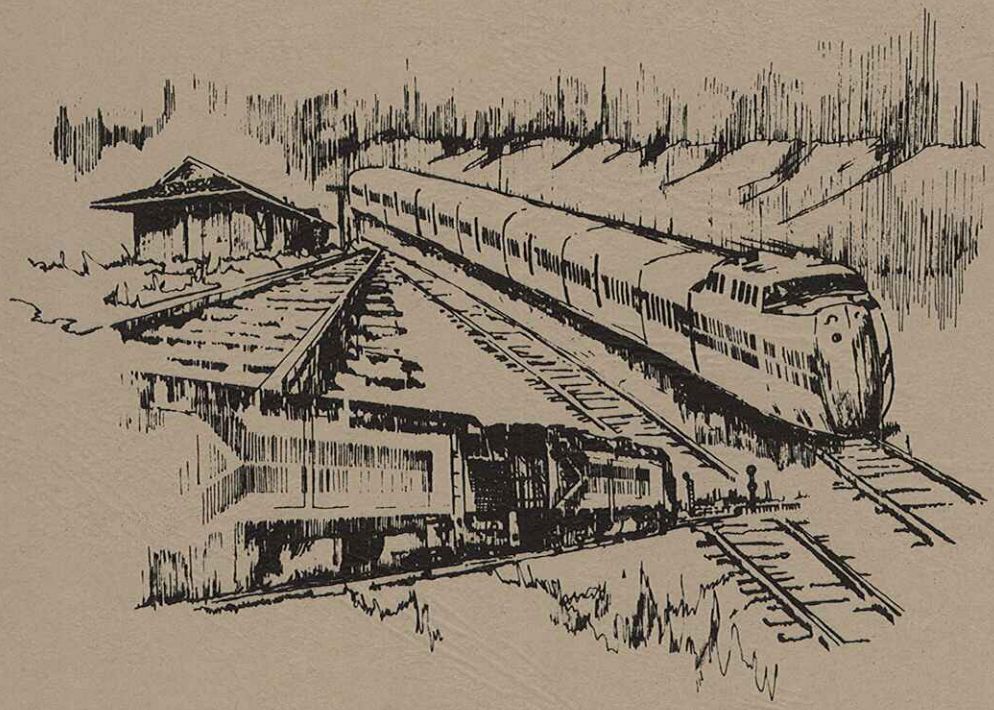
RAIL PASSENGER SERVICE IN TEXAS

SUMMARY REPORT

TEXAS RAIL SYSTEM EVALUATION



TEXAS TRANSPORTATION INSTITUTE
TEXAS A&M UNIVERSITY SYSTEM

RAIL PASSENGER SERVICE IN TEXAS

SUMMARY REPORT

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Preface

The Governor of Texas and the State Legislature assigned the responsibility for performing a state rail evaluation to the Texas Transportation Institute. A significant portion of the study addressed the possible need for increased rail passenger service, both intercity and commuter.

The following six technical reports were prepared to document the findings of the rail passenger study.

1. The History of Rail Passenger Service in Texas, 1820-1970
2. Amtrak and Its Texas Operations
3. The Technology of Rail Passenger Service
4. An Evaluation of Intercity Travel in Major Texas Corridors
5. An Evaluation of the Need for Intercity Rail Passenger Service In Texas
6. Considerations Influencing the Feasibility of Commuter Rail Service

This summary report presents the major findings and recommendations developed in those six technical reports. It is presented in three sections: the first section discusses the intercity rail passenger study; the major findings from the commuter rail study are documented in the second section; the third section presents the study recommendations.

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INTERCITY RAIL PASSENGER SERVICE

Historical

In the early 1800's, what is now Texas was a vast, undeveloped area. Waterways did not provide reliable transportation, nor did all-weather roadways exist. Transportation provided by stagecoaches and ox wagons was expensive and had limited capacity. Lack of adequate transportation precluded the development of the state's inland resources.

The first railroad was operated in the United States in 1828, and the first railroad in Texas operated in 1853. This technology offered a large-scale increase in speed and capacity while simultaneously reducing transportation costs for both person and goods movement by 50 percent. By 1900, over 9000 miles (14,481 km) of track had been constructed in Texas (Figure S-1). This

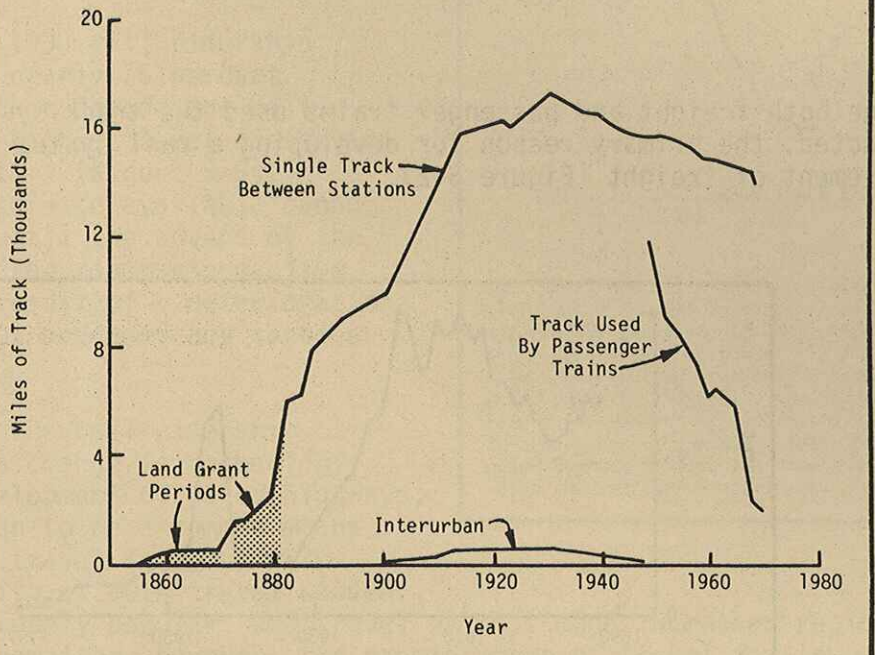


FIGURE S-1: MILES OF RAILROAD TRACK OPERATED IN TEXAS, 1853-1970

The Texas rail network expanded rapidly after the Civil War, with over 9000 miles (14,481 km) of track built by 1900. The system attained its largest size in 1932 when 17,078 miles (27,479 km) of first line track were being utilized. Until about 1930, all track served both freight and passenger train operations. Texas presently has about 13,300 miles (21,400 km) of track, more than any other state.

track allowed inland developments to occur, and a dramatic correlation exists between a city receiving rail service and the growth of that city (Table S-1).

TABLE S-1: RELATIONSHIP BETWEEN AVAILABILITY OF RAIL SERVICE AND THE GROWTH OF SELECTED TEXAS CITIES

City	Date of First Rail Service	Population Change				Annual Percent Increase In Population
		Pop.	(Year)	Pop.	(Year)	
Austin	1871	4,428	(1870)	11,103	(1880)	15
Dallas	1872	3,000	(1870)	10,358	(1880)	24
El Paso	1881	736	(1880)	10,338	(1890)	130
Fort Worth	1876	500	(1870)	6,663	(1880)	123
San Antonio	1877	20,550	(1880)	37,673	(1890)	8
Waco	1870	3,008	(1870)	7,295	(1890)	14

Significant inland developments did not exist in Texas until the rail system was constructed. However, it was not unusual for a city's population to double or triple within ten years of receiving rail service. City survival and growth both depended upon obtaining rail service.

Although both freight and passenger trains used the track system as it was constructed, the primary reason for developing a rail system has always been the movement of freight (Figure S-2).

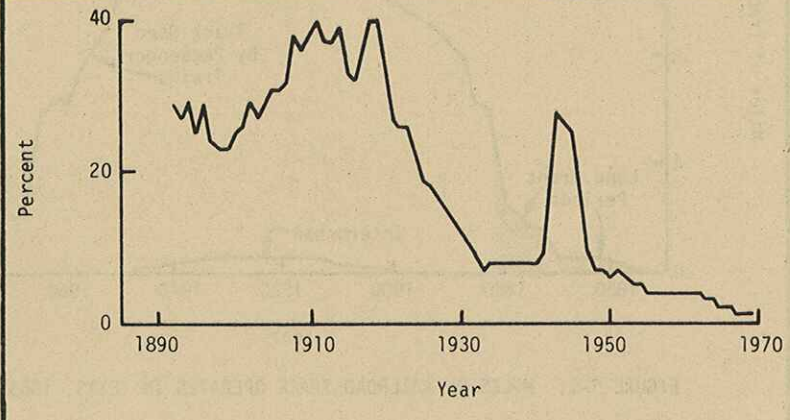


FIGURE S-2: PASSENGER REVENUE AS A PERCENT OF FREIGHT REVENUE FOR CONVENTIONAL RAILROADS IN TEXAS, 1893-1970

The rail system has always been primarily oriented toward freight movement. Even during the peak of rail passenger service, passenger revenue was only 40 percent of freight revenue, or about 25 percent of total revenue.

During the latter part of the nineteenth century, the railroads were virtually the only means of intercity person and goods movement. As inland developments increased in size as the result of the rail system expansion, so did the demand for intercity transportation. Conventional rail service, which rarely offered more than two trains per day between cities, was unable to serve this demand. As a result, in heavily traveled corridors, an interurban rail service developed. This operation provided frequent, inexpensive service and provided the conventional railroads with their first significant competition. By 1915, although the interurbans operated over only 3 percent of the track-miles in Texas (Figure S-3), they were serving 20 percent of the intercity travel demand.

In spite of the emergence of the interurbans, the conventional rails were still the only means of undertaking long intercity trips and were also the only means of making most short intercity trips. As a result, ridership continued to grow and reached the highest level that ever would be attained in 1920 when some 30 million passengers rode conventional trains in Texas. In 1920, the average Texan made eight one-way intercity trips by rail (Figure S-4).

