LONG RANGE TRANSIT PLAN

DRAFT FINAL REPORT

Kansas City Metropolitan Area Transportation Study

for the

Mid-America Regional Council

July 1975

STUDY TEAM

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The Long Range Transit Plan proposed in this Report calls for an evolving public transportation system. It starts with an aggressive improvement to the present bus system through a 5-year program which would provide for increased service, convenient park & ride stations, bus shelters, and preferential bus lanes. During this period, rights-of-way would also be acquired for exclusive busways in the major corridors.

The Plan includes a broad spectrum of transit service providing over four times the present mileage of bus routes within walking access of 75 percent of the future population.

The major corridors would be served by express buses on their own rights-of-way which can be converted to an electrically powered fixed guideway system when transit ridership and development justify this step.

SUMMARY

Three years ago, a team effort was begun to produce a Long Range Transit Plan for the Kansas City Metropolitan Region.

It was a complex process.

It involved the combined effort of the Mid-America Regional Council, the Kansas City Area Transportation Authority, Kansas City Transit Associates, and more than a dozen city, state, and Federal agencies.

Most importantly, it involved the public. A series of public hearings was held throughout the metropolitan region to incorporate the ideas and desires of citizens into the plan.

The results, recently approved by the Mid-America Regional Council for submission to public discussion is a highly flexible plan.

It calls for:

1. A greatly expanded bus system (four times as many buses and route miles as now) and,

2. Reservation of rapid transit right of way. In the beginning exclusive bus lanes would be provided which could be eventually converted to 24 miles of fixed guideway rapid transit if ridership increases enough to warrant it.

The Plan, outlined in this report, calls for a step-by-step implementation.

First stage improvements call for aggressive and innovative improvements to the existing bus system to increase ridership by 25 to 30 percent the first five years.

Improvements would include:

- Increased area coverage.
- More frequent transit service.
- Special services for low income groups, the young, elderly, and handicapped, especially within neighborhoods.
- Bus Shelters.
- Preferential and exclusive bus lanes.
- Park & ride and transfer facilities.
- Better dissemination of route information.

We feel the plan for such an improved transit system would provide a practical, cost-effective answer to the predictable transit needs for the Region in the foreseeable future.

At the same time, we feel it a duty to keep the door open to later possible use of fixed guideway if future demands warrant it.

The objective of this approach is to retain the flexibility needed in a growing transportation system and to establish a firm direction within which long-term public and private investment and legislative, financial and management decisions can be made.

That is the essence of this report.

ARTHUR ASEL

ROBERT R. DAVIS

Co-Chairmen,
Total Transportation Policy Committee

CHAPTER I

DEVELOPING THE PLAN

REGIONAL GOALS

As the agency responsible for coordinating planning in the Kansas City Metropolitan Region (KCMR), MARC has played a major and continuing role in the development of a long range transportation plan which includes both public transportation and highways. The Council's responsibilities include identification of transportation goals for the Region and evaluation of plans to fulfill these goals.

The cooperative effort between public agencies on the local, state and federal level as well as input from the public at large are essential ingredients to the plan development.

The process of finding the most appropriate transportation plan for the KCMR is of necessity, a complex one. The search for that elusive balance between public and private transportation involves consideration of many factors relating to present and future travel patterns, economic trends, shifts in land use, energy issues, and the key problem of maximizing mobility for the people and commerce of the Region. In view of the limitations of resources and the uncertainties of the future, it is essential that the probable impact of alternative plans be fully explored. In May of 1973 the MARC Board adopted a series of regional goals, one section of which related to public transportation. These goals are:

REGIONAL GOALS — TRANSIT

ADOPTED BY MARC MAY 29, 1973

General Goal

- Obtain an efficient transit network to serve the people in the Kansas City Region.

Specific Goals

1. Maintain a single agency with authority to act.
2. Continue evaluation and utilize where possible new developments in transportation technology.
3. Insure adequate funding of mass transit.
4. Relate transit operations to the overall community development so as to enhance the environmental, sociological and aesthetic values.
5. Encourage the provision of a transit system to serve existing and anticipated urban development with special emphasis on disadvantaged areas.
6. Encourage legislation for the support of transit construction and operation costs.
7. Encourage the development of and support the need for high speed service between points of heavy user demands.

The Rapid Transit Feasibility Study initiated by MARC in 1972 in cooperation with many other agencies had as its objective the development of a long range transit plan which would relate specifically to Goals #2, 4, 5, and 7. In addition, as part of the study, Goals #3 and 6 are being investigated as they deal with the means of funding an improved transit system and the necessary legislation required to implement such a system. The first Goal is being addressed by a specific Committee of MARC which is in the process of defining the powers and responsibilities of the operating agency with respect to implementation of the long range plan. Thus, all of the transit goals designated by MARC are being addressed as part of the Transit Feasibility Study.

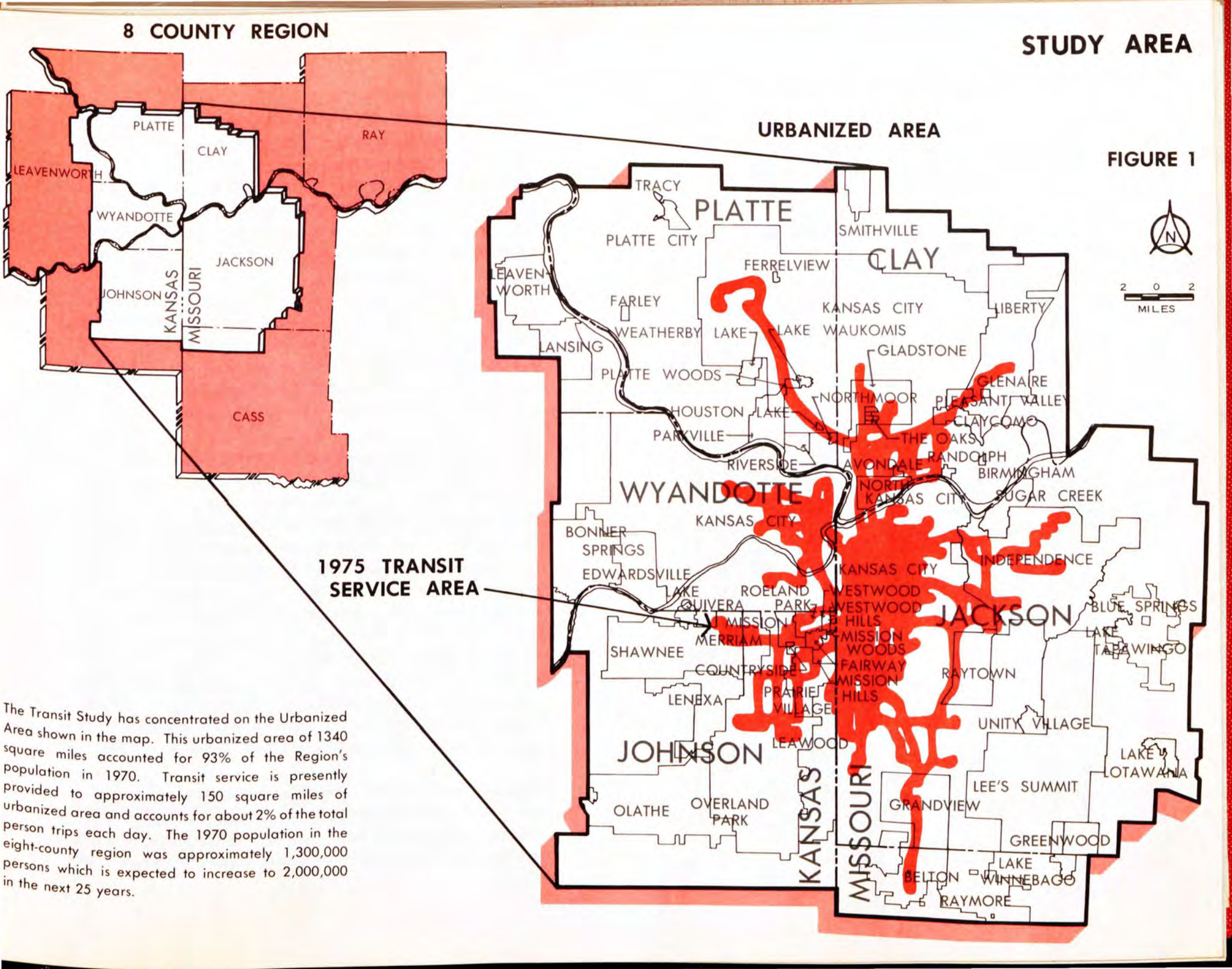
SCOPE OF THIS REPORT

In order to provide MARC, its staff, the elected officials of the Region and other participating agencies with the information necessary to make valid decisions in the process of selecting a long range transit plan, this report is presented at the conclusion of the Rapid Transit Feasibility Study. A previous report, entitled The Interim Report, was completed and distributed in December of 1974 and reviewed the various alternative systems which had been tested earlier in the study and, based on these investigations, suggested a Provisional Plan. As a result of reviews with regional agencies and public meetings, the Consultants were authorized to refine the Provisional Plan. The Provisional Plan proposes basically a regional bus system to serve all of the urbanized area with two express service options in two major corridors of the most densely developed central part of the Region. One option would utilize local and express buses on preferential and exclusive bus lanes where appropriate in these corridors, and the other would consist of a 24 mile fixed guideway system along the same corridors.

This report summarizes the evaluations of these options and merges both systems and their sub-systems into a single integrated Regional Long Range Public Transportation Plan. Moreover, it identifies procedures to be followed in staging and financing the plan and outlines the steps necessary for adoption and implementation. The report will be distributed to elected officials, agency staffs, civic groups, and the public at large in order to seek their comments and suggestions prior to final Plan adoption. It is thus designated as a draft report in order to provide the opportunity for this review.

THE KCMR

Figure 1 shows the 8 county Kansas City Metropolitan Region in Missouri and Kansas represented by MARC. The Transit Feasibility Study has concentrated on the area expected to be urbanized which is also shown in Figure 1. This eight-county region consisting of 3,800 square miles and 110 municipalities on both sides of the State Line ranked in 1970 as the 25th largest metropolitan area in the United States in terms of population. The urbanized area comprises 1,340 square miles and contained 93% of the Region's population in 1970.



The Transit Study has concentrated on the Urbanized Area shown in the map. This urbanized area of 1340 square miles accounted for 93% of the Region's population in 1970. Transit service is presently provided to approximately 150 square miles of urbanized area and accounts for about 2% of the total person trips each day. The 1970 population in the eight-county region was approximately 1,300,000 persons which is expected to increase to 2,000,000 in the next 25 years.

FIGURE 2
POPULATION GROWTH
BY COUNTY

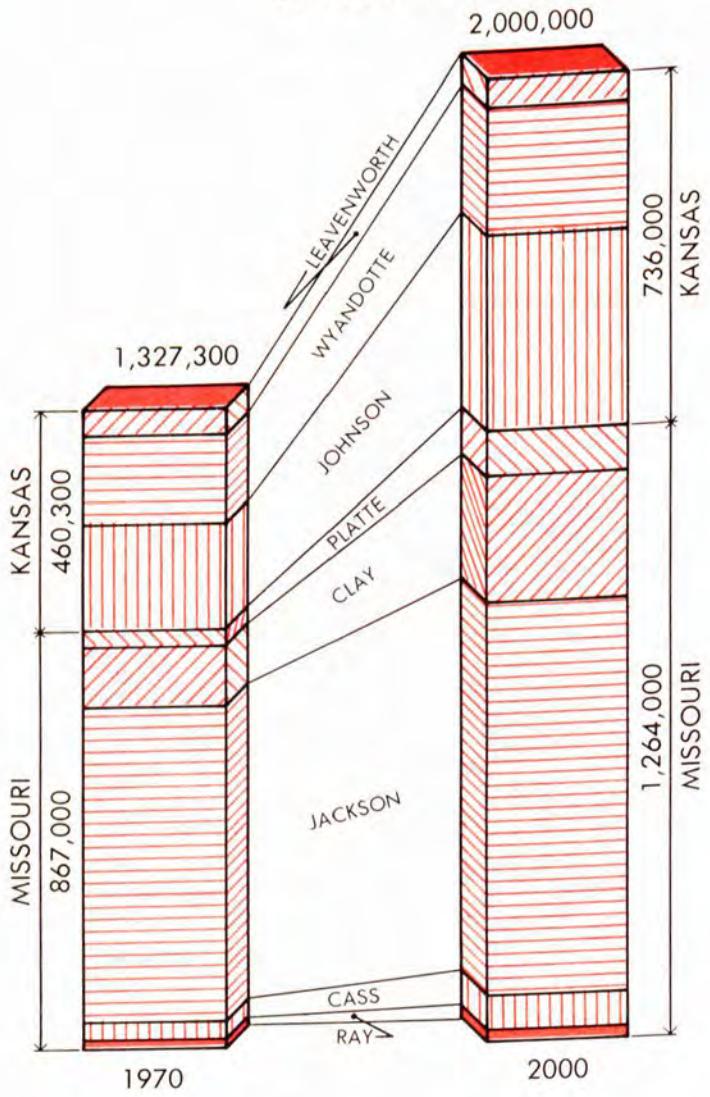


Figure 2 in the adjoining column shows the distribution by county and by state of the 1970 population and the forecasted distribution for the target year of 2000. The 1970 U.S. Census indicated that the Region had a population of approximately 1,300,000. Forecasts developed through MARC and other planning agencies here suggest that the area might grow to a population of approximately 2 million people by the year 2000.

During the post-war period there has been a tremendous amount of movement within the metropolitan area as more people sought the advantages of suburban living. This has caused large growth on both sides of the State Line in the less developed areas outside the central core.

In addition, there has been considerable in-migration from other areas, including rural areas, but during the past five years this has slowed down considerably. In fact, since 1970 population growth here has been less than 2.5 percent. The tendency towards low density levels of development in the fringe areas has created problems of providing new streets and highways, municipal services and, of course, transportation. The changes in disbribution of resident population throughout the Region has also produced a similar spreading out of employment. Figure 3 shows the distribution of employment by county for the year 1970 and the forecast year 2000. In 1970 there were approximately 567,000 jobs in the KCMR which are expected to grow by almost 2/3's to 940,000 jobs by the year 2000.

The distribution indicates growth in the suburban counties at a more rapid rate than in the central core of the Region. If this occurs, the spreading out of job locations coupled with the resident population shift is expected to create more problems

in providing highway and public transportation to serve the Region.

These forecasts of population and employment will be reviewed with MARC and the other planning agencies periodically. The changing pattern of in-migration, the birth rate, and other factors are, of course, speculative but provide a framework for long range planning which should be subject to revisions based on a review of population and employment distributions throughout the Region.

