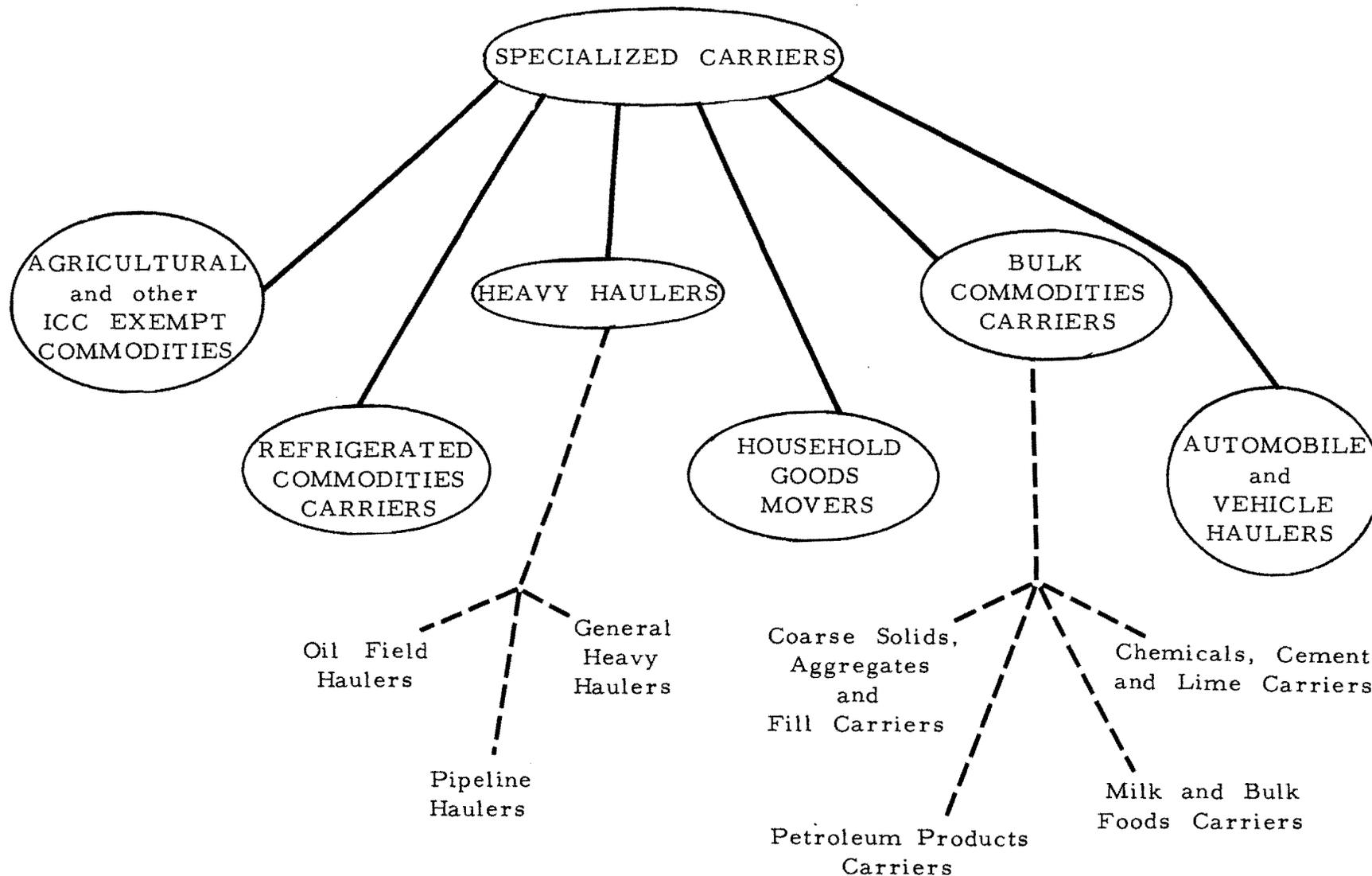
In excess of 4,000 heavy trucks, the great majority being tractor trailer rigs, are used in the twenty-six-county area by specialized carriers. These operations have been broken down for the purposes of this study as shown in the accompanying figure. Each of these six first-level subgroups will be discussed individually.

Agricultural Products and Other ICC Exempt Commodities

Transportation of agricultural commodities and other freight necessary for farm operations has been an important segment of Texas commerce for many years, particularly since the extension of the railroads into the state after the Civil War. The early transportation means were by wagon and stock drives, usually to and from rail terminals. With the growth of the use of automobiles in the twentieth century, farmers began to use their cars much as they had been using buckboards and wagons. Anything that would fit into the car or on the fenders and runningboards would be carried. The goods ranged from goats, calves, and chickens to hay, grain, and whatever else the farm produced. Farmers built trailers from old car chassis and converted their cars into all manner of trucks, using these vehicles primarily to transport goods to local market facilities.

FIGURE 9

BREAKDOWN OF SPECIALIZED CARRIER FUNCTIONS AND OPERATIONS



Over-the-road hauling of agricultural commodities became popular in Texas as the highways were improved, particularly in the 1930's. Cattle and hogs were shipped over the road to slaughterhouses as well as to rail terminals. Produce commodities were shipped by truck to Texas markets. Cattle trucks of the time were flatbed bobtails with sideboards or flat semi-trailers with sideboards. Produce trucks were quite similar but some were vans instead of flats. All of these trucks were small by today's standards. By the beginning of World War II, agricultural trucking services were well established in the state. Today extensive distribution operations using specialized feedstuff-hauling equipment, double-decker stock-hauling trailers, and specialized produce trucks are familiar to Texas highways.