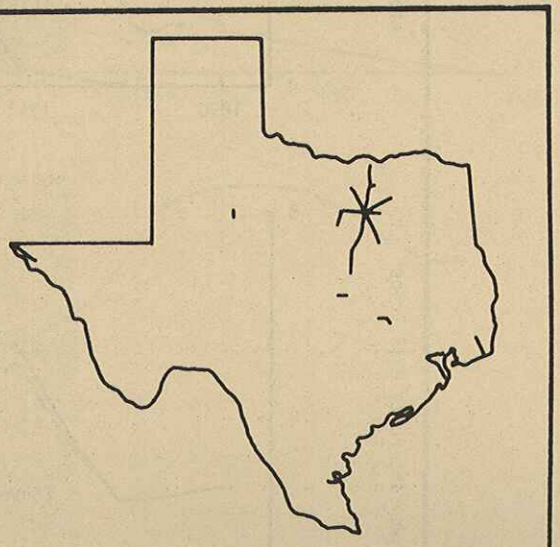


FIGURE S-3: INTERURBAN TRACK SYSTEM IN TEXAS

The interurban railroads, providing frequent, inexpensive service in major travel corridors, offered the first significant competition to the conventional railroads. By 1915, although operating over only 3 percent of the total track in the state, the interurbans were serving 20 percent of the intercity travel. The emergence of the auto, motor bus, and paved highway limited the time period during which the interurbans prospered.

From 1920 to 1930 rail ridership decreased by nearly 75 percent. Yet, during that decade the rails provided the highest level-of-service in their history (Figure S-5). Declines in service available cannot be detected until the advent of the Depression. The ridership decline was not the result of a deterioration in service but preceded any service reductions.

The cause of the rail ridership decline was a change in technology; with the development of paved highways, the auto began to be a common means of intercity travel in about 1920. The flexibility of auto travel caused it to be extremely popular, and travel by this mode increased rapidly (Figure S-6). Rail remained, however, the premier mode of travel for long intercity trips.

After World War II, commercial air service provided a further technological improvement in transportation, and air rapidly became the most popular mode for serving long distance travel. The bus had become the least expensive mode of travel, and the flexibility of the auto caused it to be the desired mode of travel for short trips. Rail passenger service no longer enjoyed an inherent

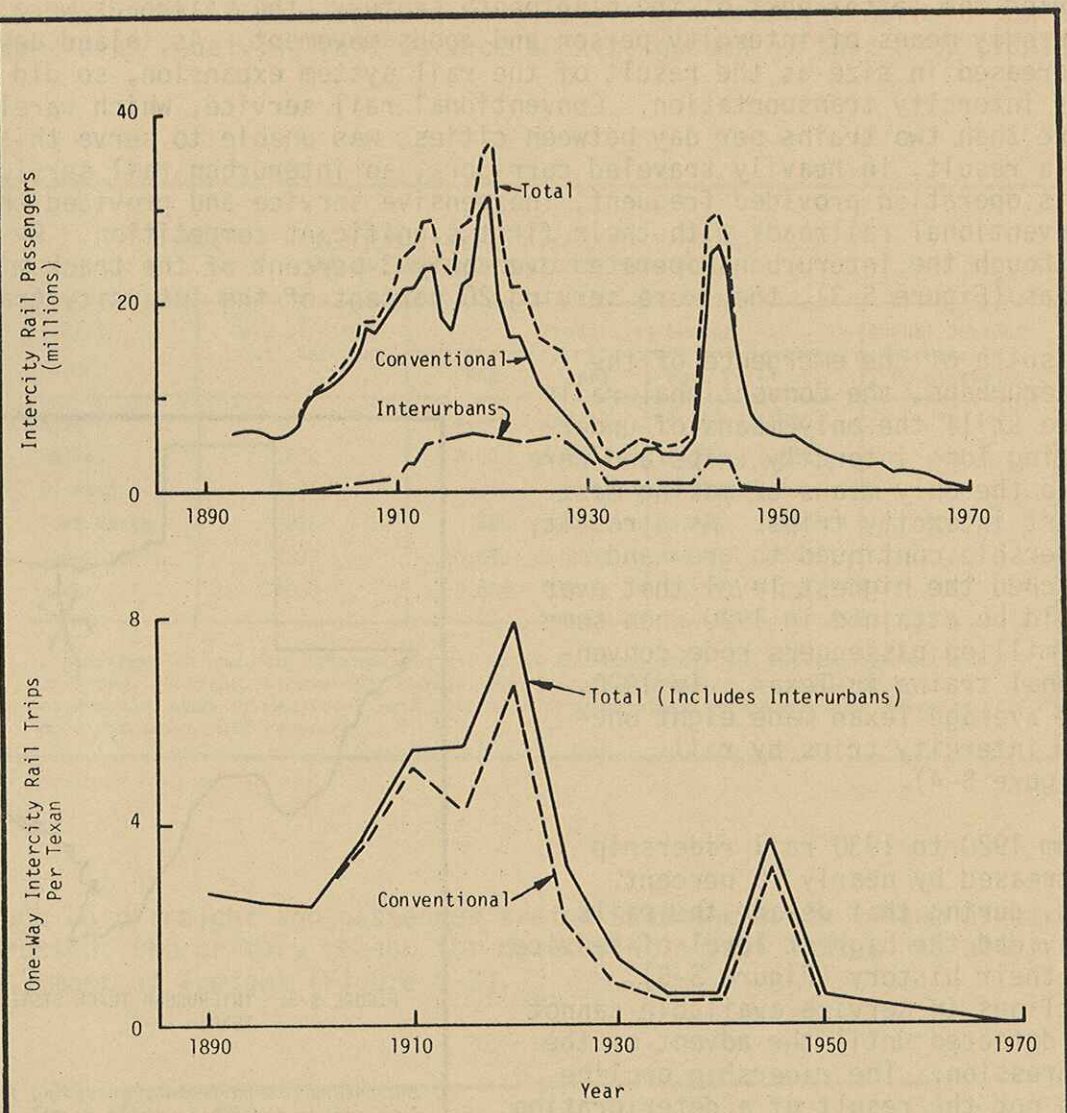


FIGURE S-4: TRENDS IN RIDERSHIP ON TEXAS RAILROADS, 1893-1970

Railroad ridership peaked in 1920 and then declined rapidly. With the exception of a brief resurgence during World War II, rail ridership from 1930 to the present has been less than one-third of the ridership that occurred in 1920.

advantage for serving any type of intercity trip.

As fewer persons used the rail mode, its financial condition deteriorated (Figure S-7). By the late 1960's it became apparent that, unless major actions were taken, rail passenger service would cease to exist. The U.S. Congress responded to this condition by enacting the Rail Passenger Service Act of 1970 which created Amtrak.

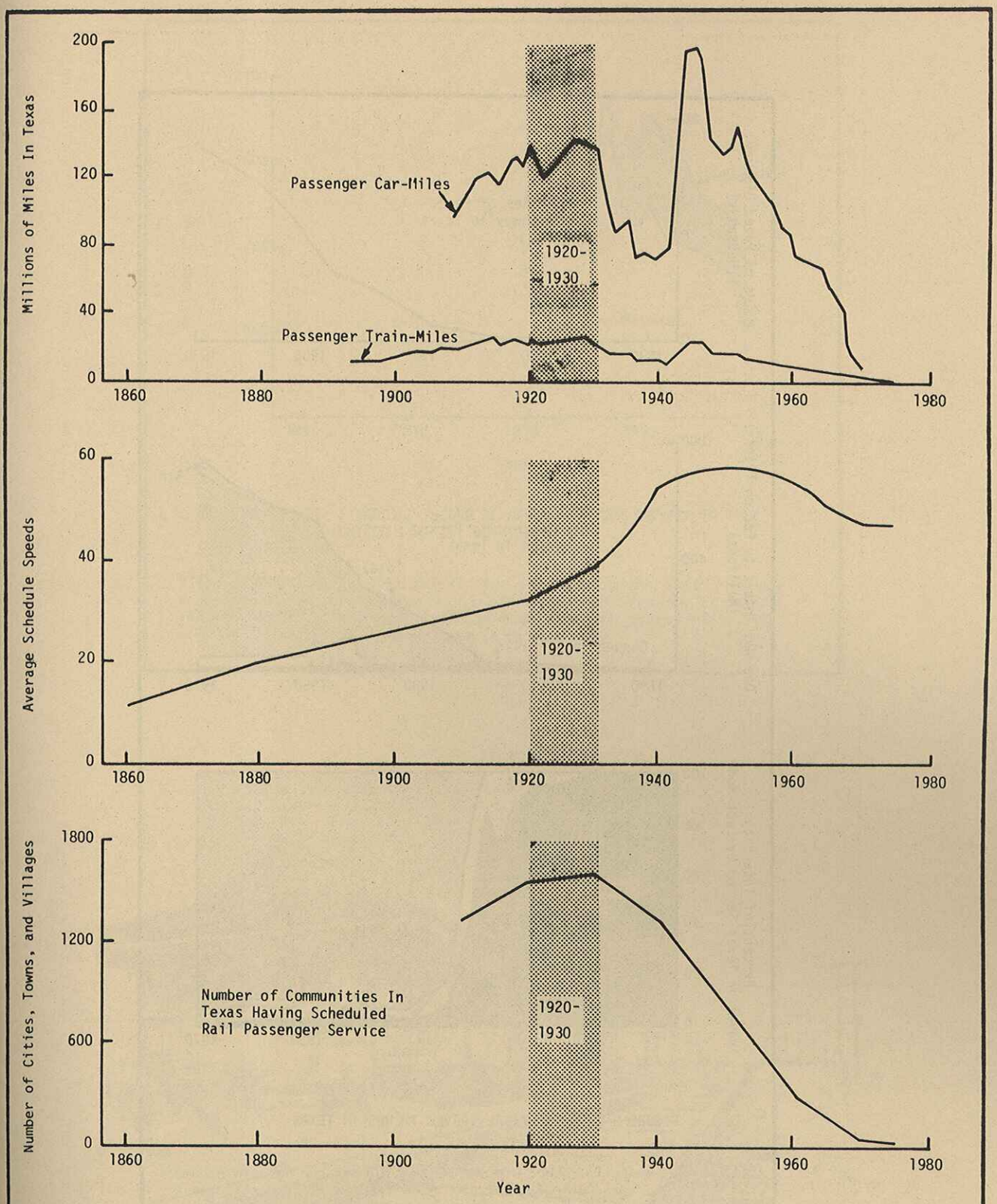


FIGURE S-5: TRENDS IN SERVICE PROVIDED BY RAILROADS IN TEXAS

Although ridership began to decline rapidly in 1920, service remained at a high level throughout the 1920's. The ridership decline preceded service declines and was not the result of declines in service.