PRESENT TRANSIT SERVICE

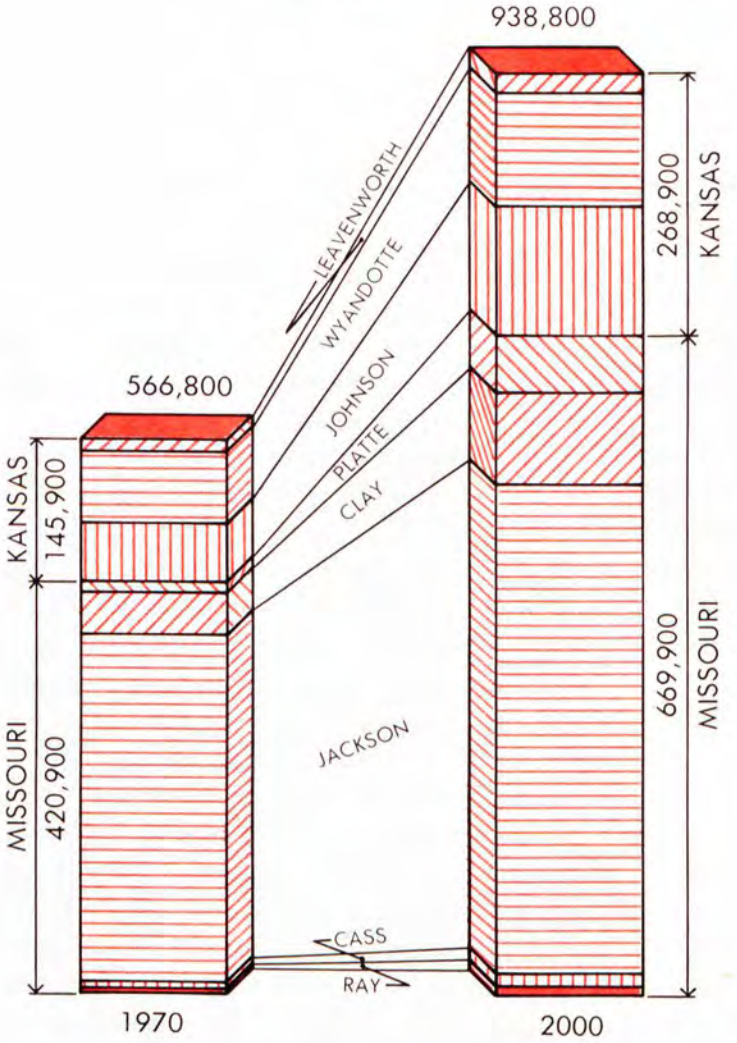
Public transportation is presently provided by the Kansas City Area Transportation Authority (ATA) which was organized in 1966 under a bi-state agreement between Kansas and Missouri. The ATA has the responsibility of planning and operating transit service throughout seven counties of MARC's eight-county Region; rural Ray County, Missouri is excluded. The area presently served by ATA is shown shaded on Figure 1 and covers approximately 150 square miles.

The ATA is operated under a ten-man board appointed by the Governors of the two States with five board members from each State. At the present time, the Authority operates slightly over 300 buses and last year carried 17 million revenue passengers. While the service has been increased gradually since the establishment of the ATA, it still only provides for slightly more than 2% of the total person trips in the Kansas City Metropolitan Region.

FIGURE 3

EMPLOYMENT GROWTH

BY COUNTY



During the past five years there has been a modest increase in the number of passengers carried, but due to increased operating costs and the unique characteristics of public transit service, the ATA in 1974 incurred a deficit of $6.4 million. During 1974's gasoline shortage, ridership on the ATA system increased approximately 9% but declined after the passing of the shortage to its former level.

THE REGIONAL HIGHWAY SYSTEM

Through sound planning and major investments, the Kansas City Metropolitan Region has attained a high standard highway and arterial street system consisting of Interstate freeways, urban expressways, thoroughfares and parkways complemented by a comprehensive network of secondary and minor streets. While there are points of congestion, particularly during peak hours on certain major links, the Region enjoys a lower level of congestion than most metropolitan areas in the United States of comparable size.

In order to develop the Long Range Transit Plan, it was necessary to establish a long range regional highway system which would both compete with and accommodate much of the public transportation. MARC, through its participating agencies, developed what was designated as the Existing and Committed Highway Network (E+C) which is shown in Figure 4. A comparison of the major links in both the 1970 and the E+C networks are shown in Table 1. It is estimated that this network would require an additional investment of $1.5 billion to complete at 1975 cost levels. The network includes major projects which are presently incomplete but committed as part of the highway planning program.

TABLE 1

KCMR HIGHWAY SYSTEM

Classification	1970 Network Mileage	E+C Network Mileage
Freeways	168	314
Expressways	39	100
Principal Arterials	243	765
Minor Arterials & Collectors	856	610
	1,306	1,789

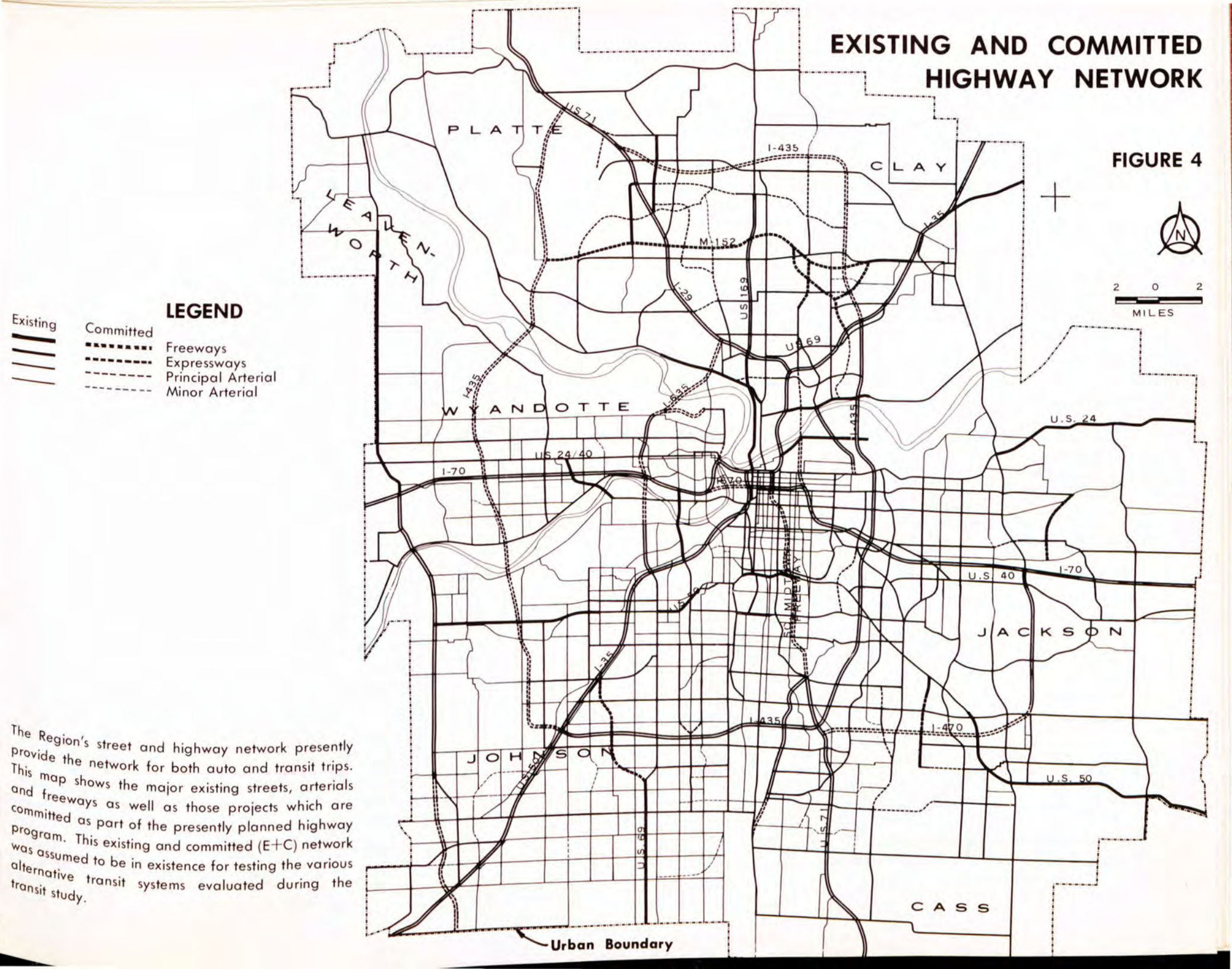
As part of the total Transportation Plan for the Region, MARC will be developing a year 2000 highway network to complement the Long Range Transit Plan and to serve the anticipated needs of the Region. Various deficiencies found in testing the different transit systems were identified earlier in the study and these highway deficiencies will be analyzed to determine modifications to the E+C highway network in developing the highway system for the year 2000.

LAND USE IN THE REGION

In order to assess the impact of different patterns of growth in the Region, MARC, with the cooperation of the other planning agencies, developed two different land use plans. Both of these plans assume the same number of

EXISTING AND COMMITTED HIGHWAY NETWORK

FIGURE 4



The Region's street and highway network presently provide the network for both auto and transit trips. This map shows the major existing streets, arterials and freeways as well as those projects which are committed as part of the presently planned highway program. This existing and committed (E+C) network was assumed to be in existence for testing the various alternative transit systems evaluated during the transit study.

residents and jobs for the year 2000 but somewhat different patterns of growth.

The first plan, Plan A, represents primarily a continuation of past land development trends towards decentralization from the central core of the Region with the major growth occurring in the peripheral areas. The central core is a 50 square mile area bounded by Armour Road on the North, 55th Street on the South, 18th Street in Kansas City, Kansas on the West, and Prospect Avenue on the East.

The second, Plan B, assumes that the central core of the area would, in general, retain its present proportional share of employment and population, that some future growth would be attracted to several high intensity corridors, and that the peripheral area would receive correspondingly less development. Realization of the development pattern for land use Plan B would require a high standard regional public transportation system accompanied by aggressive development efforts in the central core of the area and in the key corridors. During the test phase of the study, it was found that transit systems for Plan B would attract approximately 15% more riders, a definite difference but not significant enough to affect the general type of system required. As the planning process continues, consideration will be given to modifying these land use plans to make them compatible with the Regional Transportation Plan to be selected.

STUDY PROGRAM

The Transit Feasibility Study was undertaken in three major phases and this report summarizes the latter part of Phase III. The first Phase dealt with the collection of data and the development of forecasts as well as the procedures to be followed in the balance of the study. The second Phase tested alternative transit systems for Land Use Plan A while the third Phase tested additional systems for Land Use Plan B, the evaluation of all of these tests, and the selection and refinement of the Provisional Plan.

This work has consumed almost three years of effort on the part of MARC, the cooperating agencies, and the transit consultant. From all this effort will come a long range transportation plan including both the transit and highway elements to be adopted by the Region to fulfill the goals mentioned above.

COMMUNITY INVOLVEMENT

Because of the importance of transportation to all elements of the community, MARC has undertaken a continuing program to provide a dialogue between the planning agencies and the public. These have covered a variety of activities including over 150 presentations to civic groups and neighborhood associations, a series of area meetings held throughout the Region in November and December of 1974 to present and get comment on the Provisional Plan, various publications prepared by MARC and others to keep the public as fully informed as possible, and numerous written and oral presentations in the press or radio and television. Moreover, systematic public attitude surveys were conducted periodically to test public response to transit in general and the specific proposals.

The effectiveness of this program becomes more evident when more definitive information and impacts are available. It is expected that this Report will be distributed to various community organizations and public agencies before a decision is made on adopting a Long Range Transportation Plan.

ALTERNATIVE TRANSIT SYSTEMS

The December, 1974 Interim Report summarized the transit systems which had been tested and the results of these evaluations. An on-going part of the transit study has been a continuing review of transit technology, both in this country and abroad. During the past ten or fifteen years, there has been an increase in the level of research and development on various types of transit systems as well as up-dating and modernizing of the so-called standard technologies. The photographs on the adjacent pages show some of these systems which were considered as part of the evaluation procedures during the study. More specific data on the characteristics of the systems are available in a number of Technical Memoranda prepared as part of the Study. These are listed in Appendix A.

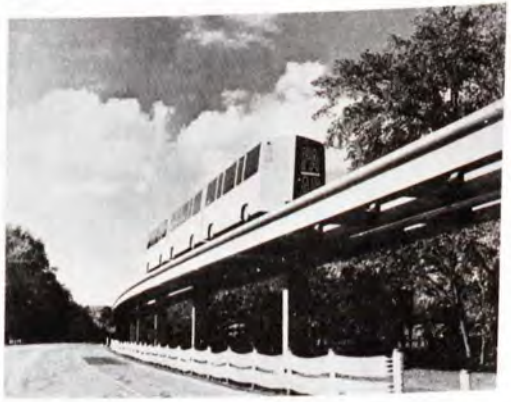
The procedure utilized in testing the alternative systems involved all of the major steps of developing a route configuration, determining the characteristics of the transit system, estimating ridership at the year 2000 level, and the development of estimates of capital cost, revenues, and operating costs for each system. These systems were designated as Test Systems #105 through #109. In addition, the general level of impact which might be produced by each system was identified and the results of all of these investigations compared with the results of the alternative systems.

Buses on Exclusive Busway

U.S. Standard Light Rail Vehicle

Rail Rapid Transit

Commuter Railroad Train



Westinghouse Skybus

Dual Mode Vehicle

CONCLUSIONS FROM EVALUATION

As a result of the evaluation, certain conclusions were drawn and summarized in the Interim Report. These are presented below:

1. In view of the fact that the existing railroad lines do not serve the major concentrations of population and in the absence of even the slightest interest on the part of the railroads and the lack of any legal precedent which would indicate that the railroads could be forced to provide at least trackage rights, the commuter railroad system should not be considered as a regional system although one line (the Frisco line along I-35) might be pursued further if transit demand in Johnson County increases significantly.

2. An extensive, fully grade separated, high capacity, rail rapid transit system such as those tested in Systems 105, 107 and 109 does not appear to justify the high capital cost ($1.4 to $1.7 billion at current cost levels) considering the fact that it would be expected to attract ridership that represents only 25% of its capacity at the heaviest load point in the year 2000.

3. A comprehensive regional express and local bus system without a rapid transit element could satisfy transit demand based on the year 2000 forecasts for Plan A or Plan B, assuming that there will be no significant change in the availability of the private automobile and that the Region's highways will continue to operate generally under free-flowing conditions. It is recognized that such a system would operate at a lower level of service for public transportation than is theoretically attainable.

4. A better solution, both from a standpoint of passenger service and in the light of the stated policy of providing alternatives in transportation, would be the incorporating of a rapid transit element in the otherwise all bus transit system in mixed traffic. The rapid transit element for the Kansas City region could consist of exclusive busways in the most congested corridors, or if the community and the Federal Government so decides could consist of a fixed guideway element.

5. The rapid transit element, be it bus or fixed guideway, would be more adaptable to operating effectively in the more densely developed areas of the region, particularly the central business district of Kansas City, Missouri.

   Undoubtedly, there are advantages to a fixed guideway rapid transit in this regard as the accommodation of buses underground poses technical problems that are not as readily resolved. Yet, without question, both solutions are feasible.

   If a fixed guideway element is given consideration consistent with the Region's needs, reasonable speeds and somewhat lower capital costs, it is reasonable to assume that the light rail vehicle or the tram would offer a better solution than the high capacity rail rapid transit systems now in operation in many of the larger metropolitan areas of the world.

6. In the course of the studies, it became apparent that the choice of land use plans is less significant than had originally been assumed. Land Use Plan B, despite its higher densities, produced only 10 to 15 percent more ridership for the year 2000 than Land Use Plan A on the tested transit systems. While a land use plan should be agreed upon by the local governments collaborating on this MARC sponsored program, neither planning concept underlying Plan A or Plan B would substantially alter the conclusions drawn from the studies to date.