The intensive study area is heavily engaged in agricultural ventures, even though farming is not a proportionally large income generator in Dallas and Tarrant Counties. Each year more than two million acres of cropland are harvested in the twenty-four Texas counties involved in the study. Sorghum, hay, wheat, cotton, oats, corn, peanuts, and peaches are some of the more important crops in the area. Counties in the area have higher numbers of tractors than do counties in much of the remainder of the state. With the exception of Dallas County, the entire area is a primary cattle-production region, with Hopkins County having a heavy density of beef cattle. Hopkins County is also the greatest milk-producing county in the state, and Tarrant, Johnson, Wise, Parker, and Erath Counties are also heavy producers. Hog production in the area is significant but does not predominate over other areas of the state. Chicken production is heavy around the Dallas-Fort Worth area, particularly in Ellis, Tarrant, and Erath Counties.

Texas-authorized carriers of agricultural products and other ICC exempt commodities operate in excess of 1,300 trucks in the Dallas-Fort Worth

Economic Area. Between 500 and 525 of these are heavy trucks, that is, three-axle trucks or combination rigs. An approximate breakdown of the uses of these trucks is shown in the exhibit below.

TABLE 3

Distribution of Heavy Trucks Used to Haul ICC Exempt
Commodities in the Dallas-Fort Worth Economic Area

Agriculture services and distribution	15%
Produce	12%
Food products	7%
Meat packing, poultry, eggs	19%
Machinery, metal products, paints, oils, wood products, building materials, textiles	38%
Vegetable oil, molasses, grain	<u>9%</u>
	100%

Approximately 62 percent of the trucks operating in this sector are used in collection and distribution of farm and ranch products, in providing farm services, or in handling raw materials directly derived from farm products. Trucks handle more than 90 percent of the fresh fruits and vegetables delivered to the cities of Dallas and Fort Worth, haulage which amounted to more than 410,000 tons in 1971. The following exhibit shows percentages of selected vegetable items shipped to Dallas and Fort Worth by truck.

TABLE 4

Percentages of Selected Items Shipped to Dallas
and Fort Worth by Truck in 1970

Apples	94%
Cabbage	99%
Green corn	100%
Oranges	97%
Potatoes	67%
Tomatoes	98%

The recent growth of the feedlot industry has affected the transportation patterns of both feedstuff and animals. Feedlots, acting as large sinks for feed products, are the origins and destinations of large cattle shipments. Animals are likely to be shipped several times during their lifetimes, sometimes over great distances. This results in more travel during the various stages of growth than was apparent in previous years when more ranchers raised calves to full market size.

On the other hand, stockyard and meat-packing facilities have become more decentralized, some plants being built in more remote rural areas. A trend has developed for initial packing houses in remote areas to supply partially processed products (carcasses, halves, and quarters) to intermediate processors in urban areas for final preparation and packaging. This trend has resulted in the partial decline of some of the centralized stockyards and packing facilities in the Dallas-Fort Worth area.

Twenty of the twenty-four counties in the area have at least one livestock auction market, and the intensive study area contains thirty-four of the 172 Texas markets. Major feedlots are located in the Texas Panhandle but Navarro and Van Zandt Counties are among the top ten beef-calf production

counties. West Texas feedlots feed out large numbers of cattle shipped in from a number of southern and southwestern states, particularly from New Mexico, Oklahoma, Mississippi, Florida, Tennessee, and Alabama. A large percentage of the shipments from the eastern area pass through the study area, and virtually all of the livestock shipped to and from markets in the area are carried by truck. Texas-fed cattle supply large portions of the California, Arizona, New Mexico, Colorado, Kansas, Nebraska, Oklahoma, and Iowa meat markets.

Between 275 and 290 trucking operations based in the study area hold state certificates allowing intercity operations and are active in the haulage of ICC exempt commodities. Of these, about 45 percent are one-truck operations, 42 percent are companies having two to nine power units, 11 percent have between ten and twenty-five units, and 2 percent have more than twenty-five trucks. Companies in the last category operate about 25 percent of all trucks serving the exempt commodities markets of the area. One company in the 2 percent bracket is in the agriculture services and distribution business and operates over seventy trucks. The average firm hauling exempt commodities in the area, however, operates about five trucks, two of which are heavy trucks.

Truck utilization in small firms is often less efficient than in larger firms because of the economies of scale available to larger operations. Further, some of the businesses holding intrastate permits have primary operations in areas other than trucking, the hauling certificate being only incidental to other business operations. Many of these trucking operations are essentially private carriers, even though they maintain state certificates.

Four to five of the companies operating out of the Dallas-Fort Worth area haul agricultural products in both interstate and intrastate commerce. Typically, these companies each haul fifteen to twenty loads per week out of the area. Loads average about 40,000 pounds net and about one round trip is made each week per tractor. About 75 percent of the return trips are loaded. One company gave this description of a regularly traveled circuit: drive from Dallas to Arkansas empty; pick up a load of chickens and drive to Arizona; unload the chickens in a major city in that state and drive empty to a nearby rural farming area; pick up a load of fruit and vegetables and return to Dallas. "Round robin" trips like the one described are common to all types of specialized carriers, but they are used in differing amounts depending on products hauled, distances hauled, opportunities for such trips, and other reasons.

Almost every town of any size has at least one truck operator in residence serving the agricultural community. Some of these specialize in a particular segment of business such as hay hauling or stock hauling, but many perform general cartage operations as well.

For companies primarily in the trucking business, the average indicated haulage per truck-day is about 14,500 pounds. Shipment weights vary to such an extent that no single estimate would be realistic: they range from 100 to 40,000 pounds. Loads average about 3,000 pounds for local dispatches but are greater, probably more than 10,000 pounds, for over-the-road hauls.

It is difficult to make total haulage estimates based on the varied information obtained from a group of such dissimilar elements. It might reasonably be assumed that the average heavy truck in this section is operated over the road in the study area four days per week and carries a daily load of 14,500 pounds. By use of these figures, it is estimated that 776,000 tons of

goods are carried each year in the Dallas-Fort Worth Economic Area by specialized carriers hauling ICC exempt commodities.