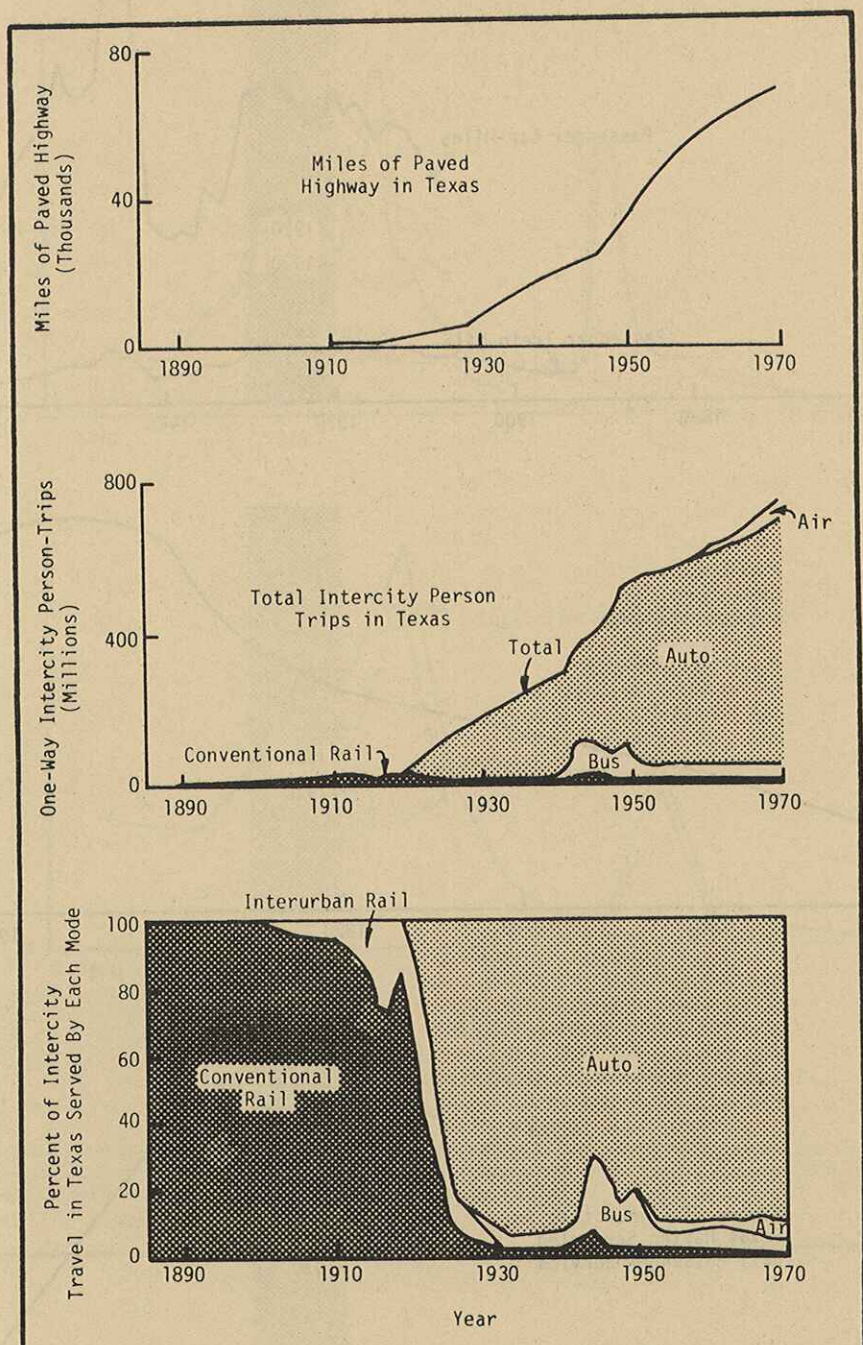


FIGURE S-6: HISTORICAL TRAVEL TRENDS IN TEXAS

The development of a paved highway system allowed the auto to become a viable mode for intercity travel. From 1920 to the present, the auto has been the dominant means of intercity travel. Rail travel has been relatively insignificant since 1930.

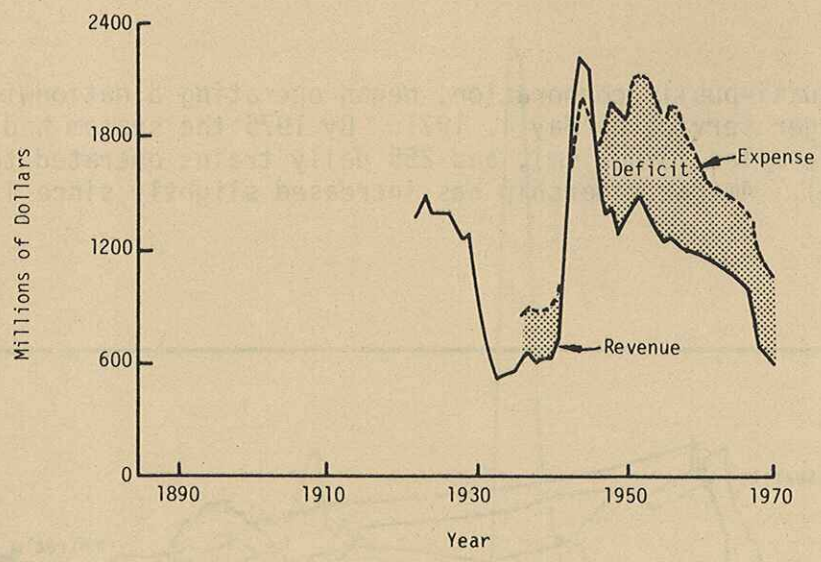
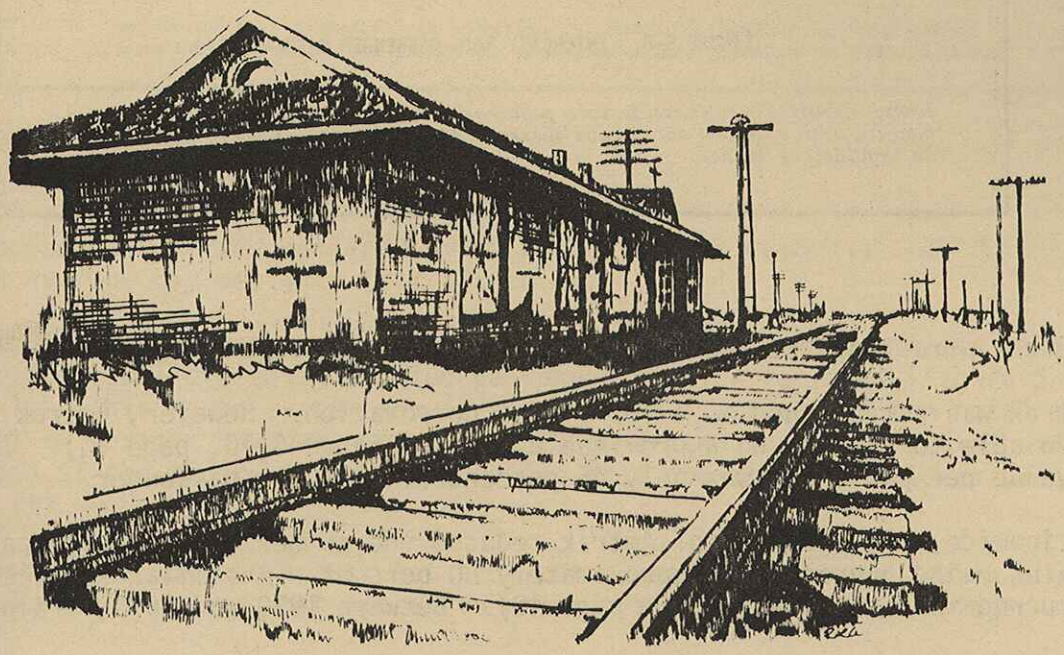


FIGURE S-7: FINANCIAL RECORD OF RAIL PASSENGER SERVICE IN THE UNITED STATES, 1936-1970

With the exception of World War II, the cost of providing rail passenger service exceeded the revenues derived from that service since at least the mid-1930's. The private railroad companies lost approximately $500 million dollars providing passenger service in 1970.