Regarding the South Midtown Freeway, alternative transit systems were tested both with and without this eight-lane facility. It was found that the deletion of the Freeway from the test highway network without the substitution of another highway facility did not significantly affect estimated transit ridership on the fixed guideway in that corridor. In addition, elimination of the Freeway would overload parallel arterials to an undesirable level.

THE PROVISIONAL PLAN

The Provisional Long Range Transit Plan would provide a high level of service to all of the major areas expected to be urbanized within the planning period. It is a comprehensive plan which includes many elements of transit service. The Plan is basically an all bus system except in the 24 miles of central corridors which were identified as being most in need of special transit facilities due to the relatively higher level of development, employment and population, and the anticipated level of street and highway congestion.

After review with the various agencies and the public meetings the Provisional Transit Plan was modified and resulted in the plan presented in the following chapter. The changes were not significant but did reflect the interests of both the public and professionals throughout the area regarding certain aspects of the service to be provided.

CHAPTER II

THE LONG RANGE TRANSIT PLAN

This Chapter of the report will describe the major elements of the Long Range Transit Plan, the services which would be included, the expected ridership, and the revenues and operating costs which might be generated. In addition, the costs of implementing the plan at current cost levels (2nd Quarter 1975) are summarized.

The plan has been developed to provide a high level of transit service to the urbanized part of the Region. It is essentially one system which would complement the Region's highway network as it is expected to develop over the next 25 years and beyond. During the refinement of the plan, two options were evaluated. An understanding of these options is essential to the evolution of a single Long Range Transit Plan.

Subsequent Chapters will review the benefits and impacts of implementing the plan and the legislative, financial, and institutional decisions which must be made if the KCMR is to have a high standard, comprehensive public transportation system. It is therefore necessary to first identify the system which is envisioned and explain what it is, where it goes, and how it would operate.

The Long Range Plan is presented in several sub-sections which include the following:

- The Plan - What type of transit system is proposed for the Region and how will it serve the major demands?
- Options - What are the options included in the Plan and what are the characteristics of each?
- Service Areas - What transit services would be offered to the major parts of the Region and how would they provide for the principal demands for local and regional travel?
- Patronage - How many riders might be attracted to the transit system, and what would be the distribution of this ridership?
- Revenues - Based on assumed fare structures, including the present fare, what annual revenues would be generated by the estimated ridership?
- Operating Cost - With the system in full operation, what would be the annual operating cost of the Long Range Plan at current cost levels?
- Capital Costs - What would it cost to construct and equip the Long Range Transit Plan at current cost levels?

THE PLAN

Figure 5 on the opposite page shows the Long Range Plan within the urbanized area. This map illustrates the major elements included in the plan. These and other aspects will be described in more detail later on in this Chapter.

The Plan was developed after analyzing the results of the six test systems summarized in the Interim Report as well as discussions of the Provisional Plan with planning agencies and the public. Some modifications were made to the Provisional Plan as a result of these discussions and more detailed analysis was undertaken as part of the refinement process. The justification for specific transit improvements will be presented as the Plan is described, but beyond the statistical evaluation it is the goals of the Region as reflected in policies established by the elected officials which will determine what kind of transit system the KCMR will have.

The system envisioned by the Plan would provide many times more transit service than is presently offered in the KCMR. In fact, it would include four times the present route miles of service and provide transit service within ¼ mile of 75 percent of the Region's population in the year 2000. In addition, 78 percent of the anticipated job locations would be within walking distance of transit service. These facts provide some measure of the improved service to be offered to the Region's citizens as the plan is implemented.

It is essential that a good transit system makes optimum use of the Region's resources in providing transportation to its citizens. The public transportation system should offer a viable alternative to the automobile. It should be one that provides a convenient and dependable service for those who are transit dependent, because an automobile is not within their means or because they are too young, too old or physically handicapped. It also should be one that is attractive to the choice user due to the reduced investments in cost and time in making essential every day trips.

There are several major elements in the proposed system, which when combined, will serve many needs. Table 2 below summarizes the facilities necessary to serve these desires.

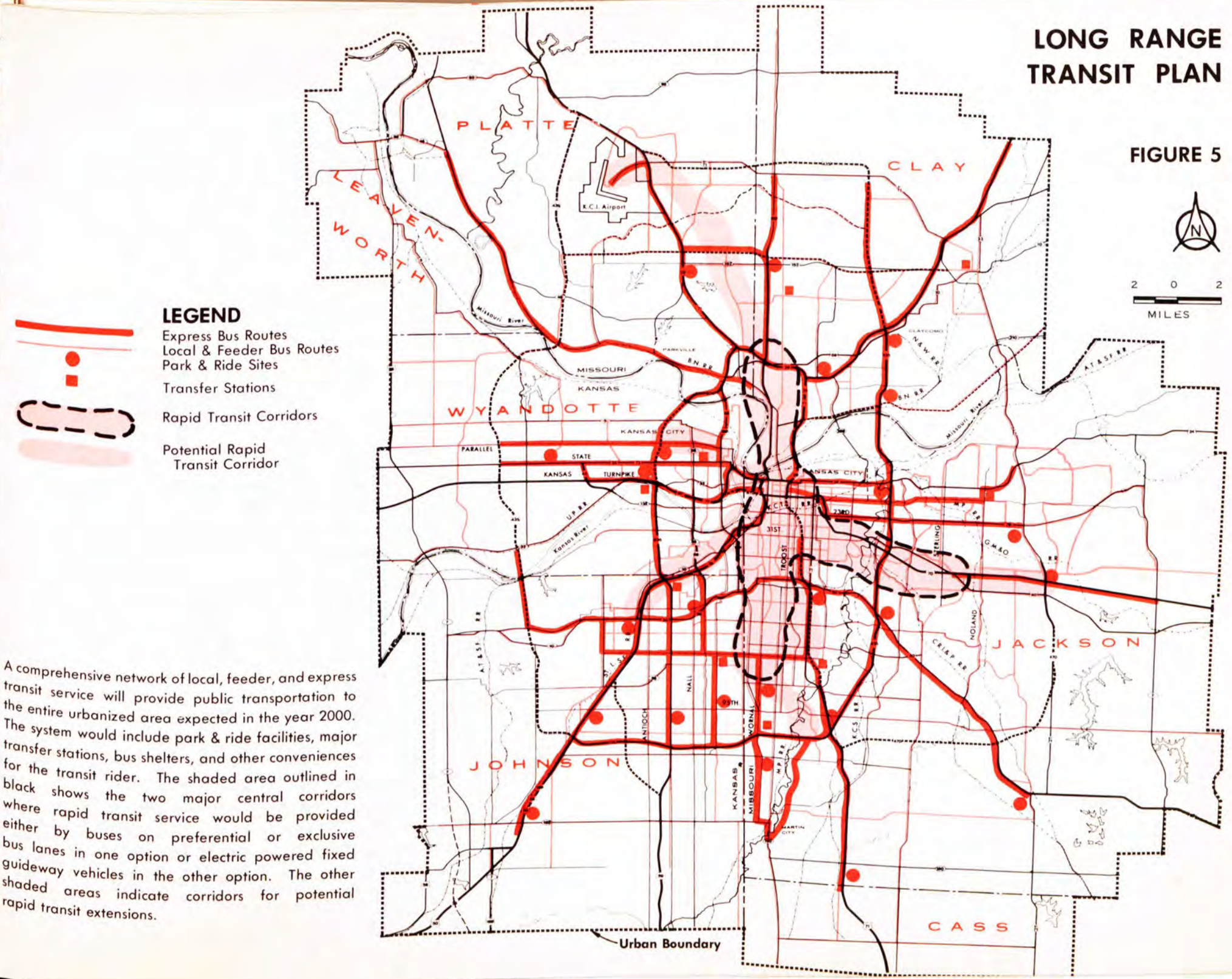
TABLE 2

MAJOR ELEMENTS OF THE LONG RANGE PLAN

	All Bus	Bus & Fixed Guideway
Local Bus Route Miles (Unduplicated)	1,027	1,024
Express Bus Route Miles (Unduplicated)	358	321
Demand Responsive Service Areas	13-15	13-15
Park & Ride Facilities	27	32
Parking Spaces	9,500	12,200
Major Transfer Stations	13	11
Bus Shelters	1,225	1,150
Fixed Guideway Route Miles		24
Fixed Guideway Stations		29
Exclusive Busway Miles	15.7	1.9
Preferential Lane Miles	18.0	6.4

LONG RANGE TRANSIT PLAN

FIGURE 5



A comprehensive network of local, feeder, and express transit service will provide public transportation to the entire urbanized area expected in the year 2000. The system would include park & ride facilities, major transfer stations, bus shelters, and other conveniences for the transit rider. The shaded area outlined in black shows the two major central corridors where rapid transit service would be provided either by buses on preferential or exclusive bus lanes in one option or electric powered fixed guideway vehicles in the other option. The other shaded areas indicate corridors for potential rapid transit extensions.

The major elements of the Long Range Plan include the following:

1. **Neighborhood Service** - A truly comprehensive system must offer service in individual activity areas or neighborhoods. This would be realized by such services as demand responsive or Dial-A-Ride service oriented to specific needs within a defined area. These services are costly but are considered an essential public service which the Region must provide to citizens who need it, i.e. the elderly, the poor, etc. Later on in this Chapter, fifteen candidate areas for this service are discussed.

2. **Local Service** - Local scheduled service is provided over the same routes where express service is provided filling a specific need for the shorter trip and greater accessibility.

3. **Feeder Service** - As a link between the local neighborhood service and the express component of the system, bus service is needed to feed the major express routes. In certain cases, the express buses would act as their own feeders by originating as a local and converting to an express on the major portion of the route. Close coordination is necessary between the feeder and express routes whether they be by bus or fixed guideway to reduce transfer time and increase passenger convenience and comfort.

4. **Express Service** - This element of the regional system would connect the major activity centers as well as the principal residential areas. It might be provided by a fixed guideway element or by express buses either in mixed traffic or using preferential and exclusive lanes. This express service is the most difficult and costly to provide but fills a need in order to make transit as nearly competitive with the travel time of the automobile as is practically possible. It is only justified where a large number of people are making similar trips at the same time and often might be restricted to the peak hours when the demand is the greatest.

5. **Special Bus Lanes** - In order to increase transit speeds to the greatest extent possible, it is desirable to free transit vehicles from highway congestion by providing their own lanes either during peak hours or for their exclusive use. Provision for this is made in the Long Range Plan in several ways. The principal designations are:

   Preferential Bus Lanes - This category includes lanes (usually curb lanes) of major arterials or downtown streets which would be reserved for buses either during peak hours or all day long depending upon bus volumes. It requires a modest investment in signing and striping and must be coordinated with traffic operation considerations. Lanes of freeways can also be designated as preferential lanes, either just for buses or for buses and carpools.

   Exclusive Bus Lanes or Busways - Where bus volumes exceed 80 buses in the peak hour and anticipated auto volumes exceed practical highway capacity exclusive bus lanes or separate busways can be provided and separated from other traffic. These lanes would be in the median of a freeway or on their own right-of-way. Buses would stop at major park & ride and other designated stations providing access and egress along the route.

6. **Park & Ride Facilities** - These facilities provide for transit passengers who wish to drive to bus or fixed guideway stations where a high level of service is available. The Plan includes a network of parking areas at these stations. The stations could be separate facilities owned and operated by the transit agency or be in joint use with a major shopping center parking area. Facilities would include platforms, canopies, shelters, waiting rooms, and may include convenience shopping and joint development. They would also serve as transfer stations.

7. **Major Transfer Stations** - It is inevitable that some transit passengers have to transfer to get to their final destinations. To minimize the inconvenience it is desirable to provide off-street Transfer Stations where a number of bus routes intersect which can be combined with other commercial uses and serve this purpose. The plan provides for a number of possible locations for these facilities in both downtown and suburban areas.

8. **Transit Vehicles** - The Long Range Plan will require a fleet of modern transit vehicles of various types to serve specific needs. These would include the following:

   a) Standard Bus - These would be 45-50 passenger diesel powered (or other if perfected) buses similar to the prototype Transbus recently tested in Kansas City. They would be 40 feet long, air conditioned, equipped with radios for close supervision, and capable of speeds of 55 MPH. Consideration might also be given to the use of double deck or articulated buses to increase capacity and reduce operating costs.

   b) Compact Buses - To provide special services such as dial-a-ride, downtown shuttles and service to activity centers, smaller buses are more appropriate. Various models are on the market varying from 20 to 30 feet long seating from 15 to 25 passengers. They can be equipped with special loading devices for use by the handicapped. Several U.S. cities are now utilizing battery powered electric buses which eliminate pollutant emissions and with substantial reduction in noise levels.

   c) Fixed Guideway Vehicles - The fixed guideway option might utilize the Standard Light Rail Vehicle which consists of an articulated unit approximately 73 feet long seating 68 passengers and powered by an overhead electric supply. They have high acceleration rates and maximum speeds of 60 MPH and can be operated as single units or in two or three-car trains. They also have capability of access from the ground level or from a high level platform.

New Transit Technology - During recent years, there has been an increased amount of research and development in new transit technology. Many of these systems have been adequately tested in revenue operation while others are untested concepts. It would be expected that the available transit technology would be monitored periodically before any major commitment to a particular system is made. The Light Rail system has been used in developing the Long Range Plan as a system with appropriate characteristics for the KCMR. It is not considered as a commitment to any particular vehicle system.

These system elements should be considered building blocks of the total regional system. Each component plays a unique role, and only with well-coordinated planning, efficient operation, and aggressive marketing can transit be attractive to the citizens of the Region.

OPTIONS IN THE MAJOR CORRIDORS

The shaded area in Figure 5 identifies the 24 miles of major corridors which appear to need special treatment for transit service. While these major corridors are not the only ones where highway deficiencies have been identified, they do include those sections of regional corridors which historically have had concentrated development and which in the future are expected to continue as important corridors of travel. These corridors are so situated that truly efficient transit service offering low travel times free of congestion cannot be provided without some special preferential treatment for transit.

The North-South corridor extends from the intersection of Vivion Road, I-29, and U.S. 169 in Kansas City North southward along the Missouri River to the Kansas City, Missouri downtown area, terminating at Waldo. The East-West corridor extends from the Blue Ridge Mall along I-70, adjacent to Independence, to the downtown business district.

There are several unique characteristics to these corridors. They include some of the Region's most important activity centers such as North Kansas City industrial area, the CBD, Crown Center and the adjacent Pershing Square Project, a number of major hospitals, the Country Club Plaza, the Broadway/Westport area, U.M.K.C., the Linclon Redevelopment area, the Sports Complex, and eastern Jackson County.

The criteria used for determining the need in these corridors are presented in subsequent Chapters, but generally they are the result of a combination of the pattern of present and expected travel, the inadequacy of present and proposed highway facilities to handle these travel movements, and the characteristics of the activity centers served. All of the facilities which will be described below are capable of extension into other directions of the Region which include such activity centers as KCI Airport, Wyandotte County, Johnson County and eastern Jackson County as well as many sub-corridors which might require special transit service.