Refrigerated-Commodities Carriers

The growth of the frozen-foods industry since World War II has stimulated the development of a specialized-carrier business equipped to perform distribution of processed refrigerated commodities. Both the establishment of ready consumer markets for frozen food products and the technological development of efficient and reliable refrigerated transportation equipment have allowed sustained growth of the service during the past several years.

The specific function has close similarities to both common-carrier motor-freight operations and exempt ICC commodities-hauling services. Refrigerated carriers fall into the specialized category primarily because of the strict control that must be maintained over perishable cargoes. Refrigerated operations are quite similar to general freight practices except that all handling of refrigerated commodities must take place in a specially maintained cold atmosphere. Specialized types of equipment required are refrigerated trailers, refrigerated dock spaces, and trailer-to-dock coupling devices to maintain the rarified conditions.

Refrigerated trailers, or "reefers," have long been available to truckers, and many common-carrier motor-freight operations presently maintain a few trailers to haul heat-sensitive commodities like candy and other foodstuffs. For the most part, these operations do not use refrigerated terminal facilities nor does the bulk of their haulage require refrigeration. In contrast, all of the primary haulage of refrigerated carriers requires a chilled environment and all hauling equipment used is designed to provide such an environment.

Differentiation between frozen-foods carriers and ICC exempt commodities carriers is based on the structural differences of route regulation, on the

terminal facilities provided, and on the commodities hauled. Even with these differences, both carrier groups compete for much of their haulage.

Refrigerated operations perform scheduled and nonscheduled service over both regular and irregular routes. Terminal spaces are maintained by the larger carriers for break-bulk and sorting of LTL shipments. Bulk or volume shipments are carried directly from shipper to the customer or distribution center warehouse. Smaller carriers handle their consignments on the shipping and receiving docks in the absence of their own work space. Temporary storage is practiced at most terminals to maintain temperature control in the event of delay. Storage is also possible in the trailer units provided they have constant refrigeration available.

A significant portion of the business involves LTL shipments along scheduled routes, with operations very much resembling common-carrier motor-freight practices. These shipments are broken and reloaded across refrigerated terminal docks and constitute approximately 40 percent of the total volume carried. On the other hand, volume loads are usually carried directly from shipper to receiver without intermediate stops at break terminals. Typically these latter operations involve round-robin trips like the one described in the discussion of ICC exempt commodities carriers.

The bulk of refrigerated haulage in the study area is meat, candy, vegetables, processed fruit products, milk products, and other chilled food products, but pharmaceuticals, blood and blood plasma, chemicals, impregnated broadcloth (used in aircraft manufacture), and other items requiring a cold environment are also commonly transported. Several carriers are able to utilize available space for the backhauling of dry goods such as carpets when no refrigerated cargo is available.

The Dallas-Fort Worth Metroplex is a major dispatching and receiving point of frozen goods shipments. All sorts of agricultural food products ranging from orange juice to prime beef are processed and shipped from plants in the area. Additionally the Metroplex is a major consolidating and bulk-breaking point for interstate shipments into and out of the area. All parts of the continental United States are served by refrigerated service from the study area, but service tends to be regional in nature with heavy emphasis on intrastate movements. A significant amount of the movement between specific trade areas is coordinated by Dallas operations.

Two Dallas companies dominate the common-carrier refrigerated service market in the area, but at least three other major carriers also specialize in refrigerated freight. Together these major carriers maintain more than 400 tractors and 550 refrigerated trailers for use in intercity traffic and twelve refrigerated bobtail vans for local LTL shipments. Additional units domiciled in other areas also travel in and out of the area daily, but no data are available showing the extent of this activity. In addition, numerous refrigerated units in the area are available for use by common carriers and other specialized carriers. These trailers are, however, utilized for duplicative movements of local freight. An extremely large part of the total haulage of frozen goods is accomplished by private carriers.

Total quantities of refrigerated goods hauled by the various common carriers are difficult to ascertain, partly because many shipments do not cross company docks and partly because of the diverse carrier types that perform refrigerated services. By use of data provided only by those carriers specializing in refrigerated service, it is estimated that at least 1,650 tons of refrigerated freight are moved each day in the study area. This indicates that more than 495,000 tons of refrigerated goods are moved in the study area

each year. Of this total, approximately 60 percent is shipped between points in Texas, with the remaining amounts being moved across state lines.

Heavy Haulers

After exclusion of operations specializing in the hauling of liquid and dry-bulk commodities, agricultural products, and other ICC exempt commodities, refrigerated commodities, household goods, and automotive transport (cars and trucks), specialized carriers can be collectively termed heavy haulers. Businesses in this group, including oil-field equipment and pipeline haulers, may handle a great variety of goods. Specific businesses may cater almost exclusively to a particular industry or to a particular segment of an industry. On the other hand, some operations transport practically anything that by reason of length, width, weight, height, or size requires the use of special devices, facilities, or equipment for handling or transporting. In general, anything that cannot be handled by a hand may be hauled by a specialized carrier, but the exact things handled are limited by a number of controls, including common and statutory law, equipment available, competition or market situation, and policies and whims of particular carriers.

The first significant amount of heavy trucking and teaming in Texas was done in the oil fields. Virtually all of the heavier moving was done with animal power until about 1915, but between that year and 1922 motor trucks became more frequently used in the oil fields. The transportation technology developed for heavy oil-field operations was suitable for shipment of other heavy commodities. The "heavy hauling" truck businesses have largely been extensions of oil-field hauling operations; in fact, a large percentage of presently existing heavy haulers mention oil-field equipment in their advertisements. Likewise, those advertising as oil-field haulers usually indicate that their business is not exclusively limited to oil-field operations. For the

purposes of the Texas Railroad Commission, oil-field haulers and other heavy haulers fall into slightly different categories. Nevertheless, although the typical wording of the certificates may differ some, much of the haulage is of the same kind and requires identical specialized equipment.