Amtrak

Amtrak, a quasi-public corporation, began operating a nationwide system of rail passenger service on May 1, 1971. By 1975 the system had expanded to 26,000 route-miles (37007 km), and 255 daily trains operated to 483 stations (Figure S-8). Amtrak ridership has increased slightly since its inception,

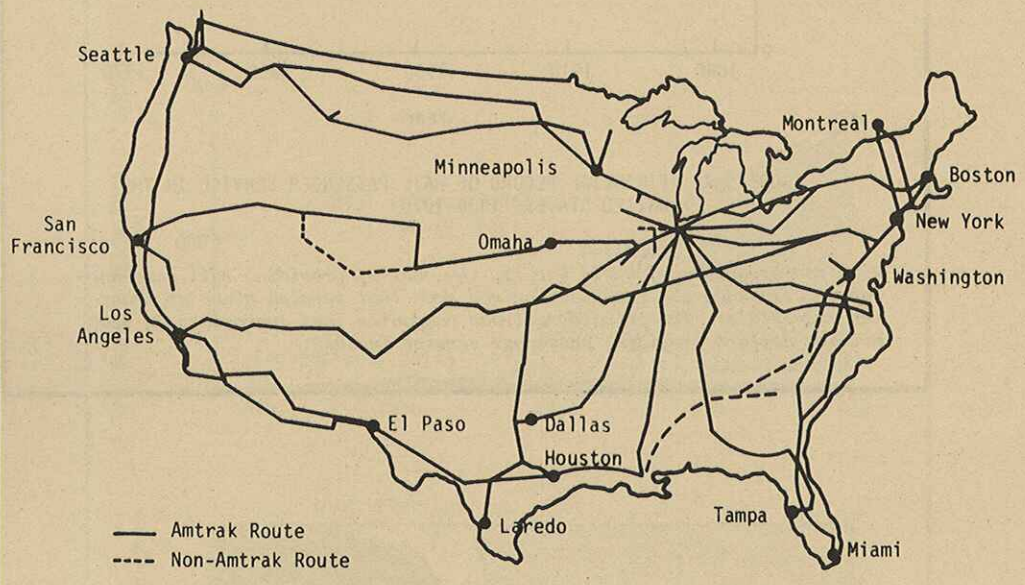


FIGURE S-8: INTERCITY RAIL PASSENGER SYSTEM, 1975

Amtrak operates a nationwide rail passenger service. About 255 daily trains operate over a 26,000 mile route system. Virtually all intercity passenger service is provided by Amtrak.

thereby arresting the downward trend in rail ridership (Figure S-9).

Amtrak was established as a for-profit corporation. However, Amtrak has not been able to operate on a profitable basis (Figure S-10, page 10). In 1975 revenue per passenger was only 45 percent of cost per passenger.

Nationwide, the creation of Amtrak reduced the number of intercity passenger trains being operated by approximately 50 percent. A similar service reductio occurred in Texas (Table S-2, page 10). Between 1970 and 1975, train-miles

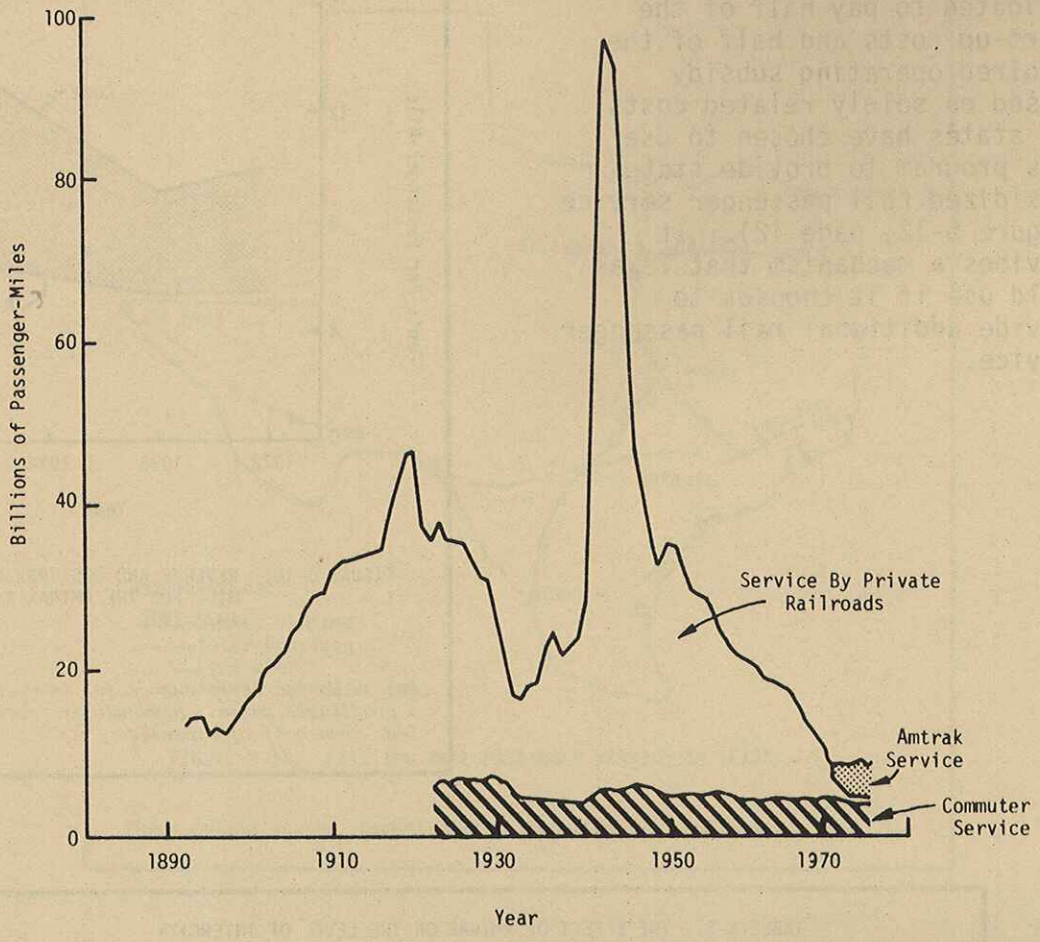


FIGURE S-9: TRENDS IN RAIL PASSENGER TRAVEL, 1880-1975

Amtrak has been successful in arresting the downward trend in passenger-miles served by railroads, and Amtrak has generated modest increases in its ridership.

and passengers served declined by 40 percent. The number of schedule stops on an average day declined from 112 to 34.

Portions of three Amtrak routes--the Lone Star, the Sunset Limited, and the Inter-American--presently provide passenger service to Texas (Figure S-11, page 11). This route system serves less than 0.1 percent of the total intercity travel in Texas. However, the ridership generated in Texas is a significant portion of the ridership on those routes that operate within Texas (Table S-3, page 11).

Section 403(b) of the Amtrak Act provides a mechanism through which a governmental agency can request Amtrak to provide additional rail passenger service.

The requesting agency is obligated to pay half of the start-up costs and half of the required operating subsidy (based on solely related costs). Six states have chosen to use this program to provide state-subsidized rail passenger service (Figure S-12, page 12). It provides a mechanism that Texas could use if it chooses to provide additional rail passenger service.

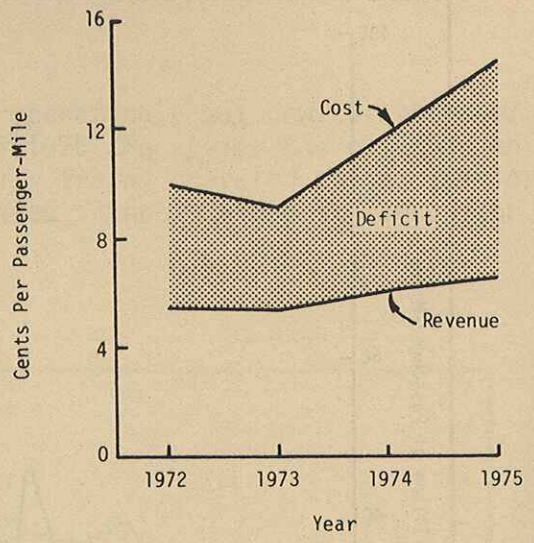


FIGURE S-10: REVENUE AND COST PER PASSENGER-MILE FOR THE AMTRAK SYSTEM, 1972-1975

Amtrak has not been successful in operating on a profitable basis. Revenues are presently less than half of expenses.

TABLE S-2: THE EFFECT OF AMTRAK ON THE LEVEL OF INTERCITY RAIL PASSENGER SERVICE AVAILABLE IN TEXAS

Service Descriptor	Service by Private Railroads 1970	Service by Amtrak 1975	Percent Change 1970 to 1975
Extent of Rail Passenger Service			
Number of Cities with Service	53	20	-62
Miles (km) of Track Operated	1,878 (3,022)	1,989 (3,200)	+ 5
Passenger Train-Miles (km)	1,327,000 (2,135,143)	794,368 (1,278,138)	-40
Ridership			
Passengers	370,925	208,922	-44
Passenger-Miles (km)	86,945,000 (139,894,505)	74,305,375 (119,557,348)	-15
Frequency and Speed of Service			
Average Daily Schedule Stops	112	34	-70
Typical Schedule Speeds, mph (km/hr)	48 (77)	48 (77)	0

The formation of Amtrak reduced the intercity rail passenger service available in Texas.

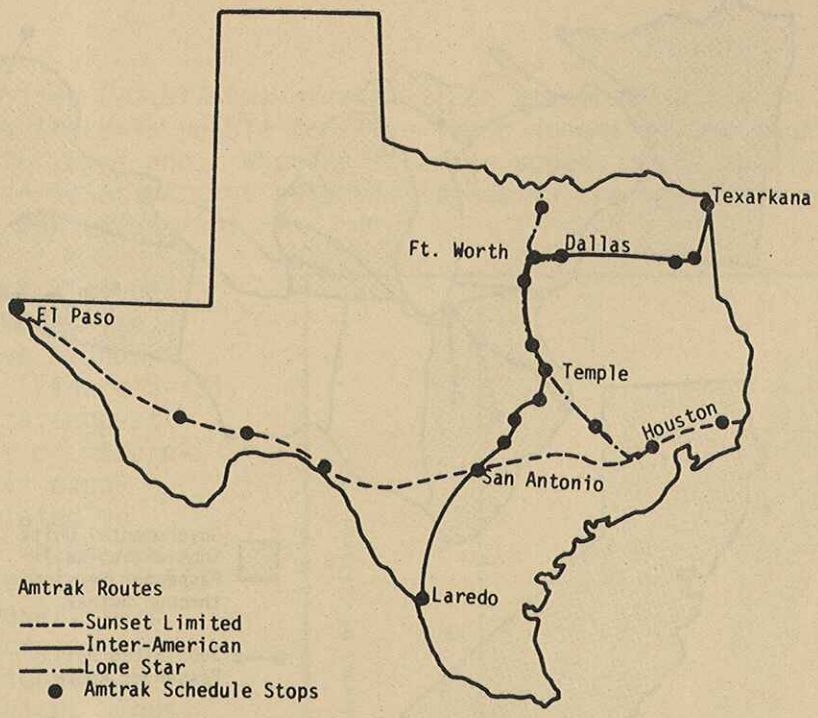


FIGURE S-11: EXISTING RAIL PASSENGER SERVICE IN TEXAS

Three Amtrak routes presently serve intercity travel in Texas.