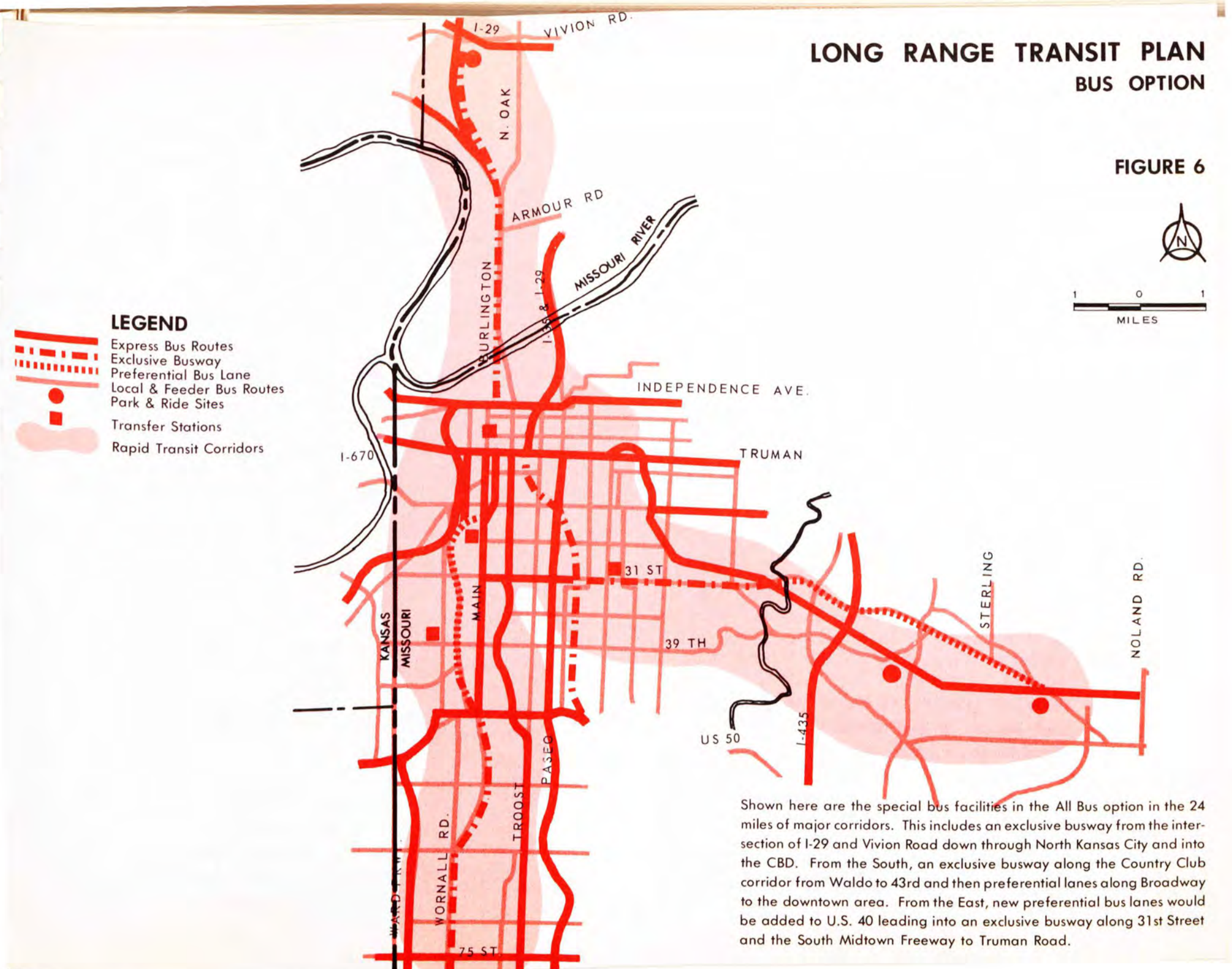
During the development and refinement of the Long Range Plan a special effort was made to locate the exclusive busways and fixed guideway routes on the same alignment so that many segments could be used initially for bus service and later, if a fixed guideway system is implemented, the rights of way would be available and the transit patterns established for the route segments to be converted to carry fixed guideway. This commonality of routes is evident in the description below and by comparing Figures 6 and 7.

BUS OPTION

Figure 6 on the adjacent page indicates the principal special bus facilities proposed as part of the bus option in the 24 miles of major corridors. These special facilities include preferential and exclusive lanes for buses, park & ride facilities, special bus transfer stations and specialized

LONG RANGE TRANSIT PLAN
BUS OPTION

FIGURE 6



Shown here are the special bus facilities in the All Bus option in the 24 miles of major corridors. This includes an exclusive busway from the intersection of I-29 and Vivion Road down through North Kansas City and into the CBD. From the South, an exclusive busway along the Country Club corridor from Waldo to 43rd and then preferential lanes along Broadway to the downtown area. From the East, new preferential bus lanes would be added to U.S. 40 leading into an exclusive busway along 31st Street and the South Midtown Freeway to Truman Road.

signal installation permitting preferential treatment for buses at major intersections.

The special bus facilities within the 24 miles of major corridors might be separated into three major segments:

North - Vivion Road to Downtown Kansas City, Missouri
South - Waldo (75th Street) to Downtown Kansas City, Missouri
East - Blue Ridge Mall to Downtown Kansas City, Missouri

These are described below and further referred to in subsequent sections of this Chapter.

North Corridor - A major park & ride facility would be located adjacent to Vivion Road with capacity for 500 cars and direct access to three major freeways - I-29, U.S. 169 and the Broadway Extension as well as Vivion Road and North Oak. Local and express buses serving KCI, Northland, Gladstone and other communities would serve this terminal and provide direct service to the areas to the South. Transfer facilities would be provided and the terminal can be designed for conversion to fixed guideway and for extension of a busway or fixed guideway north to KCI along the old Interurban right of way.

From this point south, an exclusive busway would be constructed parallel to and in the right of way of the Broadway Extension then through the KC Water Works property to Burlington Road and south on Burlington Road to a new Missouri River bridge terminating at 7th Street between Grand and Walnut. Distribution of the buses in the CBD is discussed later in this Chapter. Major intersections would be grade separated including North Oak/M-9 and Burlington Road/10th Street. Along Burlington the busway would be located along the west side still permitting three automobile travel lanes north and south bound. Major stops could be provided at Armour Road and 14th Street and buses on Armour Road could enter or leave the busway. As an alternate, but at greater cost, the busway could be constructed on an aerial structure in the median of Burlington Road.

South Corridor - The principal bus routes serving the southern corridor would utilize an exclusive busway in the Country Club right of way starting at Waldo (75th Street) and connecting with Nichols Parkway/Broadway in the vicinity of 43rd Street. Major cross streets would be grade separated and some minor streets would cross the busway at grade protected by traffic signals. Stations in this section would be provided at 75th, Gregory, Brookside, 55th, 51st/UMKC and 47th/Country Club Plaza. These stations would provide shelters, access for autos and a modest amount of parking at major stations.

In order to preserve the park-like environment of the Country Club right of way, landscaping and other amenities should be provided. Consideration might be given to staging this busway in two steps by first constructing an at-grade busway from Volker to 75th as part of the first five year program and then as ridership develops constructing the grade separations at major cross streets.

This section of the busway would connect with Nichols Parkway in the vicinity of 43rd Street where, with minor widening of the existing pavement, preferential bus lanes would be established along each curb. These preferential lanes would continue north along Broadway to 31st Street within the present street width. Major stops would be

provided along the route and an off street transfer station constructed in the vicinity of 39th and Broadway to provide for convenient transfer from crosstown bus routes.

North of 31st Street the preferential bus lanes would continue through Penn Valley Park requiring only slight widening in the vicinity of the Wyandotte underpass. These lanes would extend via the Pennway to the 23rd Street Connector proposed as part of the Pershing Square Project. Buses would use this connector to reach Main/Walnut and Grand where preferential lanes could be provided to the CBD.

This routing would provide access to the Union Station area and serve Crown Center and Pershing Square. In the event that the 23rd Street Connector is delayed, buses could use Pershing Road via a connecting street between Pennway and Broadway which would have to be constructed.

East Corridor - East of the Blue Ridge Mall buses would be in mixed traffic along I-70 and major north-south arterials serving eastern Jackson County and connecting with a network of park & ride lots as shown on Figure 5. Additional park & ride facilities would be provided at the Truman Sports Complex with access from Blue Ridge Cutoff.

Figure 6 indicates special bus lanes along U.S. 40 from Sterling Avenue to Van Brunt. This would be accomplished by adding an additional lane in each direction within the present right of way. Use of this lane would be restricted to buses at least during the peak hour operations.

Along the 31st Street corridor between Van Brunt and the proposed South Midtown Freeway, a grade separated busway could be provided by acquiring additional property on the North side of 31st Street. This widening could be done in concert with the improvements to the existing right of way to provide both a major arterial and busway along the 31st Street corridor. While eventually it appears desirable to provide a depressed fully grade separated busway, an earlier stage could include construction of an at-grade busway along 31st Street with the idea that it could be up-graded to a grade separated facility at a later date. The alignment could also provide for construction of a fixed guideway in the future. West of Garfield the buses would be routed via special ramps into a two-lane busway in the median of the proposed South Midtown Freeway. These exclusive bus lanes would be carried north to special exit and entrance ramps at Truman Road where the buses would leave the busway and eventually circulate in the CBD using preferential bus lanes. Provision should be made for extending the busway and eventually fixed guideway in the median of the South Midtown Freeway south of 31st Street, at least as far as Highway 50, and to 75th Street if possible.

All of the bus services in these major corridors would be planned and scheduled to provide convenient transit service to connect all of the major activity centers, residential and employment areas.

FIXED GUIDEWAY OPTION

An option to the all bus system previously described in the same major central corridors would be utilization of an electrically powered fixed guideway network providing, in effect, similar functions to the express buses. While

the fixed guideway component has been proposed as a tram or light rail vehicle, the decision on the actual equipment to be used should only be made after a thorough review of transit technology at the time of commencing final design. The important thing is that any system to be adopted would be at least comparable in speed, capacity, and service.

North-South Corridor - Figure 7 shows the general alignment and major station locations of the fixed guideway component and indicates a fixed guideway route in the north-south corridor from Vivion Road/Highway 169 to 75th Street/Waldo in the Country Club corridor. Over these 14 miles 18 stations would be provided as indicated. The fixed guideway northern terminal would be located in the vicinity of Vivion Road near the intersection of the Broadway Extension, I-29 and U.S. 169. It should be located so that the line could be extended to the North to serve the KCI/I-29 corridor on an alignment generally following the old Interurban streetcar right of way.

A major park & ride and transfer station would be provided at Vivion Road providing good access to local feeder buses originating in other parts of the Northland.

The route would then go South parallel and within the right of way of the Broadway Extension through the KC Water Works Plant and after crossing over the intersection of Highway 9 and North Oak, would be located on an aerial structure in the median of Burlington. The fixed guideway could also be constructed on an at-grade transitway along the west side of Burlington Road at less cost but requiring restricted frontage access to the commercial properties along the west side. Stations would be provided at Armour Road and 14th Street to serve the North Kansas City residential and industrial areas. South of 10th Street the guideway would be carried over the Missouri River on a new structure just west of the ASB Bridge. As in the case of the busway, the transit facilities could be accommodated by a new structure or utilize part of the existing ASB if a new vehicular bridge is constructed.

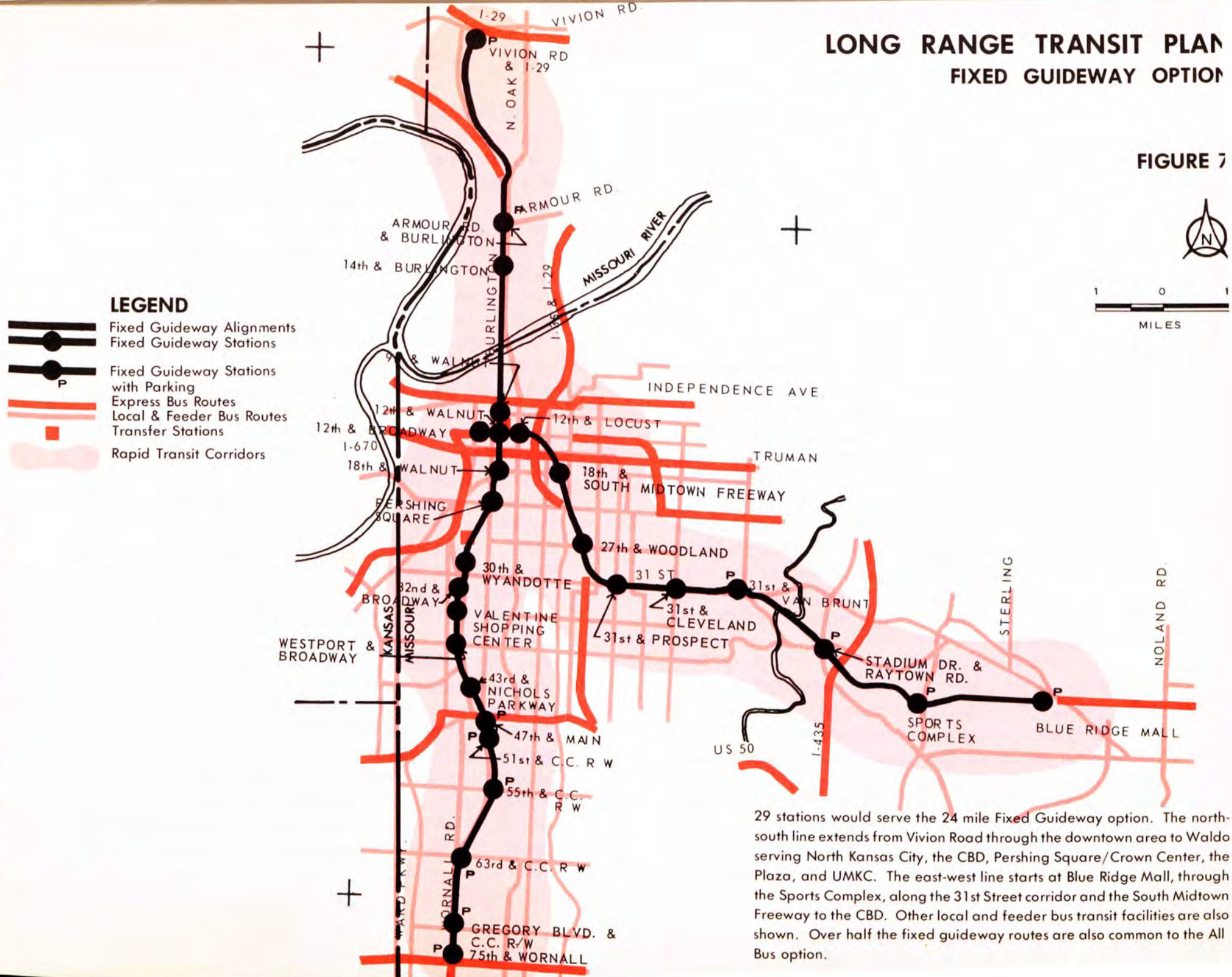
South of the Missouri River the guideway would be carried over the railroad tracks and then into a tunnel along Walnut Street beginning in the vicinity of 2nd Street. The line could be constructed as a bored tunnel, based on preliminary engineering investigations and continue in tunnel through the CBD. Stations would be provided at 9th Street and 12th Street, the latter being a joint two-level station with the east-west subway line above it. Convenient access could be provided to major buildings in the downtown area along the Walnut Street corridor. A service connection for fixed guideway vehicles would be provided between the north-south and east-west lines. This double station would be the focal point of the fixed guideway network and is expected to be utilized by over 40,000 passengers per day in the year 2000.