Heavy machinery rates high on the list of commodities desired by heavy-hauler carriers. "Heavy machinery" may be broken into two categories: off-the-road construction machinery and equipment, and industrial machinery used in production operations. Construction equipment may be hauled from job to job or to and from lot and repair facilities. Likewise, new machinery for use in the construction industry is transported by the same carrier group.

Heavy industrial machinery takes a great variety of sizes and shapes. Much of this equipment is transported new from fabricators to be installed for its intended uses, but a certain amount of used equipment is moved from one location to another.

Steel products (reinforcing bars, beams, sheet steel) and steel scrap, along with building materials, are commodities also carried largely by heavy haulers. Carriers in these markets are likely to specialize and may concentrate more than 95 percent of their business in carrying a small list of similar items. A number of carriers specialize in pipe hauling; others primarily carry concrete materials, particularly precast-prestressed concrete beams and other precast items that require special loading and unloading equipment.

Another heavy-hauling designation is miscellaneous freight. About one half of the reporting companies indicated haulage of some miscellaneous freight, but this generally made up less than one fourth of their total haulages. This category may include high explosives and light machinery of various kinds, among other things, or may include items in any of the previously mentioned categories that make up small portions of the particular respondent's total haulage.

Some carriers appear to cater to particular customers rather than to emphasize kinds of commodities. For example, some haulers have a much greater percentage of government freight than do others. Other operators tend to follow more regular routes, preferring customers on or near these routes. Smaller companies are much more prone to specialize according to customer, to limited region, or to particular commodities than are larger operators. Nevertheless, some large operations have limited areas of specialization.

Of approximately 110 businesses in the twenty-six county area actively engaged in heavy-hauling operations, 75 are located in the Dallas-Fort Worth Metroplex. Sizes and scopes of operations of the individual businesses vary greatly. At least two companies operate more than 100 trucks in the area, while several operations performing heavy hauling work maintain only one tractor. Approximately one third of the Dallas area haulers operating under Texas certificates have five or fewer trucks, about one half have between six and twenty-five trucks, and the remaining one sixth operate with more than twenty-five trucks. The "average" heavy-hauling firm has about fourteen tractors that operate in the area but a "typical" company operates with five to ten tractors.

State certificates issued to heavy haulers usually allow operations state-wide and do not specify routes or schedules. Nevertheless, many companies essentially maintain route structures, particularly those firms that cater primarily to specific shippers or specialize in only a few commodities. Many of the Dallas- and Fort Worth-based firms operate wholly within 100 miles of the Dallas-Fort Worth commercial zone even though they may have authority to travel anywhere in the state.

Virtually all of the larger firms operating in the study area have interstate authorities of some kind. Some are able to operate anywhere in the

nation, while others may serve three or four states. Most interstate firms apparently attempt to serve particular regions defined by economic and geographic characteristics as well as by political boundaries.

A number of heavy hauling operations have neither interstate nor intrastate authority in their own name. These operations may lease or buy rights originally issued to other companies or may operate in cooperation with other active trucking firms under authorities issued to those firms. Many of the local businesses not maintaining their own permits perform loading, unloading, rigging, and brokerage services for larger interstate and intrastate trucking concerns but perform their own local origin-destination hauling. Many provide other customer-service operations, with trucking somewhat of a secondary function. Machinery rigging and setup for stationary as well as temporary installations are typical among services commonly provided.

Many hauling operations are only secondary businesses that complement some primary business. Businesses with specialized-common-carrier certificates can haul for others as well as for their primary business, thereby keeping their trucking equipment occupied a greater percentage of the time. This is most likely to occur in businesses that perform repetitive trucking operations of some sort. For example, a road contractor may move his own machinery from place to place and a concrete-beam fabricator may haul his own products to his customers, but both would prefer to keep their equipment in operation a greater percentage of the working day than specific company needs might dictate. Part of this slack equipment time can be used in performing specialized common-carrier operations for others. Still, a number of private businesses perform essentially heavy-hauling operations only for themselves.

Fluctuations in the volume of heavy commodities movements in the study area are largely dependent on the particular industries being served. In general, May through October tend to be heavier volume months, with December

and January dropping to approximately 75 percent of the monthly summer volumes.

The average weights of loads hauled tend to fall around 35,000 pounds net, but variations from this are great. One company reported a range from about 1,000 pounds net to 250,000 pounds gross, with an average load being between 32,000 and 42,000 pounds net.

Very heavy loads must often be routed in roundabout ways because of variations in state laws determining maximum load weights and policy variations in state law enforcement. For example, a very heavy load shipped from Detroit to Seattle might move through Texas because of load-limit policies maintained and enforced by several of the midwestern states along the Mississippi River.

Most companies attempt to keep their unloaded mileage to a minimum. Load factors vary according to markets served, customers served, methods of obtaining business, and other factors. Firms that have "routes," or regular runs, may have 95 percent or more of their miles loaded, whereas others may have only slightly over 50 percent of their traveled miles loaded. Local operations are more likely to have empty return trips than are longer over-the-road operations. The larger and more efficient heavy haulers that carry general heavy freight usually have between 75 percent and 85 percent of their miles loaded.

A number of firms use scheduling services, particularly for routing loads requiring permits. These services may arrange for all the permits in the various states along the route to be traveled, as well as determine the best route according to clearances, bridge loading, and other factors that would limit transportation. The larger firms perform much of this work for themselves.

Between 1,200 and 1,300 tractors are used in the twenty-six-county study area in the heavy-hauling trucking business. Approximately 290 over-the-road

loads are dispatched each day from the region and about 310 over-the-road loads are received each day. Additionally, about 850 local loads are shipped within the twenty-six-county area each day, primarily in the Dallas-Fort Worth commercial zone. Because of the relatively short distances between points in the commercial zone, many tractors may haul two or more loads per work day. About 75 percent of all trips by heavy haulers in the Dallas-Fort Worth Economic Area originate and terminate in that area. Most of the remaining 25 percent of the haulage in the area is to or from other parts of the nation.