TABLE S-3: THE IMPORTANCE OF TEXAS RIDERSHIP TO THE AMTRAK ROUTES OPERATING IN THE STATE

Route	Percent of Route Miles In Texas	Percent of Passengers with at least One Trip-End In Texas
Lone Star	30	48
Sunset Limited	46	57
Inter-American	55	69

Amtrak does not provide extensive service in Texas. However, on those routes that do operate through Texas, the ridership generated in Texas is a significant portion of the total route ridership.

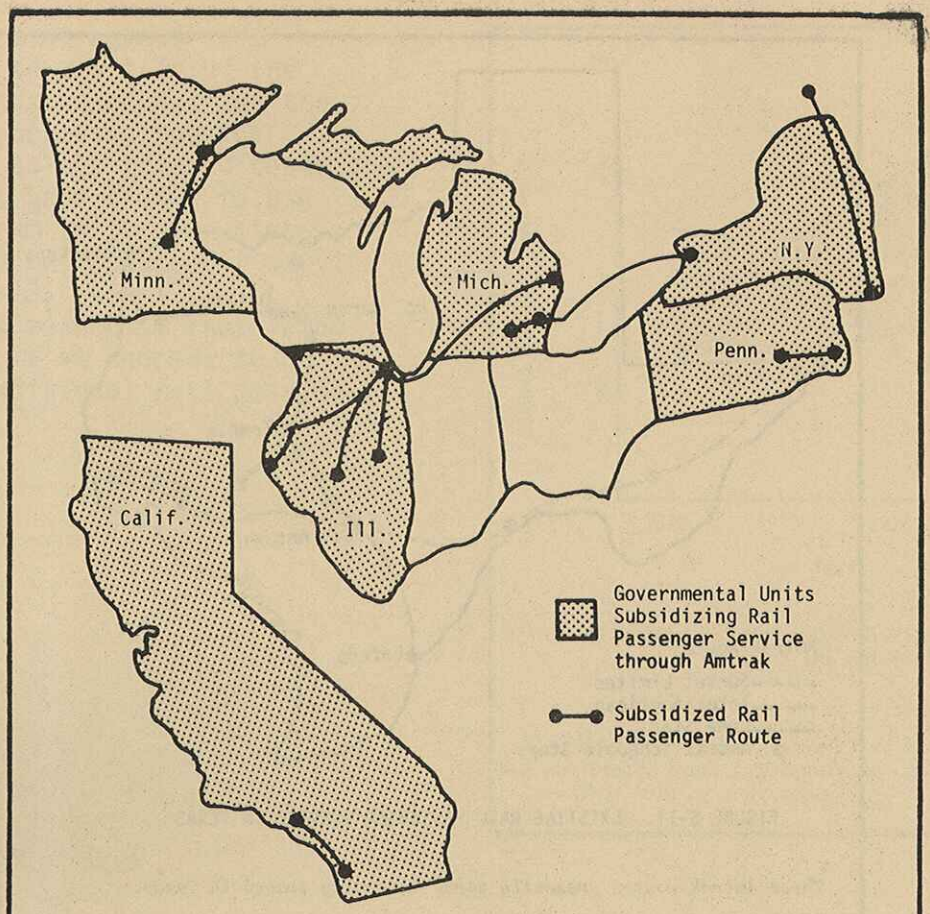
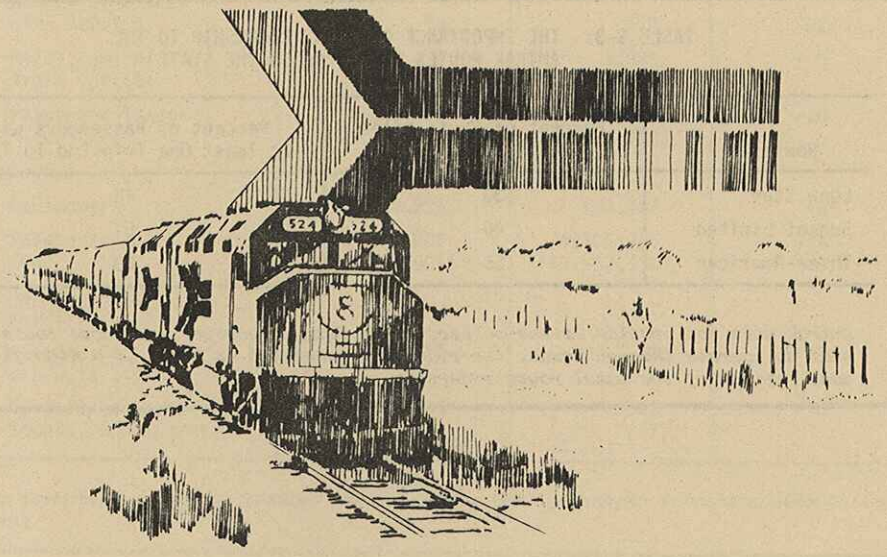


FIGURE S-12: STATE SUBSIDIZED AMTRAK ROUTES

Six States have chosen to provide additional Amtrak rail passenger service through State subsidization using the 403(b) Program.



Technology

Over 13,000 miles (20,917 km) of rail track presently exist in Texas. In general, this track is unable to serve train speeds of the magnitude that were served 20 years ago. Whereas schedule speeds of 60 mph (97 km/hr) were once common in Texas, Amtrak schedule speeds in the state are currently less than 50 mph (80 km/hr).

A capital cost will be required to modernize track to serve higher train speeds (Figure S-13). Available data suggest that the cost of modernizing track is exponentially related to the speed to which the track is modernized. It appears, however, that ridership increases in direct relation to speed of service. Thus, although the revenue derived from passenger service due to higher operating speeds will increase, it will not increase as rapidly as will the track upgrade cost required to provide the higher speed of service.