At the south edge of the CBD the fixed guideway would leave the subway under Walnut Street and then be carried over the Crosstown Freeway on structure continuing along the west side of Walnut Street in an open cut with most of the major cross streets remaining open to traffic.

Additional stations would be provided at 18th Street and at Union Station to serve the Pershing Square/Crown Center project as well as the terminal. Under the Kansas City Terminal Railroad tracks an existing baggage tunnel could be used which would also have room to provide for station facilities. Union Station is expected to be a major

LONG RANGE TRANSIT PLAN
FIXED GUIDEWAY OPTION

FIGURE 7



29 stations would serve the 24 mile Fixed Guideway option. The north-south line extends from Vivion Road through the downtown area to Waldo serving North Kansas City, the CBD, Pershing Square/Crown Center, the Plaza, and UMKC. The east-west line starts at Blue Ridge Mall, through the Sports Complex, along the 31st Street corridor and the South Midtown Freeway to the CBD. Other local and feeder bus transit facilities are also shown. Over half the fixed guideway routes are also common to the All Bus option.

activity center with the proposed Pershing Square development, Crown Center, museum and intercity Amtrak service.

South of Pershing Road, the fixed guideway would be located in a bored tunnel under Memorial Park gradually rising to the higher elevations of 31st Street. A station could be provided to serve the St. Mary's/Trinity Hospital complex north of 31st Street.

To serve the Broadway/Westport corridor the fixed guideway would be located in subway under Broadway. Consideration was given to locating the fixed guideway in an open cut parallel to and west of Broadway. The subway alignment would substantially eliminate right-of-way acquisition, but would be considerably more expensive and could be expected to cost approximately $44 million more than the open cut alignment based on 1975 prices. In view of the substantial reduction in housing and business dislocation resulting from the subway alignment, it appears to be the most appropriate location. Stations would be provided in the vicinity of 32nd Street, Valentine Road, and Westport Road, all providing convenient access to this high density area.

In the vicinity of 43rd Street, the existing Country Club right of way could be utilized from that point south to Waldo. Grade separations would be provided at major cross streets but some minor streets could be permitted to cross the guideway at grade. Stations would be located in the vicinity of 43rd Street to serve the St. Luke's Hospital complex, at 47th Street to serve the Country Club Plaza, 51st Street adjacent to UMKC, 55th Street, 63rd/Brookside, Gregory Boulevard and Waldo. A major parking structure for up to 800 cars would be constructed within the right of way adjacent to the Waldo station. Every effort should be made to preserve the park-like environment of the Country Club right of way which is a great asset to this corridor. A limited amount of parking facilities would be provided at the major intermediate stations within the Country Club right of way. The line could be extended at modest cost below 75th Street following the Country Club line right of way in the vicinity of 87th Street and Holmes. A single track would extend south of 75th Street along the Country Club right of way to provide access to the maintenance shop and storage facility east of the Missouri Pacific Railroad near 87th Street.

East-West Corridor - The eastern terminus of this line would be in the vicinity of Sterling Avenue and the Blue Ridge Mall. Local and express bus service could provide service to the terminal along the rapidly developing I-70 corridor.

From the Blue Ridge Mall station the guideway would be located within and on the south side of the I-70 right of way then pass through the Truman Sports Complex where a major park & ride station could be provided just west of Blue Ridge Cutoff. An additional station, utilized only during sports events would be provided between the two stadia. It is proposed that the line be carried through the Sports Complex parking areas at grade which would require only a modest re-arrangement of existing roadways of the Sports Complex parking areas. This arrangement would provide a very desirable combination for park & ride for the commuter users as well as convenient access to sports activities for fans throughout the metropolitan region.

The line would then bend south to the right of way of the Rock Island Railroad continuing in a northwesterly direction through the Leeds industrial area where a station would be provided to serve these major industries. After crossing I-435, the alignment would turn east towards the intersection of 31st Street and Van Brunt where another station would be provided. From Van Brunt, the guideway would be located in an open cut along the north side of 31st Street with stations at Cleveland and Prospect . West of Euclid it would turn north within the right of way of the proposed South Midtown Freeway with a station at 27th Street serving the proposed Lincoln Redevelopment project and then continue in the South Midtown Freeway median north to 12th Street and then west along 12th in subway. A station would also be provided at 18th Street. Stations in the CBD would be provided at Oak Street to serve City, Federal, and County office buildings, and at Walnut which serves as a joint station with the north-south line. The line would continue in cut-and-cover subway under 12th Street and terminates near Broadway at the H. Roe Bartle Convention Center. Convenient access could be provided from this station to the Municipal Auditorium, Convention Center, and the major hotels in the CBD.

The east-west line includes a total of 11 stations. An alternate alignment from 31st Street to the CBD developed for the Provisional Plan would be to construct the fixed guideway in the right of way of the South Midtown Freeway from 31st Street to 22nd Street and then along the Paseo to 12th Street. It would reduce costs by approximately $11 million but would increase the right-of-way taking, reduce common alignment with the busway location described in the foregoing section, and make the future extension south more difficult.

DEMAND RESPONSIVE AND LOCAL AREA SERVICES

Throughout the KCMR, there are many areas which cannot be economically served by line-haul transit services. Moreover, line-haul services have not always satisfied mobility requirements of necessity transit users such as the aged, the young, the poor and the physically handicapped. One means of satisfying these service demands is through the innovative alternative of demand responsive transportation.

Operationally, demand responsive transit utilizes a fleet of relatively small vehicles traversing a flexible routing pattern. Communications between the user of the system and the operator allow demand responsive services to be provided on either a prearranged (Dial-A-Ride) or a demand actuated basis. Experience in many other cities testing demand responsive transportation indicates that the degree of operational sophistication directly affects the size of the system service area, service patterns, management requirements and capital and operating costs. It must be strongly emphasized that in concept demand responsive transportation offers a very attractive option; however, the operational and financial considerations can detract significantly from its effectiveness.

Potential demand responsive service areas have been identified throughout the Region. The selection of these candidate areas, shown on Figure 8 has been based upon the socioeconomic data given in Table 3 and on travel desires.

TABLE 3

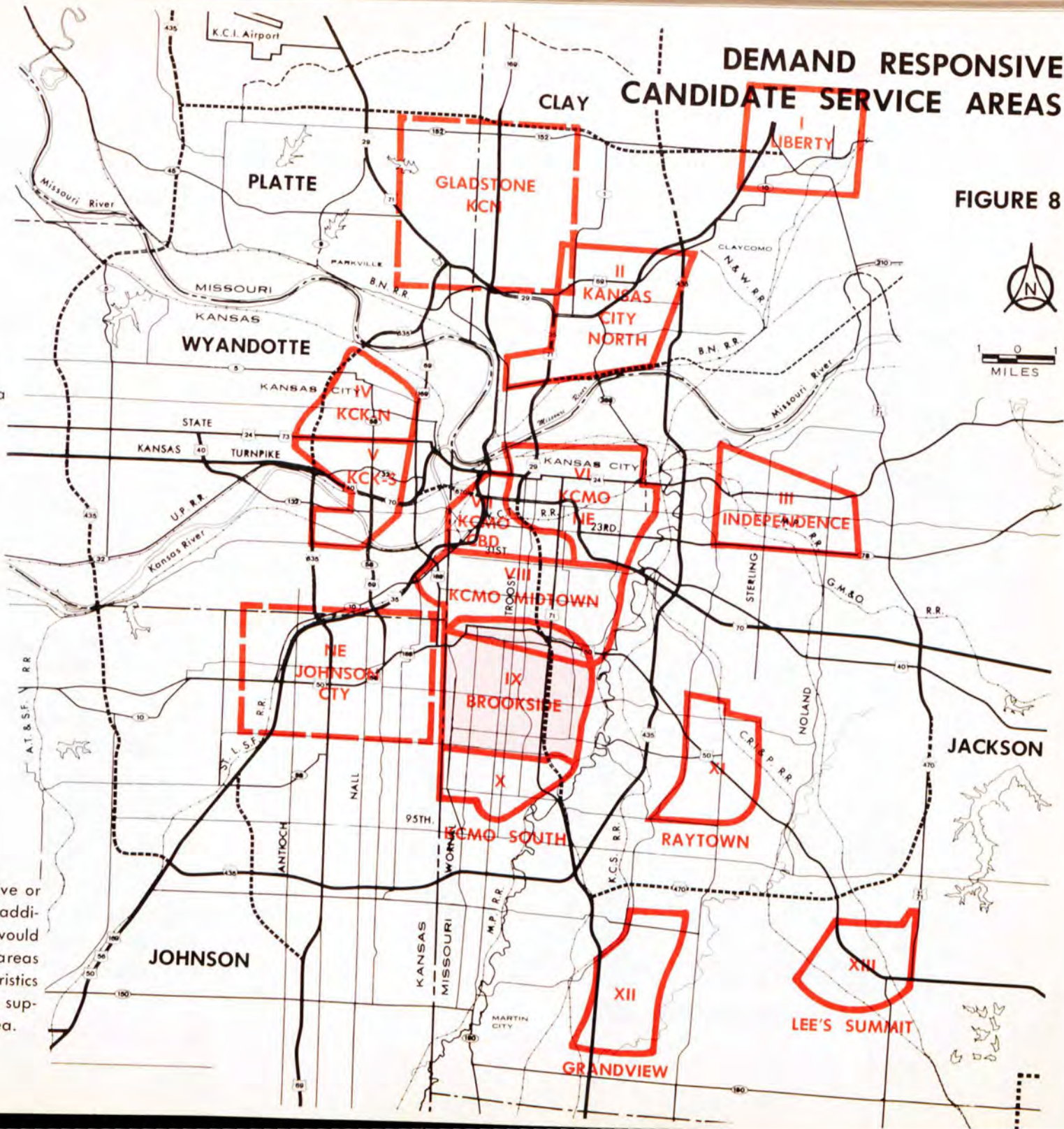
PRIORITY SERVICE AREAS & CHARACTERISTICS DEMAND RESPONSIVE SYSTEMS

Service Area	Total Population	Elderly Population	Elderly Pop. Density/mi²	Autoless Households	Families Below Poverty Level
I — Liberty	17,137	1,636	182	471	209
II — K. C., Mo. North	18,316	2,667	267	486	313
III — Independence	37,974	7,724	772	2,173	888
IV — Kansas City	34,971	5,991	749	2,960	1,590
V — Kansas City Kansas - North	36,765	6,997	1,166	3,064	1,034
VI — K. C., Mo. Kansas - South	73,757	9,973	1,108	8,920	2,701
VII — K. C., Mo. Northeast	41,806	9,447	1,181	8,462	2,155
VIII — K. C., Mo. CBD	97,567	18,489	1,541	13,631	3,157
IX — K. C., Mo. Midtown	76,436	17,018	1,418	5,320	1,134
X — K. C., Mo. Brookside	33,702	7,989	1,141	1,552	458
XI — Raytown South	25,965	2,401	343	295	165
XII — Grandview	24,211	1,127	125	191	244
XIII — Lee's Summit	11,940	1,148	191	207	148

Source: 1970 Census, MARC.

DEMAND RESPONSIVE CANDIDATE SERVICE AREAS

FIGURE 8

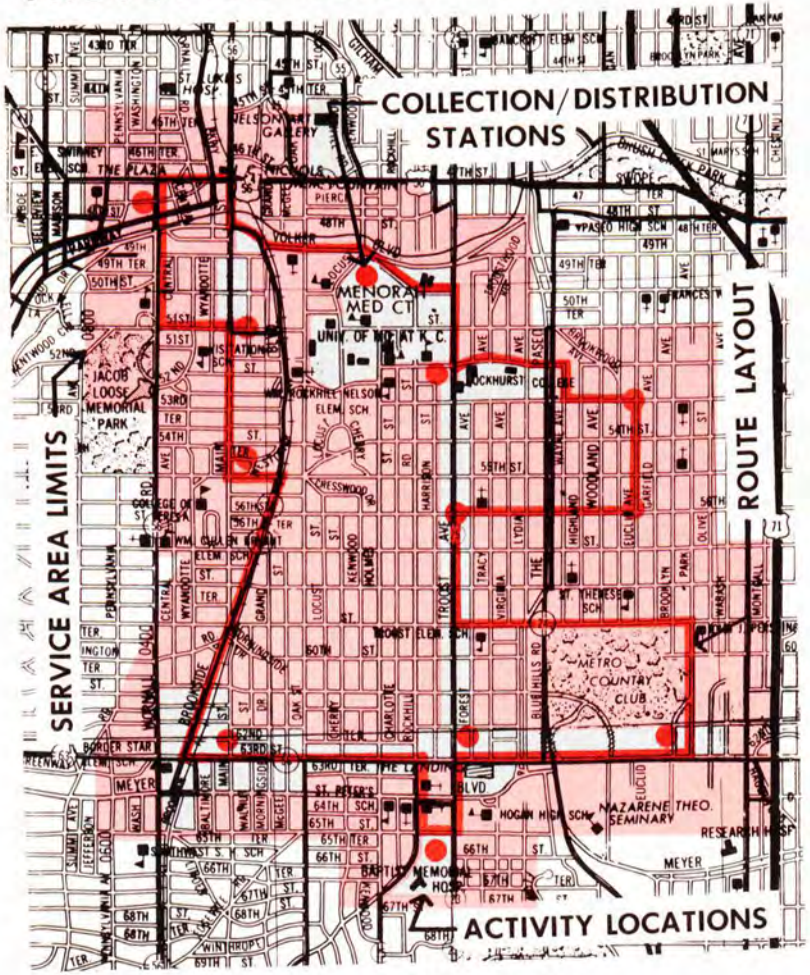


13 possible service areas for demand responsive or Dial-A-Ride service are shown on the map. In addition, 2 other optional service areas which would also be given consideration are shown. These areas are unique by their density and travel characteristics and would be provided with special service to supplement the scheduled transit routes in each area.

To illustrate the concept of demand responsive transportation, one prototype system was developed using a portion of service area - IX, Brookside. In Figure 9 the major activity centers most likely to encourage demand

FIGURE 9

PROTOTYPE DIAL-A-RIDE SERVICE



BROOKSIDE AREA

responsive usage are shown in addition to one possible routing scheme. These include the Plaza, UMKC, Menorah Medical Center, Baptist Memorial Hospital, Troost Avenue Commercial Area, and Brookside.

The prototype system was designed using a combination of the two aforementioned service types. The routing would be essentially fixed, but also flexible to handle spontaneous pick-ups and drop-offs within the 3-4 block limit of the routes. Along the main route at specified locations, checkpoint activity locations are designated for scheduled stops acting as demand responsive collection/distribution centers. Thus, each user of the system has the option of either walking to or from the most convenient center or prearranging a more personalized pick-up or drop-off within the limit of the service area.

Service should be offered only within the service area, providing optimum response time. Passengers with destinations outside the service area can be delivered to a transfer point for transfer to another demand responsive system or to an intersecting line-haul routing.