Intrastate commerce out of the local area largely concerns the Houston-Gulf Coast area, while the interstate commerce tends to be concentrated in three general areas. Those areas are, in order of decreasing volume, (1) the industrialized eastern states, primarily Pennsylvania and New York, (2) the industrial states northeast of the Ohio River, and (3) the West Coast. Additionally, a significant amount of hauling is done between the study area and the states immediately joining Texas and with the southern states.

Household-Goods Movers

Development of the moving and storage business in Texas has been dependent on three things: the trend to urbanization in this century, the establishment of good all-weather roads, and the development of a highly mobile society since World War II. Since that war, Texas has been transformed from a primarily rural state to one in which almost 80 percent of the population live in urban areas.

The moving and storage business can be isolated as a specific kind of trucking business in Texas in the 1930's. Initially it was a part of the local cartage operations that performed local moves and acted as freight forwarders for household goods shipped by rail. As the population became more mobile and urbanized, families became more dependent on moving specialists and the development of a specialized hauling function to fit the market was stimulated. Permits

issued by the Texas Railroad Commission and the ICC have recognized the specialized nature of the moving and storage business. Regulation has in turn encouraged specialization.

Services provided by moving and storage companies are directed primarily at the private householder, with 90 to 95 percent of the business being in moving household goods. A number of operations specialize in local moving or in moving specific items such as pianos; in many cases local cartage work makes up some of the business. Most movers seek both local and long-distance work, but many of the smaller operators cater only to those making local moves. Agents for nationally operated van-line organizations may schedule about 50 percent of their haulage for long distance and about 50 percent for local business. Smaller independent operators may be more akin to local cartage haulers and often haul a much greater variety of goods. Some of these businesses advertise under "hauling-local cartage" and "heavy hauling" headings as well as under "moving and storage."

In addition to household moving, most intrastate movers are also authorized to transport used office equipment and business machines of various types, including computers and other electronic processing equipment. Art and museum pieces, store displays, and other items requiring special handling also are often moved.

A number of other services may be offered by moving and storage operations. Warehousing of household goods for varying periods of time is probably most significant, but almost anything that these movers carry might also be warehoused. Many such warehouses store business records and papers in special racks. A number of operations rent large storage crates to customers. Some movers will crate items to be shipped by common carrier or by other means, the mover essentially acting as a freight forwarder.

Even though a great variety of objects are moved by moving and storage companies, in most cases more than 90 percent of the volume is made up of household goods. Most moves are made during the summer months, largely because of school-year patterns. As a result, June through mid-September are the greatest volume months; these months average about twice the monthly volumes of the rest of the year.

The weight of the average household move totals between 4,000 and 5,000 pounds for the furnishings of a four-to-five-room house. In most cases, furnishings for three households can be loaded into one van. Frequently a tractor-van unit will pick up one load bound for some city and will then pick up a second load enroute that is bound for another location in the same general direction. Most national operations have a scheduling service that keeps the amount of empty miles to a minimum. Some companies report that only about 10 percent of their total mileage is empty.

Moving and storage operators tend to concentrate in larger cities, with relatively few of them locating in small to medium-sized municipalities. The custom seems to be for the larger operators in Dallas and Fort Worth to advertise in local telephone directories of outlying municipalities. That does not mean that smaller cities do not have local movers. Most cities of more than 15,000 population have at least one resident moving and storage operation that is connected with a nationally known van line. Several communities in the area have two or more of these agencies.

Statistics of the intensive study area show that somewhat more than 6.5 percent of the total population makes at least one local move each year. About 1.5 percent of the population moves away from the area each year and a number of persons equal to about 4.6 percent of the population move into the area each year. By use of these figures, it is estimated that about 52,500 households move either into or out of the area each year. Of the group

immigrating to the area, about 70 percent move from other places in Texas or from other southern states. A significant number of these moves are between the Houston and Dallas areas.

Approximately 90 percent of all households making long-distance moves use a professional mover. Given this estimate, approximately 47,250 households (or shipments) are moved into or out of the area each year by professional movers. Assuming that an average of three shipments may be hauled by a single van and that an average of two shipments are actually hauled, about 23,625 loads of household goods move into or out of the area each year. The estimated weight of this movement is about 100,000 tons per year, or 385 tons per working day.

The survey shows that about 140 tractor-trailer rigs are operated in and out of the study area by about 110 nationally linked but locally operated moving and storage firms.

Bulk-Commodities Carriers

Bulk commodities are materials or items that are transported or stored in containers without itemized packaging. The storage or transportation vessel serves as the product package and upon delivery the product is removed to a completely separate container. In general, two types of transportation containers are used in motor transportation of bulk commodities. Sand, gravel, coal, soil, and various other coarse solids are usually hauled in open-top dump or hopper containers. Liquids and finely divided solids such as cement, lime, and flour are usually transported in tanks. For the purpose of this study, bulk commodities are broken into four categories: sand and gravel; chemicals, cement, and lime; petroleum products; and bulk food products.

With the exception of coarser solids, most bulk commodities are hauled in tank trucks of one kind or another. About four general types of tanks are

common, three for liquids and one for solids. General-purpose tanks are designed to haul liquids at atmospheric pressure and usually are unloaded by gravity from the bottom of the tank. Most of these are used to haul petroleum products, but any noncorrosive liquid bulk product that is stable at atmospheric pressure, such as fuel oil, prepared cherries, milk, and printer's ink can readily be carried in variations of general-purpose tank semitrailers.

A second kind of semitrailer tank is designed for hauling corrosive liquids such as acids and other chemicals. These tanks are usually smaller than general-purpose tanks because of the typically heavier specific gravity of products hauled. They are normally lined with rubber or phenolic resin coatings to prevent corrosion. Typically these tanks are unloaded from the top by a pneumatic unloading system.

The third type of liquid-carrying semitrailer tank is designed to carry high-pressure liquids such as liquefied petroleum gas. These tanks are built to handle working pressures up to 300 pounds per square inch.