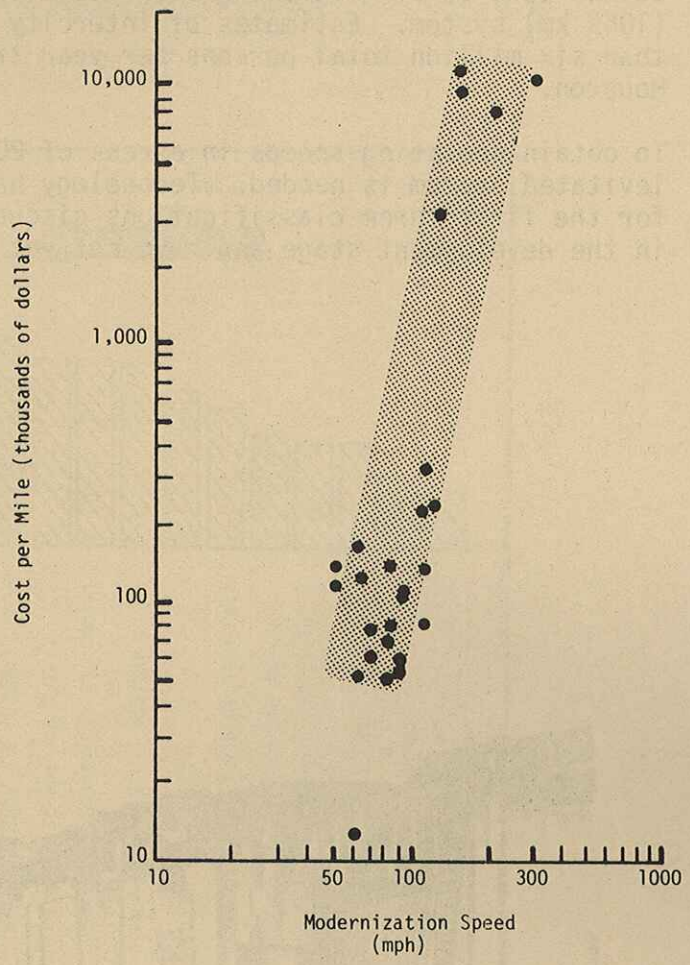


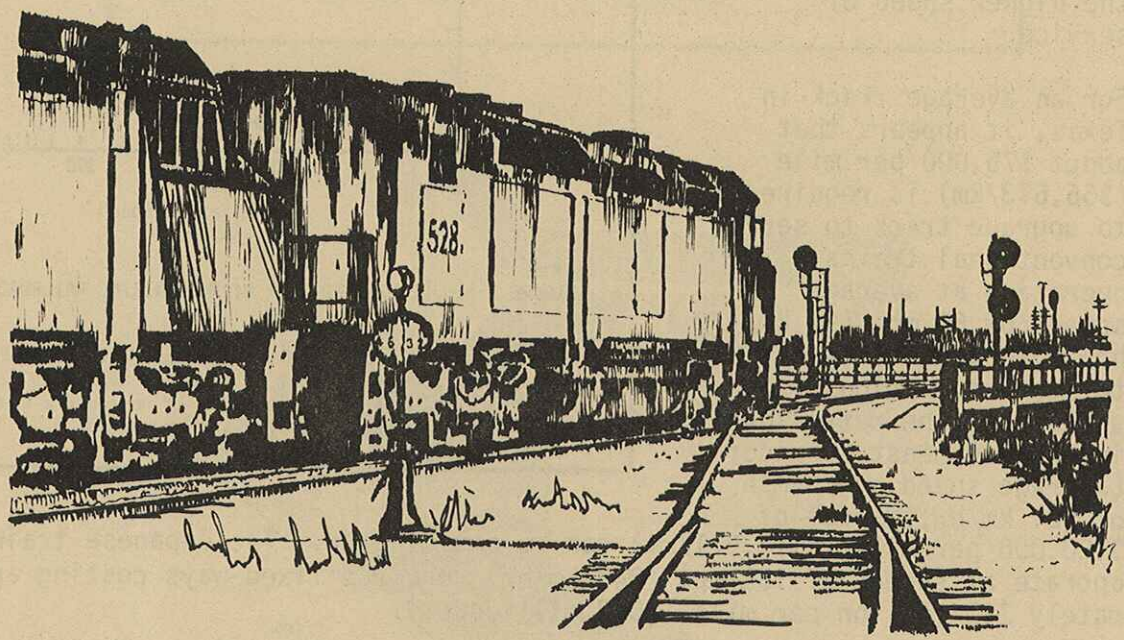
FIGURE S-13: ESTIMATED COST OF MODERNIZING RAILROAD TRACK

In general, the rail track in Texas today is not able to serve train speeds as great as those it served 20 years ago. To provide passenger service at reasonable speeds, a track upgrade cost will probably be required.

For an average track in Texas, it appears that about $75,000 per mile ($56,613/km) is required to upgrade track to serve conventional trains operating at average speeds of 60 mph (97 km/hr). To upgrade track to serve operations similar to the metroliner in the Northeast Corridor (average speed of 75 mph or 121 km/hr) a cost of $180,000 per mile ($111,971/km) can be anticipated. The Japanese trains that operate at speeds of 155 mph (249 km/hr) required fixed-ways costing approximately $10 million per mile ($6.2 million/km).

Intercity rail passenger service can generally be classed as conventional, improved, high-speed, or levitated. Conventional service is similar to most of the service provided by Amtrak; average speeds are about 60 mph (97 km/hr) with maximum speeds of approximately 80 mph (129 km/hr). Improved train servic is similar to the Metroliner service between Washington, D.C. and New York City. Average speeds are about 75 mph (121 km/hr) with maximum speeds in the range of 100 mph (161 km/hr) to 120 mph (193 km/hr). The Japanese Shinkansen System is perhaps the best example of high-speed train service. Average speeds exceed 100 mph (161 km/hr) with maximum speeds of approximately 155 mph (249 km/hr). It might be noted that the Japanese System has been highly successful It has done so by generating over 130 million annual passengers on a 663 mile (1069 km) system. Estimates of intercity travel in Texas suggest that fewer than six million total persons per year travel between Dallas-Fort Worth and Houston.

To obtain operating speeds in excess of 200 mph (322 km/hr), some type of levitated system is needed. Technology has already been developed and utilized for the first three classifications discussed above. Levitated vehicles are in the development stage and have not yet been used for scheduled service.



It was assumed that, if analyses determined that intercity corridor capacity required expansion, rail passenger service should be evaluated as an alternative approach to increasing capacity. Rather than evaluate all intercity corridors in the state, preliminary evaluations were conducted to establish study priorities. Based on these preliminary evaluations, it was determined that the passenger study should focus on the Dallas-Fort Worth to Houston and the Dallas-Fort Worth to San Antonio corridors (Figure S-14).

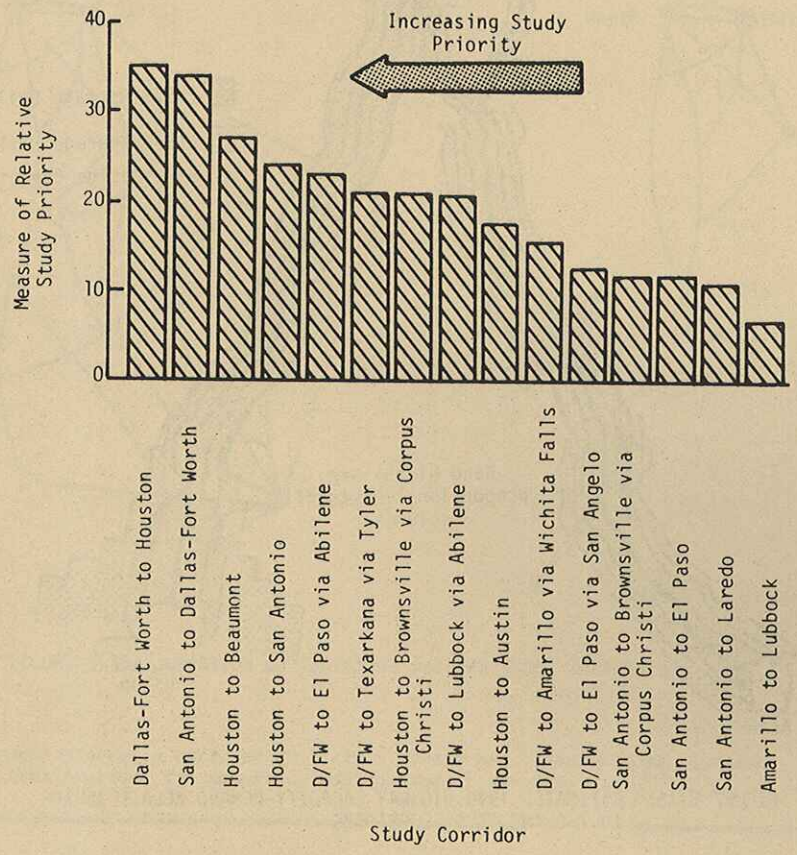


FIGURE S-14: COMPOSITE RANKING OF CORRIDOR TRAVEL CHARACTERISTICS

Preliminary analyses determined that Dallas-Fort Worth to San Antonio and Dallas-Fort Worth to Houston had the highest study priorities for intercity transportation planning.

It is estimated that travel demand in both the study corridors will increase

TABLE S-4: SUBJECTIVE COMPARATIVE EVALUATION OF INTERCITY PASSENGER MODES

Comparative Factor	Relative Standing of the Modes		
	Highway	Rail	Air
Energy Consumption	Intermediate	Most Desirable	Least Desirable
Pollutants Emitted	Intermediate	Most Desirable	Least Desirable
Fatality Rate	Least Desirable	Most Desirable	Intermediate
Flexibility Regarding Origin & Destination Served	Most Desirable	Intermediate	Least Desirable
Flexibility Regarding Ability to Serve Both Passenger & Freight Travel	Most Desirable	Intermediate	Least Desirable

In terms of non-quantifiable considerations, the intercity rail passenger mode rates favorably.

Existing tracks in Texas do have some unused capacity. By upgrading an existing track, conventional service could be provided. It appears, however, that provision of metroliner service would require both the upgrading of an existing track and the construction of a new track. An initial capital cost in the range of $20 million would be required to upgrade a track in a 275 mile (442 km) corridor to serve a conventional train operation. It appears that a cost of approximately $500 million would be required to upgrade an existing track plus construct a new track to serve metroliner operations.

Operation of a conventional train service in either of the study corridors would have generated approximately 35,000 to 40,000 riders in 1975; it is estimated that such a service would accommodate 85,000 passengers in 1990. The revenue derived from the service would be less than half the fully allocate cost of operating the service. This conventional train service would accommod only about one percent of the intercity travel; no noticeable impact would be made on total corridor capacity.

The frequency of service provided by the metroliner gives it a relatively high theoretical capacity. As a result, since rail is being considered as a means of increasing corridor capacity, the metroliner operation appears to be a superior alternative to the conventional train alternative. The metroliner operation is estimated to be able to serve ten percent of the intercity travel in the Dallas-Fort Worth to Houston corridor and six percent of the travel in the Dallas-Fort Worth to San Antonio corridor. Revenues generated will be less than fully allocated costs; by 1990 revenue will equal solely related cost in the Dallas-Fort Worth to Houston corridor.

Modal Alternatives and Comparisons

Flexibility is assumed to be a primary concern in evaluating travel in the two study corridors. Over half of the highway travel that occurs in those corridors is not travel moving from one standard metropolitan statistical area (SMSA) in the corridor to another corridor SMSA. A travel mode such as air or rail that serves only SMSA to SMSA travel is somewhat limited as to how much of the total corridor travel it can serve.

Air has been a rapidly increasing means of travel. Its absolute travel in the corridor will increase; quite possibly, its share of the market will also increase. It is limited to serving SMSA to SMSA travel and is primarily restricted to serving travel between SMSA's that are more than 150 miles (241 km) apart. Air is unable to serve significant volumes of freight travel. Although air travel will increase, it appears doubtful that it can expand its market share sufficiently to accommodate enough travel to allow the existing highway system to operate satisfactorily.

If additional capacity is to be provided, either the highway system needs to be expanded or a metroliner intercity passenger train operation developed. In terms of flexibility, the metroliner is restricted to serving travel that both originates and terminates in cities that lie in the corridor. Highways offer the flexibility to serve all types of corridor trips at all times of day. Using an existing track to serve passenger operations may hinder rail freight service; expansion of the highway system will allow both the truck and bus modes to continue to operate as they presently do. It is estimated that a start-up cost of $500 million will be required to upgrade one existing track and construct one new track to serve metroliner operations in either of the study corridors; it is estimated that $200 million will be needed to expand the interstate highway facilities in either of the corridors from four to six lanes. In terms of cost per passenger-mile, based on estimated 1990 usage levels, the highway mode would cost nine cents while the metroliner operation would cost 21 cents. The highway improvement would be more extensively utilized. In 1990 over seven million passengers would use a highway improvement in a corridor while less than two million would use the metroliner service (Table S-5).