Typical operating characteristics which this system might have are described below:

- Service Area : *6 Sq. Miles*
- Service Day Length : *8 A.M. to 7 P.M.*
- Service Days/Week : *6*
- Route Length (Fixed Portion) : *16 Miles*
- Average Vehicle Speed : *12-15 MPH (including stops and starts)*
- Headway Range : *15-20 Minutes*
- Fleet Requirements: *4 Vehicles (2 clockwise; 2 counterclockwise)*

Operating costs for demand responsive transit vary considerably depending upon the operator of the system and the planned operational and maintenance programs. For Kansas City, current annual operating costs for this sample system might be approximately $700 /day or $200,000 /year.

Revenue forecasts for demand responsive service are highly speculative. These services must be viewed as an experimental program and if they do not meet criteria established as a matter of policy they should be discontinued and replaced with local scheduled service. This criteria would be expressed in terms of either the minimum number of passengers per mile carried following a suitable break-in period or by designation of a tolerable operating ratio. The inauguration of demand responsive services in other metropolitan areas has resulted in extremely high operating costs per passenger carried and has resulted in some of these services being discontinued.

A meaningful standard for this criteria would be the passengers required at various levels to maintain a 3.0 operating ratio (expenses ÷ revenues). For example, it would require over 2,300 passengers a day to produce sufficient revenues to reach this operating ratio for this prototype system if the fare was 10 cents. A 50 cent fare would require 465 passengers a day.

More detailed investigations must be undertaken to establish the need and appropriate type of service for each of the candidate areas before demand responsive services are implemented.

MAJOR SERVICE AREAS

This section will provide an explanation of the major services to be provided in various service areas throughout the Region. The description is accompanied by maps which show specific areas, transit services and facilities included, and their relationship to the regional system. These major service areas are:

Kansas City, Missouri CBD
Jackson County
Clay and Platte Counties
Wyandotte County
Johnson County

Where parts of the rapid transit corridors are included in the service areas, the service to be offered by both the all bus and the fixed guideway option are briefly described.

KANSAS CITY, MISSOURI CBD

Figure 10 shows the Kansas City, Missouri CBD within the freeway loop as well as the commercial area to the south which includes Crown Center, the proposed Pershing Square development, and the Union Station area. Indicated on the map are the major streets where preferential lanes for buses might be provided and the streets which will be utilized to carry buses to and from the major corridors serving this area. It does not show other streets which would be used for local buses. The fixed guideway routing and station locations described in the previous section are shown in Figure 11.

It would be highly desirable to take advantage of the high standard of freeway access to and from the CBD. Major freeways serving this area are I-35 from Johnson County, I-70 West connecting Kansas City, Missouri and Wyandotte County, I-70 East serving the eastern part of the City and the highly developed areas of Jackson County, the Broadway Extension & I-29 & I-35 serving the Northland, and other major arterials serving the southern corridors.

Within the freeway loop express buses would utilize an east-west and a north-south loop where preferential curb lanes could be provided to assure that the buses would travel with as little congestion as possible. In the north-south direction these express buses would utilize the Main/Walnut one-way pair which is part of the City's street improvement program. Main would be operating in a southbound direction while Walnut in a northbound direction. Because this north-south access carries a high volume of transit passengers, preferential lanes along Grand Avenue would also be provided. Buses would enter the CBD on various streets shown and distribute and pick up passengers along these preferential lanes returning to the route as indicated. At the intersection of 11th and Grand, a major transfer station is proposed on the site of the Emery Bird store which would also have the opportunity of joint development with a commercial building.

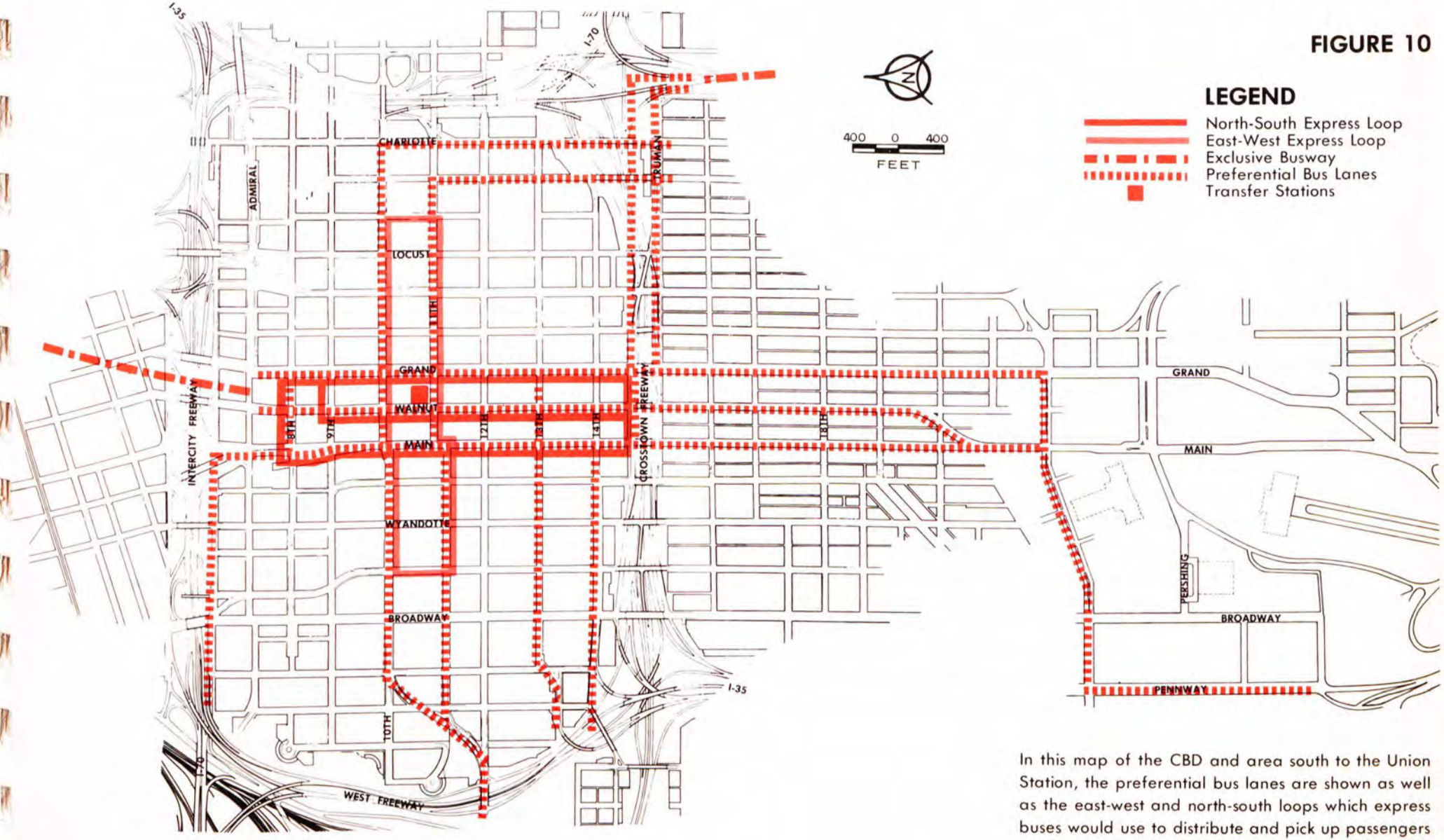
In an east-west direction, the major streets for express buses would be 10th in an eastbound direction and 11th in a westbound direction. At the major stops on both of these loops, shelters and in some cases, waiting rooms should be provided for the convenience of the transit passengers. Also shown are proposed connections in the City's traffic plan between 10th and 12th and between Central and Broadway. The configuration of ramp access from the various freeways permits much flexibility in bus routing and as the bus volumes increase, implementation of preferential lanes can be staged to fit the requirements of transit service.

Also shown is the southern terminus of the proposed exclusive busway from Vivion Road to the CBD, which provides access for the buses along Admiral between Grand and Walnut. In addition, the northern terminus of the proposed exclusive busway in the median of the South Midtown Freeway carrying buses on their own lanes to Truman Road is indicated. South of the CBD the principal streets to be used by express and local buses would be Main, Walnut, and Grand. The 23rd Street Connector adopted as part of the Pershing Square project would be used to distribute buses from the preferential lanes on Broadway via the Pennway and connecting with this arterial. In utilizing the connector, a high level of service would be provided to the Union Station area, the Pershing Square project, and Crown Center. In the event that the construction of the Connector is delayed, Pershing Road could be used for this purpose if a one block street could be provided by extending Pershing Road west to Pennway.

It should be emphasized that while the bus routings and facilities shown in the Figure are based on the year 2000 demands, they can be put into operation as the demand develops without interfering with automobile circulation more than is necessary. In order to provide the highest level of service possible to the transit patron, preferential treatment for buses is considered essential and consequently must be accommodated by some restrictions on the use of automobile lanes. The implementation of

MAJOR SERVICE AREA
DOWNTOWN KANSAS CITY, MO.
EXPRESS BUS ROUTING

FIGURE 10



In this map of the CBD and area south to the Union Station, the preferential bus lanes are shown as well as the east-west and north-south loops which express buses would use to distribute and pick up passengers within the downtown area. Access to the CBD would generally be via the principal freeways and arterials and in some cases along exclusive busways to the fringe of the CBD. A major transfer station would be located at the intersection of 11th and Grand.

special bus facilities must be closely coordinated with the City Department of Transportation taking advantage of the most up-to-date traffic engineering techniques that are possible. These techniques include special traffic signal systems giving preferences to buses where justified, monitoring equipment which helps coordinate and dispatch the buses to assure meeting schedules and adequate signing to guide both the motorist and the bus operators in this highly developed area.

In order to provide shuttle service within the downtown area, a more extensive Dime-a-Time type service is shown on Figure 11. This routing continues the present east-west and north-south routings of the shuttle service but adds a second north-south service utilizing Walnut and Grand as well as Main Street. This shuttle service would link the activities within the freeway loop with River Quay, Pershing Square, Crown Center, and Union Station.

This shuttle service would act as a sub-system to serve these activity centers and could easily be extended to the Country Club Plaza utilizing the preferential lanes shown in Figure 11 and on Broadway. Frequent service is essential for a successful shuttle system plus it must have the flexibility to respond to transit needs without a major capital investment. In service function, the shuttle service could be the forerunner of a fixed guideway system linking the CBD, Crown Center/Pershing Square and the Plaza.

JACKSON COUNTY SERVICE AREA

Western Jackson County is one of the most highly developed areas in the KCMR. It includes the downtown area of Kansas City, Missouri; the Country Club corridor; Independence; Raytown; and many of the major Interstate freeways.

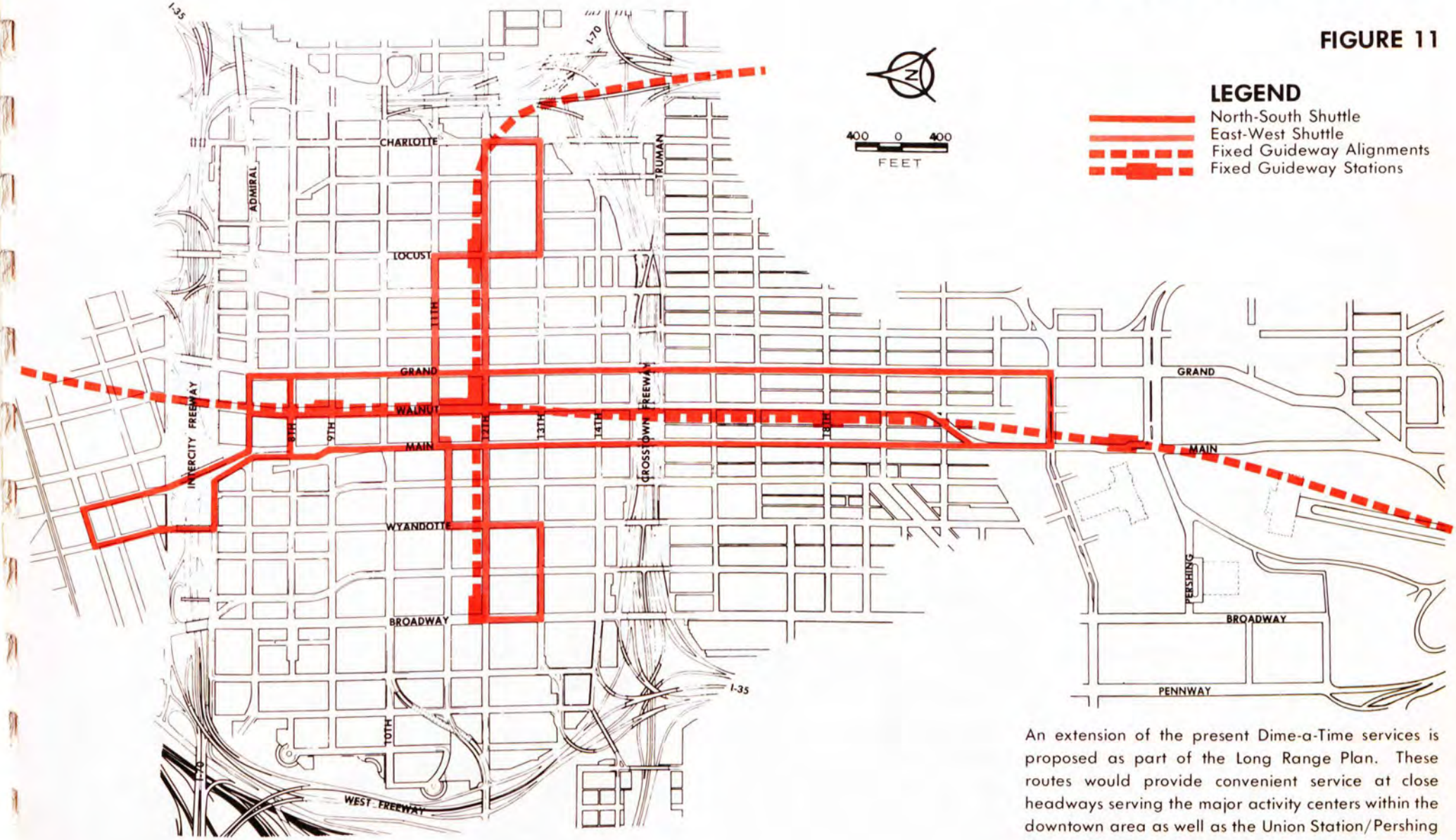
Figure 12 shows the high level of local and express transit service being provided in the Long Range Transit Plan. Much of the 24 miles of rapid transit corridors are included in this section of Jackson County. The map indicates the park & ride and major transfer stations included in the plan. A summary of the major services and facilities is shown in Table 4.

The pattern of transit routes shown, reflects the historic development of the major corridors and also takes into consideration the long range forecast of population and employment developed at the beginning of the transit study. While many of the transit routes would continue to provide service to the Kansas City, Missouri downtown area, many new services are included to provide east-west and north-south transit service for people living and working in other parts of the Region.