There are many variations and even combinations of these three liquid-carrying tanks. Variations may involve interior coatings, baffles, compartments, methods and devices for loading and unloading, temperature control mechanisms, and other differences.

Semitrailer tanks designed for dry-bulk haulage closely resemble general-purpose tank trailers but may often be identified by their loading and unloading equipment. Many of the tanks resemble covered-hopper rail cars in some ways, primarily by the hopper-like unloading devices under the tank.

Typically, bulk carriers do not interchange equipment between the various companies. Most firms maintain more semitrailers than they do tractors. Semitrailers are often used to haul only one commodity, partly because of the trailer design and partly because of problems and expense incurred in cleaning

tanks for different products. Tractors may be more readily used for various commodities in the same physical state (i.e., liquid, pulverized solid) but this interchangeability may only be apparent within a given firm.

Between 40 and 50 specialized bulk carriers in Texas haul commodities other than foods and aggregate products, the majority of which do some business in the Dallas-Fort Worth Economic Area. Approximately twenty-five of these carriers are major haulers, several being designated Class I carriers by the ICC. This group of about twenty-five operates a majority of the equipment used in Texas, each firm operating between ten and 600 tractor-trailer rigs. The remaining fifteen to twenty firms operate two to fifteen rigs each. Thus about 2,200 tank-truck rigs are operated in Texas by specialized common carriers. Some of the more important carriers based in the Dallas-Fort Worth area are Chemical Express Carriers, Inc., East Texas Petroleum, Inc., Steere Tank Lines, Inc., and Western Commercial Transport, Inc.--all members of the Texas Tank Carriers Association.

Coarse solids, aggregates and fill carriers.

Sand and gravel operations in the study area are heavily associated with base-materials transport for road construction. Additionally, airport and dam construction as well as fill and landscaping ventures require appreciable use of over-the-road materials-hauling equipment. Aggregate hauling for concrete construction is another significant segment of dump-truck operations.

Construction materials are hauled to building sites from quarries or from preparation sites such as rock crushers or sand and gravel washers. Aggregate for concrete is hauled to ready-mix concrete plants. Fill and landscaping topsoil are transported from the mine or cut to the area being built up or landscaped. Much of this transport is done by large-capacity off-the-road vehicles, particularly on larger projects, but vast amounts of

materials are transported over the road in the Dallas-Fort Worth area.

Between twenty-five and thirty sand and gravel firms hold intrastate permits in the twenty-six-county study area. These companies collectively have more than 800 heavy trucks, about 500 of which are combination rigs. These trucks can be operated about 300 days per year and haul an average of six to ten loads per day, depending on the lengths of the hauls. In some cases, fifteen or more loads can be carried per truck each day while at other times three or four loads per truck-day would be acceptable production.

Single-unit dump trucks haul between 30,000 and 35,000 tons per truck-year and combination rigs haul between 45,000 and 55,000 tons per year. This figure, along with the truck count above, gives a yearly haulage of approximately 35 million tons, or 1.9 million loads, of sand, gravel, and similar construction materials in the Dallas-Fort Worth Economic Area by carriers holding state permits. The firms from which this estimate was made average about thirty trucks per firm but range from about five to more than 140 units.

A number of smaller firms haul sand, gravel, and similar materials with small fleets of single-unit trucks. Most of these operations maintain only one to three trucks and typically perform work for individuals or do contract work for small local construction projects. Vehicle usage is likely to be less efficient in this group and carrying capacities are not so great. The total yearly haulage of the group of smaller firms is probably somewhat less than 10 percent of the total carried by the larger firms.

Materials haulage for contracts of governmental units recognized by Texas are exempt from route, area, and tariff regulations of the Texas Railroad Commission. Registration with the commission is required primarily to monitor insurance coverage of the trucking firms.

The primary limitations on the transportation of gravel and similar materials over the public roads are size and weight limitations. The larger combination rigs are limited to about 44,000 pounds net (72,000 pounds gross) and three-axle single-unit trucks can carry up to about 22,000 pounds net (42,000 pounds gross). The use of aluminum-bodied trucks has allowed slightly greater net capacity in recent years. Off-the-road trucks used in earth-moving operations can carry much heavier loads, resulting in a lower labor cost per ton mile.

Dump-trucking operations are somewhat seasonal in North Texas, primarily because of prevailing rainfall patterns. The greatest amounts of rainfall normally occur in April, May, and October--the slower months for business. Snow usually falls in some of the area in December, January, and February. The summer months, particularly July, see somewhat heavier activity, partly because of the longer days. With the exception of the rainy days and the resultant mud that sometimes is a factor, dump-truck operations can go on ten hours a day almost year round.

Chemicals, cement and lime carriers.

The transportation of chemicals, cement and lime is closely allied with construction and manufacturing businesses. Upwards of 75 percent of this haulage by specialized carriers is of portland cement, but lime, silica, silica gell catalysts, sands, fly ash, and slag are also carried from time to time. One company reported that during the construction of the runways at the new Dallas-Fort Worth Regional Airport more than 200 loads of cement were hauled several times in single days.

Haulers of dry chemicals usually have empty return trips, with about 50 to 55 percent of all miles traveled loaded. Liquid-chemical haulers often have higher proportions of loaded miles because of the nature of the markets. In

many cases, chemicals are shipped several times in liquid form between raw-material and finished-product stages.

Approximately 320 trucks are used in the study area in the transport of dry and liquid bulk chemicals. Individual truck combinations haul from less than one to more than four loads per truck-day. During the summer months, cement haulers experience their peak haulage, with the winter months averaging approximately 80 percent of the summer average. Haulage associated with manufacturing is not so seasonal, since weather does not affect output as it does in the construction business.

This study found that approximately 2.1 million tons of liquid and dry bulk chemicals are hauled each year in the Dallas-Fort Worth Economic Area, approximately 100,000 loaded trips per year. These yearly figures consider materials shipped from point to point within the area as well as materials shipped into or out of the area.