The recommendations resulting from this study are presented in the final section of this summary report, page 25.

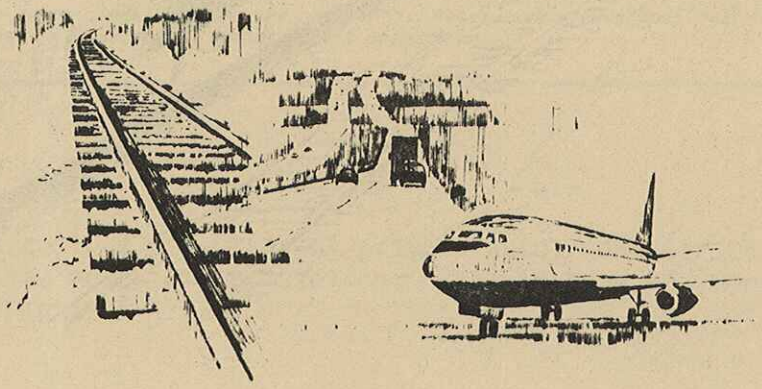
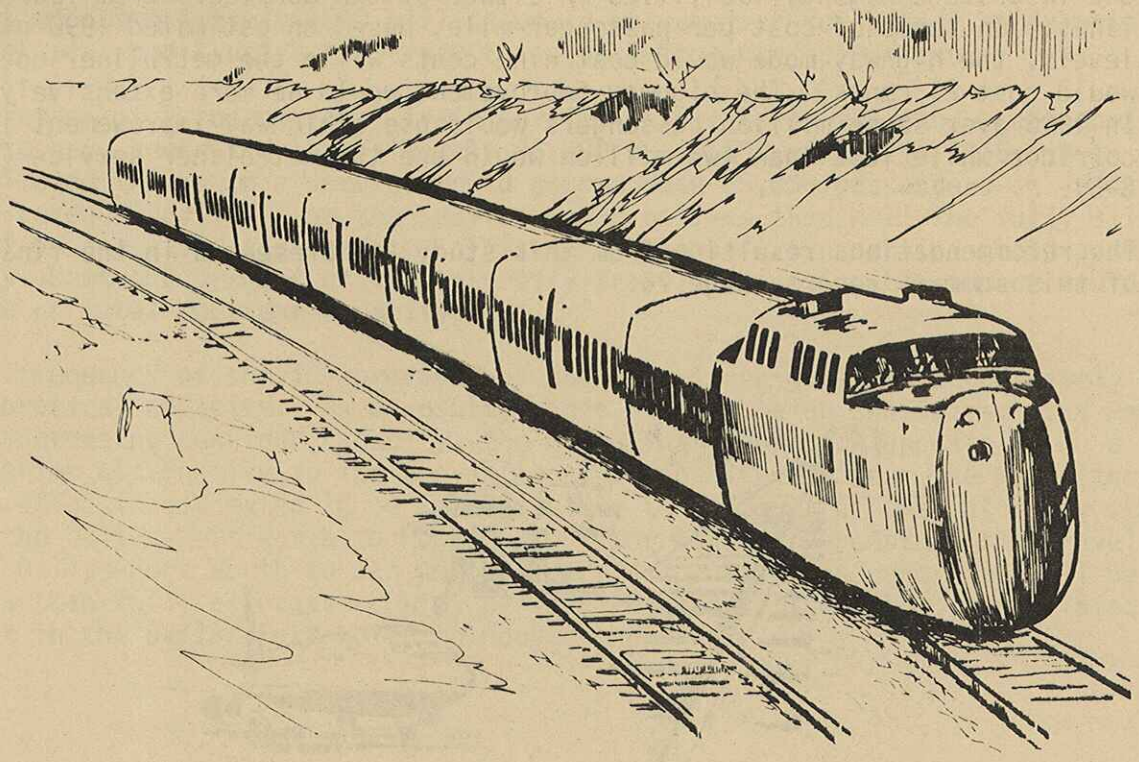


TABLE S-5: COMPARISON OF COST AND USAGE ASSOCIATED WITH EXPANDING RAIL OR HIGHWAY CAPACITY

Comparative Consideration	Mode	
	Metroliner Rail	Auto on Highway
Initial Start-Up Cost Per Mile (km), dollars	2,000,000 (1,243,000)	800,000 (497,000)
Operating Cost Per Passenger-Miles (km), cents	21 (13.1)	9 (5.6)
Estimated 1990 Usage Per Mile (km), Passengers	2,000,000 (1,243,000)	7,000,000 (4,351,000)

Expanding a highway from four to six lanes requires a lower start-up cost than does implementing a double track metroliner system, and highway operating costs are also lower. More persons will utilize the incremental improvement in highway capacity than will utilize a metroliner service.



COMMUTER RAIL SERVICE

At present the automobile, with peak period occupancies of 1.3 persons per vehicle, serves virtually all of the urban work trips in Texas. Congestion currently exists during peak periods, and projections indicate that this congestion will intensify in the future.

Railroad tracks already exist in many of the heavily traveled commuter corridors in Texas. To many motorists, driving in congested traffic and viewing a rail track that may be unused at that time, the idea of commuter rail seems realistic.

Commuter rail is oriented toward serving peak period work trips destined to the central business district. In 1970, sixteen significant commuter rail services were operating in the United States. The population characteristics of the cities served by these rail operations are quite different from those of major Texas cities (Table S-6).

TABLE S-6: POPULATION CHARACTERISTICS OF SELECTED TEXAS CITIES AND STANDARD METROPOLITAN STATISTICAL AREAS SERVED BY COMMUTER RAIL

City	SMSA Population, 1970 (millions)	Central City Population Density Persons/Sq. Mile (km)
Cities with Commuter Rail Service		
New York	11.6	24,385 (9,419)
Chicago	7.0	12,283 (4,744)
Philadelphia	4.8	15,164 (5,857)
Boston	2.8	13,936 (5,383)
San Francisco	3.1	10,035 (3,876)
Texas Cities		
Dallas	1.6	3,179 (1,228)
Houston	2.0	3,102 (1,198)
San Antonio	0.9	3,555 (1,373)
Fort Worth	0.8	1,919 (741)

The major urban areas in Texas are smaller and less densely developed than those cities presently served by commuter rail operations.

Relative to the cost of commuting by private auto, commuter rail is a relatively inexpensive means of commutation. Rail is however, more expensive than the motor bus (Figure S-17).