Bus service is included on all of the major highways in the Region including I-70, South Midtown Freeway, I-29, U.S. 50, U.S. 24, and U. S. 40. On certain freeways and major arterials, preferential or exclusive bus lanes are proposed as part of the plan. These include the South Midtown Freeway from Truman Road to U.S. 50 and

MAJOR SERVICE AREA
DOWNTOWN KANSAS CITY, MO.
SHUTTLE & FIXED GUIDEWAY

FIGURE 11



An extension of the present Dime-a-Time services is proposed as part of the Long Range Plan. These routes would provide convenient service at close headways serving the major activity centers within the downtown area as well as the Union Station/Pershing Square/Crown Center area. One-way street patterns and other connecting roads are in accordance with the proposed improvements of Kansas City Transportation Department. The fixed guideway station locations and alignments in the CBD are also shown.

possibly 75th Street and additional lanes on U.S. 40 from Sterling Avenue to Van Brunt which then lead into an exclusive busway along 31st Street to connect with the South Midtown Freeway. In addition, a new Missouri River bridge is proposed which would carry exclusive bus lanes or fixed guideway from the Northland to the CBD. In order to encourage transit usage for the longer trips, park & ride facilities are an integral part of the program. Some of these would be in joint use at existing or proposed shopping centers and the Sports Complex while others would be independent stations on property acquired for this purpose and providing a high standard of access to the major highways of western Jackson County. These park & ride facilities would vary in capacity from 200 to 500 cars and in addition, act as a transfer point between local and express bus routes.

Transit service within the individual communities would be provided by both local bus service and by demand responsive or Dial-A-Ride services with close coordination where necessary between the local and regional transit lines.

The Long Range Plan includes the ultimate provision of fixed guideway routes, some of which could be used initially for bus operations. In western Jackson County, these common routings include the Country Club line from 43rd Street to at least 75th Street, parts of the South Midtown Freeway from the downtown area to 31st Street and the proposed busway along 31st Street. If these were to be initiated as bus facilities, it would be expected that transit patronage could be increased by segregating the buses from mixed traffic consequently reducing bus travel time.

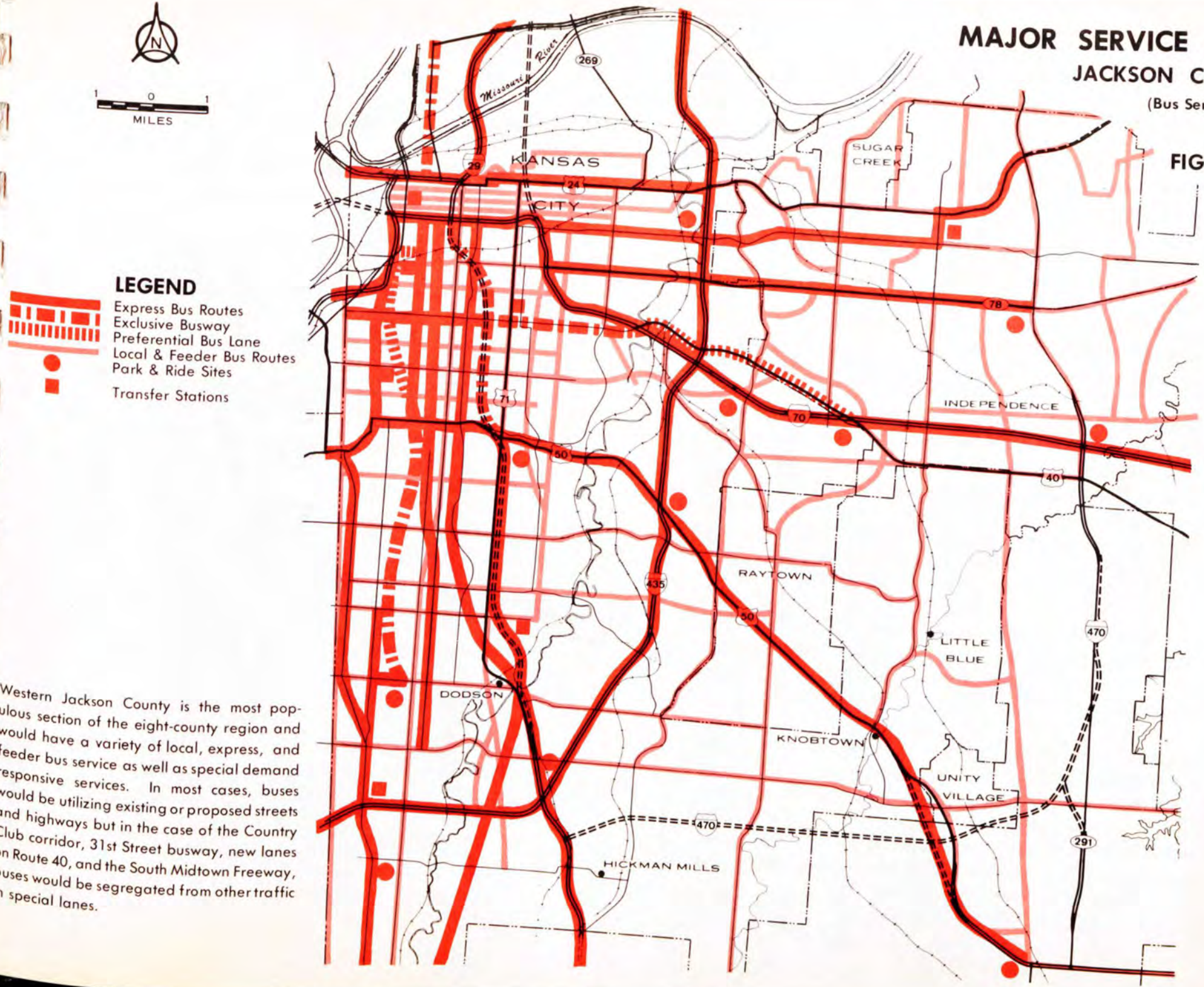
TABLE 4

JACKSON COUNTY SERVICE AREA SUMMARY

System Component	All Bus	Bus & Fixed Guideway
Route Miles		
• Local Bus	458	458
• Express Bus	164	133
- Busway	10.1	1.9
- Preferential Lane	18.0	6.4
• Fixed Guideway		18.9
Park & Ride Facilities		
• Major	7	4
• Joint Use	5	4
• Part of Station		10
Fixed Guideway Stations		26
Bus Transfer Stations	7	5
Bus Shelters	650	610
Maintenance Facilities		
• Fixed Guideway		1
• Bus Major	1	1
• Bus Minor	1	1

MAJOR SERVICE AREA
JACKSON COUNTY
(Bus Service Only)

FIGURE 12



Western Jackson County is the most populous section of the eight-county region and would have a variety of local, express, and feeder bus service as well as special demand responsive services. In most cases, buses would be utilizing existing or proposed streets and highways but in the case of the Country Club corridor, 31st Street busway, new lanes on Route 40, and the South Midtown Freeway, buses would be segregated from other traffic in special lanes.

CLAY AND PLATTE COUNTIES SERVICE AREA

North of the Missouri River, the transit service for Clay and Platte Counties is presented together due to their similarity in development characteristics. In population growth, Clay County is expected to double by year 2000 while Platte might increase three-fold from present levels. Employment opportunities for Clay are also expected to double while Platte should experience a surge of employment approximating a five-fold increase in jobs. The northern sections of the I-29 corridor near KCI are projected to undergo extensive industrial and commercial development.

Within the Burlington corridor, the Long Range Transit Plan includes two options of connecting this area with the CBD of Kansas City, Missouri. The bus alternative would consist of a two-lane busway originating at Vivion Road, running south on the west side of Burlington at grade to 12th Street. From 12th Street south an aerial structure would deviate from the Burlington alignment at the river crossing and utilize a new bridge connecting to the CBD at 7th Street.

The fixed guideway option would also begin at the Vivion Road and I-29 juncture extending south at grade to North Oak, then aerial structure in the median of Burlington Road to a new bridge over the Missouri River.

Due to the future congestion levels in addition to the substantial transit volume on I-29, further consideration might be given to the use of the Interurban right of way for a busway or fixed guideway to KCI. This would be included in both options providing continuous high speed bus access in the bus option and serving as a channel for feeder service to the fixed guideway.

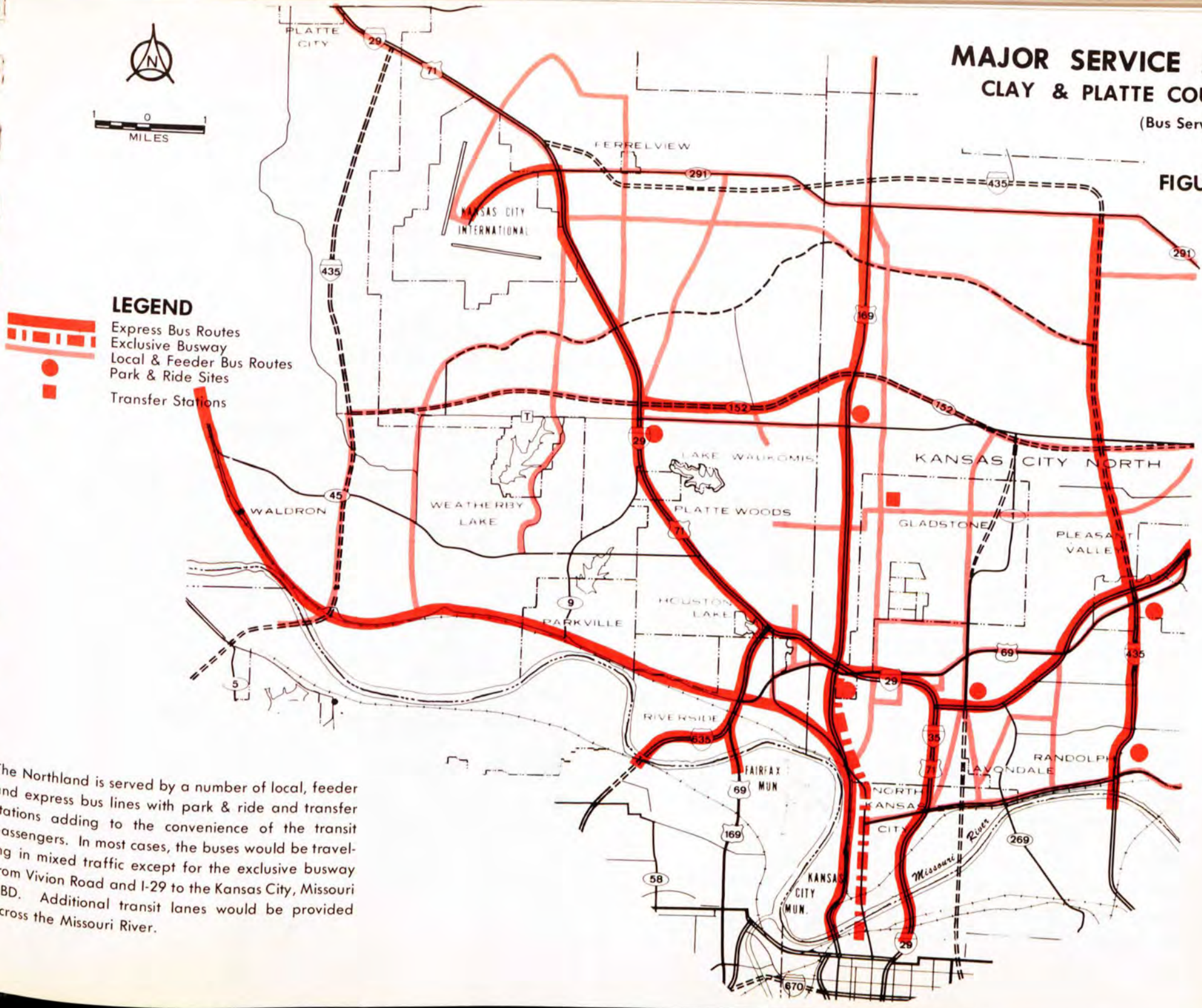
TABLE 5

CLAY AND PLATTE COUNTIES SERVICE AREA SUMMARY

System Component	All Bus	Bus & Fixed Guideway
Route Miles		
• Local Bus	218	215
• Express Bus	86	81
- Busway	5.6	
• Fixed Guideway		4.8
Park & Ride Facilities		
• Major	4	2
• Joint Use	2	1
• Part of Station		2
Fixed Guideway Stations		3
Bus Transfer Stations	2	2
Bus Shelters	255	240
Maintenance Facilities		
• Fixed Guideway		
• Bus Major		
• Bus Minor	1	

MAJOR SERVICE AREA
CLAY & PLATTE COUNTIES
(Bus Service Only)

FIGURE 13



The Northland is served by a number of local, feeder and express bus lines with park & ride and transfer stations adding to the convenience of the transit passengers. In most cases, the buses would be traveling in mixed traffic except for the exclusive busway from Vivion Road and I-29 to the Kansas City, Missouri CBD. Additional transit lanes would be provided across the Missouri River.

WYANDOTTE COUNTY SERVICE AREA

The majority of Wyandotte County development is expected to occur within Kansas City, Kansas, since it occupies such a large portion of the County's area. Numerous industrial and commercial centers such as the Central, Turner, and Fairfax Industrial Districts provide abundant employment opportunities for workers on both sides of the state line.

Figure 14 shows the planned local and express bus routings in addition to potential areas for demand responsive or Dial-A-Ride services. A high degree of accessibility is provided throughout the service area by east-west express routings -- along Kansas, State, Parallel and Leavenworth Avenues converging at the Lewis and Clark Viaduct for connection to Kansas City, Missouri. In the north-south direction, I-635 will serve as a major express bus facility serving proposed development in the KCI corridor.

Park & ride facilities have been located along State Avenue and at the intersection of I-635 with Kansas and Parallel Avenues. These have been planned to encourage auto users coming from western Wyandotte County to Kansas City, Kansas and Kansas City, Missouri to leave their autos and utilize express buses.

In order to reduce the inconvenience of transfers, two major transfer stations are included in the Plan. These off-street facilities would supplement the park & ride facilities which also serve as transfer points.

Possible fixed guideway routings to serve Wyandotte County were investigated as part of the study during the evaluation of alternative systems. While the 24 miles of fixed guideway described previously do not include service to Wyandotte County, the east-west line along 12th Street, Kansas City, Missouri can be extended west of Broadway across the river bottoms to downtown Kansas City, Kansas and beyond. This line would desirably be located in the Minnesota-State Avenue corridor and terminate at either I-635 near Indian Springs Shopping Center or further west to serve the State Avenue corridor.