Petroleum products carriers.

A large percentage of liquid bulk commodities shipped by trailer tanks are petroleum products. Much of the light-product distribution (gasoline, jet fuel, and diesel fuel) is handled by private operations of the major oil companies. Much of the remainder is distributed by contract carriers. On the other hand, most of the asphalt, crude oil, and other petroleum products transported over the roads is carried by specialized motor carriers. The study showed that about 125 trucks operate as specialized common carriers hauling petroleum products in the twenty-six-county study area. Private and contract firms operate 200 or more additional trucks to haul light-petroleum products in the area.

Specialized carriers of petroleum products haul in excess of one million tons of goods each year in the study area. This haulage represents about

50,000 truck loads per year. The quantities hauled by private and contract carriers exceed the specialized carrier haulage by a substantial amount, largely because of typically shorter distances from distribution points to customers and the larger number of trucks being used.

Milk and bulk-foods carriers.

A number of firms specialize in hauling bulk-food products. Milk and liquid foods make up a substantial part of this group, but carriage of dry products such as flour and granulated sugar is also common. Somewhat more than eighty trucks are involved in this market, about seventy of which haul bulk milk. Raw milk is loaded from holding tanks at dairies and hauled to processing plants for pasteurizing, homogenizing, and packaging. Usually milk is picked up from dairies every other day. Approximately 633,156 tons of milk were produced in the twenty-four Texas counties (which lie in the North Texas Milk Marketing Area) in 1971, largely in Hopkins (32 percent), Erath (13 percent), and Wise (11 percent) counties. Maximum milk loads net about 44,000 pounds, but several companies have smaller trucks with maximum loads of 32,000 pounds. These figures indicate that up to 40,000 loads of bulk milk are carried to market each year in the study area.

It is estimated that the remaining bulk-food carriers haul about 79,000 tons of product in the area each year, largely to food-processing firms such as bakeries and canneries.

Automobile and Other Vehicle Carriers

Transportation of automobiles and trucks is a significant segment of the specialized-motor-carrier industry. A variety of hauling methods are used and both new and used vehicles are transported. A commonly observed hauling unit is a combination tractor-trailer rig designed to carry automobiles and pickup

trucks. This kind of unit has been used since before World War II in Texas, primarily to distribute new cars to retail dealers. With present truck size and weight limits it is common to see seven medium-sized automobiles loaded on a single truck. The delivery of motor vehicles by truck is often termed "truckaway delivery."

Several versions of "driveaway delivery" are also commonly used in the transport of motor vehicles. Automobiles, trucks, and buses are often driven as single units (single deliveries), or in the case of automobiles and trucks, in tow-bar combinations with one vehicle driven and the second towed.

Deliveries of trucks may take several other variations of driveaway delivery. Single or multiple "saddle mount" deliveries of partially completed truck chassis or of truck tractors are common. Sometimes four or more truck units are handled in this manner. The leading unit is driven and the front wheels of following vehicles are elevated and mounted on the framework of the truck ahead. When one truck to be moved is significantly larger than another, the smaller one can often be mounted entirely on the larger for "full mount" delivery. A final method of moving vehicles is by wrecker, a method usually used in the movement of disabled units.

A large part of the transportation of motor vehicles over the road is delivery of new units to dealers or directly to customers of sales organizations. In addition to the transport of new vehicles, used-vehicle movements are significant. Certain businesses specialize in ferrying used cars and trucks either for dealers or for private owners. Used cars are often shipped from one part of the country to another, depending on relative sales markets. Individuals owning more than one car and moving from one section of the country to another may hire professional drivers to transport their cars.

The Dallas-Fort Worth area is a major automotive distribution point for much of the Southwest. General Motors operates an assembly plant at Arlington with a production of approximately 1,000 cars per day. About 400 of these vehicles are shipped by truck, the remaining 600 leaving the area by rail. Automobile shipments transported into the area by rail are broken down in the Dallas area and loaded on trucks for regional distribution. Two major firms are presently involved in this distribution work in the Dallas-Fort Worth area, Auto Convoy Company and United Transports, Inc.

Between 280 and 290 tractor-trailer rigs are used in the distribution of new automobiles to and from the area. Loads average 6.9 vehicles each, and about 750,000 automobiles and pickup trucks are distributed each year. Between 50 and 55 percent of all deliveries are made in the Dallas-Fort Worth Metroplex, the remainder being distributed throughout North and Central Texas. Of the truckaway distributions of automobiles made from the area, 64 percent are brought in by rail, 14 percent by truck, and 22 percent originate at the General Motors plant in Arlington.

Survey data indicate that about 109,000 loads are distributed each year from the area, an average daily haulage of more than 310 loads. The survey indicated that somewhat more than 58 percent of miles traveled by haulaway trucks are loaded. Backhauls are primarily of vehicles imported through the Port of Houston or through other ports on the Texas Gulf Coast.

Seasonal fluctuations in the new-car distribution business are affected by traditional model-change periods and by monthly sales trends, the lowest months being July and August and the highest months being October and November. The following exhibit indicates the shipment volume trend in the Dallas-Fort Worth area.

TABLE 5

Automobiles Shipped by Truck from Distribution
Points in the Dallas-Fort Worth Area by Month

(% of yearly total)

January	9.2
February	7.1
March	7.2
April	7.9
May	7.8
June	6.7
July	4.2
August	4.1
September	9.2
October	14.9
November	12.5
December	<u>9.2</u>
TOTAL	100%

Several certificated firms specializing in transporting automobiles from one part of the country to another have offices in the Dallas-Fort Worth area. Typically such a business has about sixty offices in major cities throughout the country and deals primarily in interstate shipment of vehicles. Some of these operations emphasize experience records of twenty years or more. Approximately five such operations exist in the study area. In addition, about forty or more old truckaway rigs in the area are used to transport used cars and are often operated as a part of a larger but related business such as a wrecking yard. Typically a business so engaged will have one to three trucks. At least ten wrecking yards, garages, and wrecker-service businesses in the area

maintain certificates to haul automobiles in intrastate commerce.