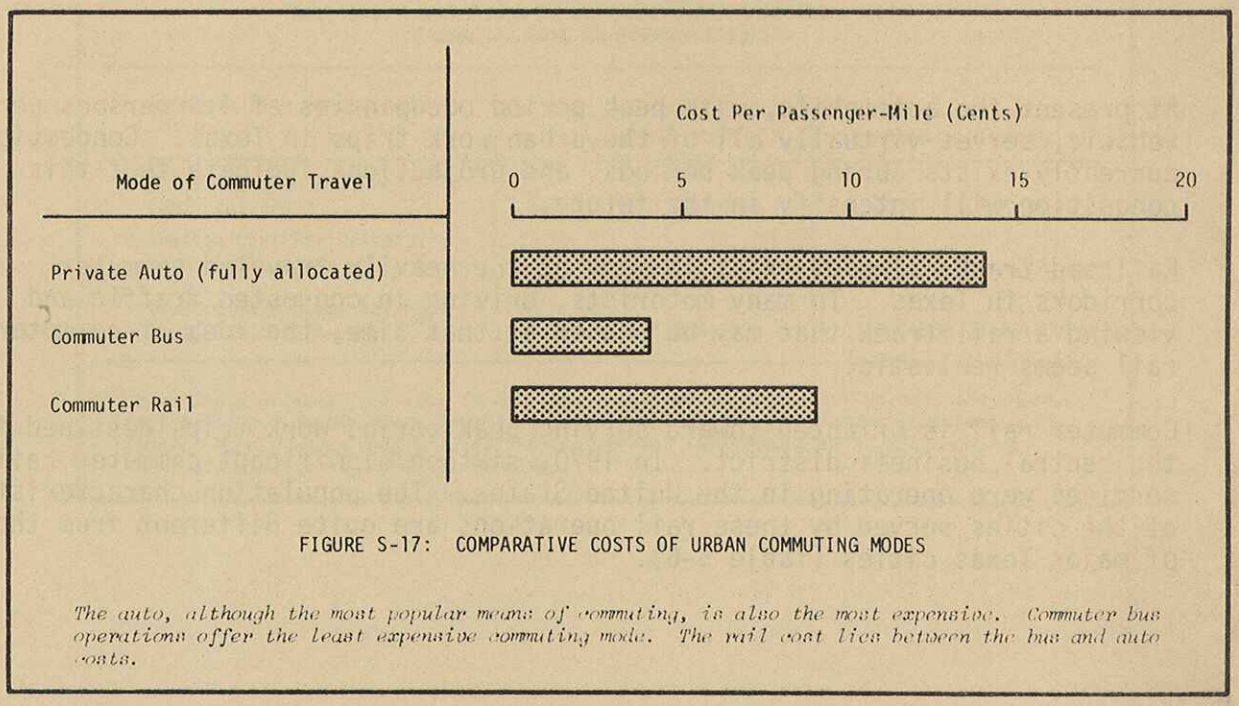


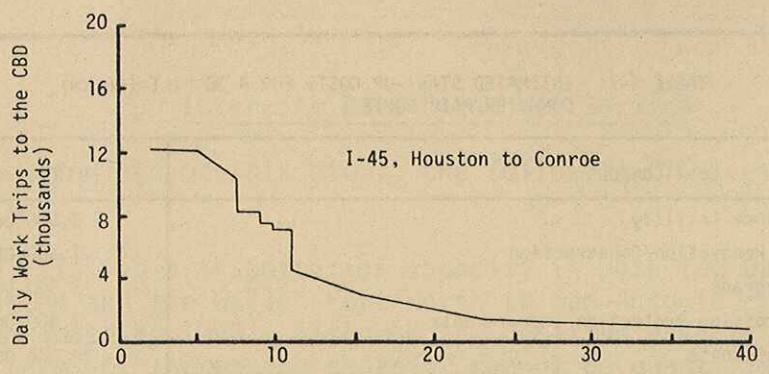
FIGURE S-17: COMPARATIVE COSTS OF URBAN COMMUTING MODES

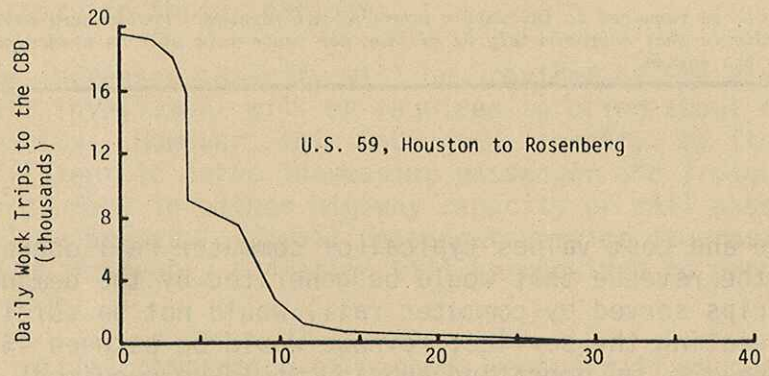
The auto, although the most popular means of commuting, is also the most expensive. Commuter bus operations offer the least expensive commuting mode. The rail cost lies between the bus and auto costs.

In evaluating the desirability of commuter rail, several considerations need to be analyzed. First, the rail track in Texas is owned by private railroad companies. No legal mechanism presently exists that would require the private companies to allow commuter service to operate over their tracks; thus, unless the private railroad is agreeable, it is doubtful whether commuter rail services will exist. Any service that is implemented will need to be coordinated with rail freight operations.

Significant commuter volumes do occur in certain urban travel corridors in Texas. A review of three corridors in Houston indicates that 10,000 to 20,000 trips per day into the downtown occur in these corridors (Figure S-18). Under the most favorable conditions, commuter rail might be able to attract 20 percent of the trips shown in Figure S-18. If this volume of traffic were generated, between six and twelve directional train operations would be required to serve the demand. This volume of train operations would significantly reduce the capacity of the streets which intersect the commuter track due to the additional delay time incurred while the crossing is closed to autos to facilitate train movement.

A capital expense will be required to start-up a commuter service. Train equipment will need to be procured. Passenger train maintenance facilities will be needed, and stations will have to be renovated and/or built. It is probable that some track upgrading will be needed and, for safety reasons, better protection will be warranted at those locations where streets and highways intersect the rail track (grade crossings). For a 30 mile (48 km) one-way route, it appears that approximately $30 million will be required to initiate train service (Table S-7, page 24).





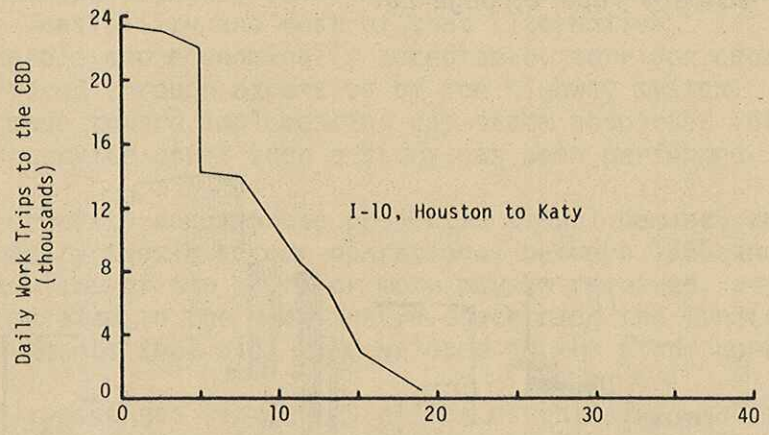


FIGURE S-18: ESTIMATED DAILY WORK TRIPS INTO THE HOUSTON CBD ALONG THREE FREEWAY CORRIDORS

Substantial commuter volumes exist in some urban corridors in Texas. If commuter rail were able to serve 20 percent of this demand, between 6 and 12 directional trains per day would be required.

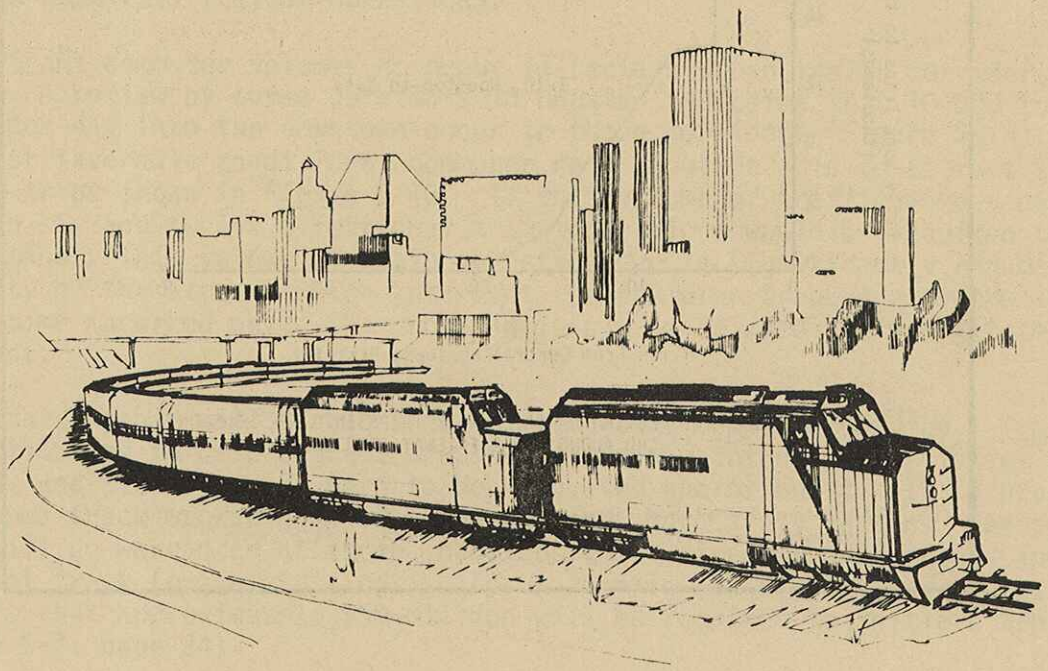
TABLE S-7: ESTIMATED START-UP COSTS FOR A 30 MILE (48 km) COMMUTER RAIL ROUTE

Cost Component	Cost
Maintenance Facility	$ 2,000,000
Station Renovation/Construction	1,600,000
Track Upgrade	1,500,000
Grade Crossing Protection Improvements	1,400,000
Equipment Costs	24,000,000
TOTAL	$30,500,000

A cost will be required to initiate a commuter rail system. Preliminary estimates indicate that approximately $1 million per route-mile will be needed to start-up the system.

Based on revenue and cost values typical of commuter rail operations in the United States, the revenue that would be generated by the demand (based on 20 percent of trips served by commuter rail) would not be sufficient to cover the costs of operating the service; revenue would be between 45 and 90 percent of cost. As a result, an operating subsidy would be required.

The recommendation resulting from this study is presented in the following section of this summary report, page 26.



STUDY RECOMMENDATIONS

Intercity Rail Passenger Service

Based on the findings of this study, the following findings and recommendations are set forth.

- The existing transportation capacity in both the Dallas-Fort Worth to Houston and the Dallas-Fort Worth to San Antonio corridors will be inadequate by 1990. Although the negative aspects of doing nothing in terms of increasing capacity cannot be quantified, such a policy will have adverse impacts on the economy of the state. As a result, it is recommended that action be taken to increase transportation capacity in those corridors.

- Some increased capacity will be provided by the air mode; no direct state involvement will be required to bring about this increased capacity. However, this increased capacity, by itself, will not be sufficient to serve increasing passenger and freight travel. Some improvement in either highway capacity or rail passenger capacity will be needed. If rail passenger service is provided, some form of a high frequency operation will be required to provide a high-capacity service.

- An initial comparison of highway versus rail suggests that improving highway capacity (i.e., expanding I-45 and I-35 from their present four lanes to at least six lanes) may be the better approach. It is recommended that a study be undertaken to more accurately determine the feasibility and cost of that alternative. If it is found to be feasible and economically acceptable, corridor capacity should be improved through expansion of the highway system. No efforts should be made toward implementing any state supported intercity rail passenger service until such a study has been performed.

- In order to accommodate projected travel demand, any increase in capacity should become operational between 1985 and 1990. Since a lead time of ten years or more may be required, a decision needs to be formulated in the near future concerning the type(s) of capacity improvements that will be developed in the study corridors.

- Rail passenger service is not as essential to the state as is rail freight service. Future planning should consider this finding.

- The State of Texas should become involved in multimodal intercity transportation planning. Without such planning, it is quite possible that the cost and congestion associated with intercity travel will, based on current design standards, become unacceptable. This will adversely affect the economy of the State.

Commuter Rail Service

- From the information presented in this report, it cannot be concluded that commuter rail service is or is not applicable to Texas cities. Texas cities face significant problems in generating the person movement capacity to serve peak travel demands. Development of commuter oriented services certainly warrants consideration, and commuter rail is such a service. However, several problems will be incurred in attempting to implement a commuter rail service. Nevertheless, this form of transportation does warrant consideration in analyzing and evaluating alternative approaches to serving travel demand.