Evaluation of Specialized Common Carrier Operations

Owing to the great variations in operations performed under the general heading "specialized carriers," it is difficult to make generalized value judgments about the services offered. Over the scope of the industry group considered, excellent service is available. Nevertheless, efficiencies and qualities of service among the various operations vary greatly.

Individual specialized-carrier operations tend to function as loners more than do the general-freight carriers. Interchange of equipment is uncommon although several heavy hauler operations exchange permit rights. Some kinds of specialized carrier organizations are set up so that drivers operate their own tractors and sometimes their own semitrailers. These practices are often followed by household-goods movers, heavy haulers, refrigerated transport carriers, and to some extent by ICC exempt commodities haulers. Drivers operating their own rigs are motivated to keep their empty mileage to a minimum. Owner-operators involved in intercity operations usually lease their equipment and services to a large operation. Such as a nationally known moving and storage operation, a heavy hauling firm, or some other business that holds the necessary operating permits. In most of these cases the owner-operator receives a contracted-for percentage of the revenues he brings in, from which come his operating expenses as well as his profit. This sort of arrangement seems to work well in intercity operations, but in some local activities (notably sand and gravel operations) prices are bid down to such an extent that long-run fixed costs are often not covered.

Quality of management, company objectives, and marketing practices vary greatly. Some firms are satisfied with serving a particular business or industry, although greater opportunities lie elsewhere in the trucking

business. Those opportunities may lie well within certificate and corporate charter limitations, but for various reasons truckers do not take advantage of them. For example, the larger heavy haulers in the study area indicated that there was more business than they could handle alone, and that there was a particular shortage of drivers. Consequently these larger firms were turning away business. On the other hand, many of the smaller operations that have statewide certificates almost identical to those of the large companies were handling highly seasonal work in the local area. Possibly the equipment used by many smaller firms is not capable of sustained highway usage or the companies are not creditable in customers' eyes, but it is more probable that the potential markets are not being approached.

The predictability of having shipments meet prearranged schedules varies with equipment-usage practices and with business policies and procedures of individual trucking companies. The kind of equipment used, company maintenance practices, driver skill and knowledge of the equipment operated, and operation of the equipment according to design limitations all affect the probabilities of maintaining scheduled departure and arrival times.

For the most part, trucking operations in the study area have acceptable maintenance practices and the equipment is operated within its design limitations. But in some cases, overextended haulers are inclined to ignore preventative maintenance requirements during busy periods, rationalizing that maintenance can be performed more profitably at a later date. This kind of practice often results in an increased amount of unscheduled down time for mandatory maintenance.

As a rule, route and schedule limitations pose few problems in specialized trucking businesses. State permits typically allow state-wide operation and ICC permits allow operation between certain states. Notably exceptions to this rule are the household-goods moving operations which allow operations to and

from a particular metropolitan area, and cement (chemical) carriers, for which only one permit has been issued allowing state-wide operation in Texas. In any case, geographic operation flexibility is not nearly so constrained as is carriage of general freight on scheduled specified routes. On the other hand, specialized-carrier operations are generally more likely to be involved in one-way trucking than are general-motor-freight carriers. Permit or specialized-equipment limitations may not allow backhauls of otherwise readily available loads. Further, because of the nature of many specialized-carrier operations, individual trucks often use only a small part of truck capacity. Some of this problem might be alleviated if more interline cooperation were realized between the various enterprises.

In many cases specialized common carriers use expensive, highly specialized equipment, the effective operation and maintenance of which often require special skills and training. Without this training a completely competent gravel truck driver may not be able to use the sometimes temperamental specialized loading and unloading equipment commonly used by bulk-commodities haulers. Equipment is often custom-made for a particular application and may have unique operating characteristics. Tractors and trailers often are not interchangeable between firms performing essentially the same function.

Barriers to entry into the various areas of specialized hauling appear to vary significantly in Texas, as suggested by the varying sizes of firms operating in the several kinds of specialized hauling businesses. For example, relatively few bulk-chemical carriers are in the cement-hauling business, and each of those carriers operates a relatively large number of trucks. On the other hand, a large number of haulers, each operating a relatively small number of trucks, carry ICC exempt commodities and sand and gravel.

There are many small "shoe string" operations in some phases of the specialized-carrier trucking business. As a rule these firms operate older, sometimes marginal, equipment. In many cases operation of this kind of equipment can be profitable but is usually limited to local hauling, and operating personnel who have a "feel" for machinery are chosen selectively. Further, the used equipment must be carefully checked before purchases are made. If equipment and personnel are prudently chosen and good financial and administrative practices are used, a small company is likely to be successful. In reality such a small company is often plagued with equipment breakdowns, chronic financial problems, and poor personnel and business management policies. Typically, many of these businesses cannot cover fixed costs over the long run and eventually go broke. On the brighter side, the individuals involved enjoy the trucking business and often habitually work twelve or more hours per day six or seven days per week.

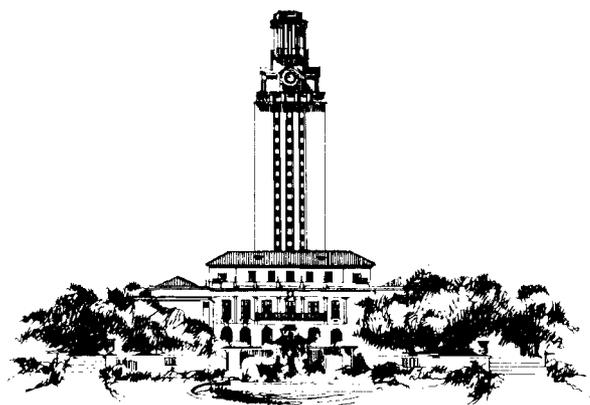
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