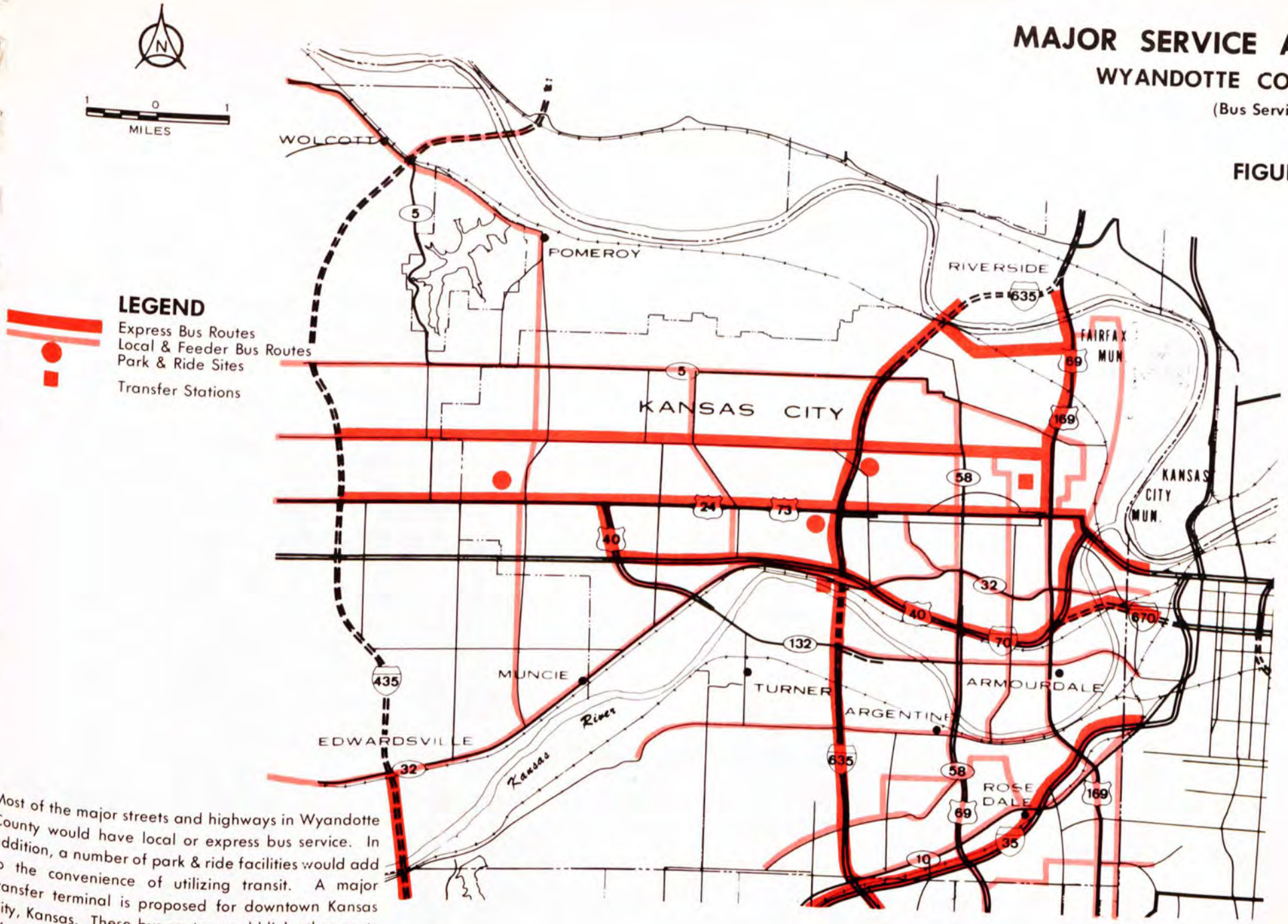
TABLE 6

WYANDOTTE COUNTY SERVICE AREA SUMMARY

System Component	All Bus
Route Miles	
• Local Bus	134
• Express Bus	46
Park & Ride Facilities	
• Major	1
• Joint Use	2
Bus Transfer Stations	2
Bus Shelters	150
Maintenance Facilities	
• Bus Major	
• Bus Minor	1

MAJOR SERVICE AREA
WYANDOTTE COUNTY
(Bus Service Only)

FIGURE 14



Most of the major streets and highways in Wyandotte County would have local or express bus service. In addition, a number of park & ride facilities would add to the convenience of utilizing transit. A major transfer terminal is proposed for downtown Kansas City, Kansas. These bus routes would link other parts of the Region with a high standard of transit service as well as serving trips within Wyandotte County.

JOHNSON COUNTY SERVICE AREA

Located in the southwest quadrant of the KCMR, Johnson County is characterized by low density residential communities, moderate to high density apartment complexes, light industry, and a number of regional shopping centers. As seen in Figure 15, the County is penetrated by numerous major highway facilities such as I-35, U.S. 169 and I-435 providing ready access to the CBD of Kansas City, Kansas and Missouri in addition to Western Jackson County.

Coupling a high level of automobile ownership with the excellent network of major arterials and collector/distributor streets, a favorable environment exists for extensive automobile usage. Express and local bus services are designed to intercept these vehicles at peripheral park & ride facilities. From these locations, express buses would utilize I-35, U.S. 50, Metcalf and Mission Road, among others, for access to the regional core. Local bus service will continue to provide intra-county mobility in addition to feeder service complementing express bus operations.

Demand responsive or Dial-A-Ride services might be tested on a pilot basis connecting major activity centers such as Oak Park, Metcalf South, Prairie Village and Mission to residential areas. The Dial-A-Ride system would also connect with the local and express bus transfer locations permitting continuous regional transit movement.

As transit demand in the southern portion of the region increases, bus preferential treatment may be initiated along I-35 by the provision of contra flow operation from I-435 north to Kansas City, Missouri. This would be dependent upon the expansion of I-35 from four to six highway lanes south of Johnson Drive.

The Long Range Transit Plan as presented in this report does not include fixed guideway service to serve Johnson County but permits possible extension to Wyandotte and Johnson Counties if the patterns of development and transit demands justify it in the future. Various alignments were investigated earlier in the study as part of evaluating alternative systems. The use of the Frisco Railroad right of way which parallels I-35 appears to be the most appropriate corridor.

TABLE 7

JOHNSON COUNTY SERVICE AREA SUMMARY

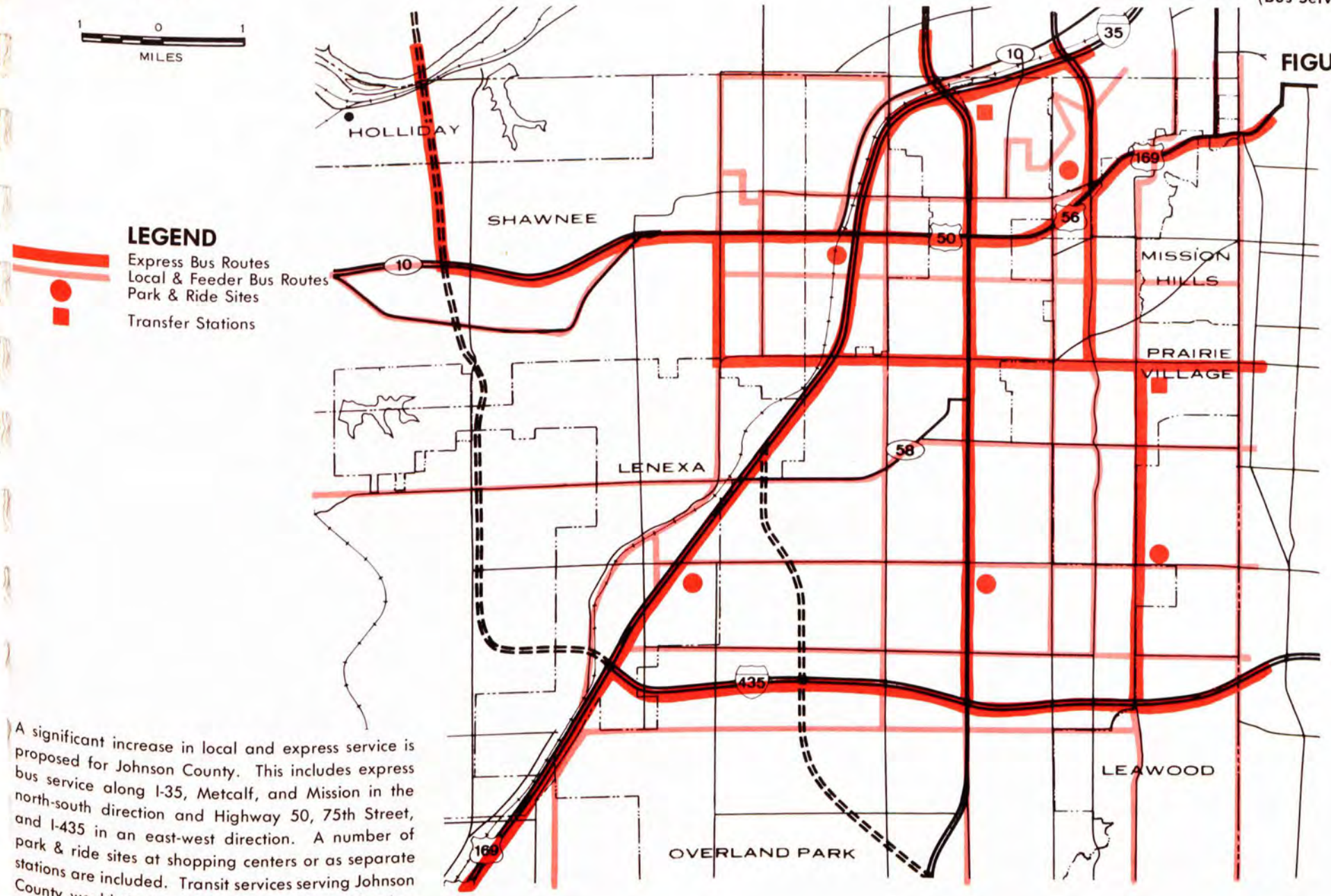
System Component	All Bus
Route Miles	
• Local Bus	175
• Express Bus	62
Park & Ride Facilities	
• Major	2
• Joint Use	4
Bus Transfer Stations	2
Bus Shelters	170

MAJOR SERVICE AREA

JOHNSON COUNTY

(Bus Service Only)

FIGURE 15



A significant increase in local and express service is proposed for Johnson County. This includes express bus service along I-35, Metcalf, and Mission in the north-south direction and Highway 50, 75th Street, and I-435 in an east-west direction. A number of park & ride sites at shopping centers or as separate stations are included. Transit services serving Johnson County would tie in with lines connecting with other parts of the metropolitan area.

PATRONAGE

Patronage potentials of the Long Range Transit Plan were derived from mathematical models which utilized land use forecasts, travel behavior patterns and the transportation system's network characteristics data to simulate the year 2000 travel demand. The procedures for determining the forcasted patronage are described in a number of Technical Memoranda prepared as part of the Study and also summarized in the Interim Report.

The patronage potentials resulting from the models are predicted baseline estimates which can be further influenced by several factors. The modal split model, which determines the transit and auto share of the future travel, was developed and calibrated from 1970 transit usage data in the Region. Since that base year, the transit cost to riders has decreased due to a fare reduction program while auto costs have increased. The fuel shortage, which is not reflected in the modal split model, has encouraged many patronage increases across the nation during 1973. Increased highway congestion and intensive transit marketing programs would also tend to have a significant impact on patronage estimates beyond those variables built into the model. In a separate Technical Memorandum the combined effect on patronage of several important patronage influencing factors was analyzed in detail and it was concluded that a 30% increase over the baseline estimate could be reasonably expected. In order to realistically reflect the impact of such factors the baseline patronage estimates for the two plan options were increased by 30%.

On a daily basis, the All Bus option is estimated to attract 295,700 revenue trips in year 2000, of which 176,800 trips are on express buses or express-local bus combinations, 112,100 trips are made entirely on local buses, and 6,800 are trips on demand responsive or Dial-A-Ride sub-systems. This transit ridership amounts to 5.5% of the 5.3 million daily person-trips expected in the design year for the Region. Approximately 42% of the transit trips are CBD oriented. Figure 16 shows estimated daily ridership on express routes for the All Bus and Bus & Fixed Guideway options.

The patronage forecast for the Bus & Fixed Guideway option indicates a ridership of 323,600 daily transit trips, or 6.0% of total daily person-trips. Some 92,700 trips are estimated to involve fixed guideway travel, 94,800 trips use express buses or express-local bus combinations, 129,300 trips are exclusively on local buses, and 6,800 trips on demand responsive or Dial-A-Ride services. CBD trips account for approximately 45% of total daily transit trips. Figure 17 shows estimated daily ridership on the fixed guideway routes.

The difference in express services provided by the two plan options in the 24 mile central corridors results in a 10% increase in estimated system-wide ridership for the Bus & Fixed Guideway option. The moderate impact of fixed guideway on system-wide patronage is mainly due to the following factors:

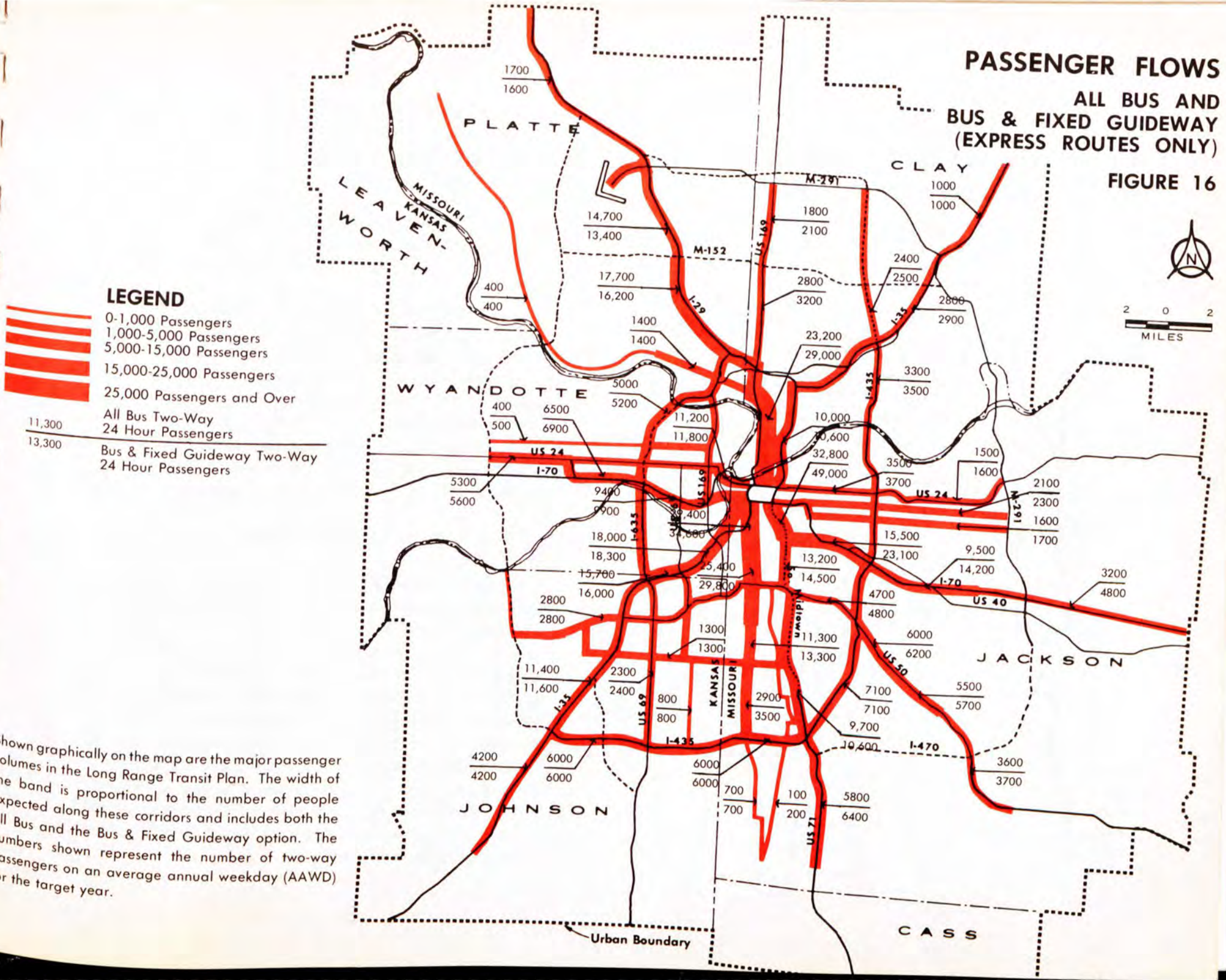
- In areas outside the 24 mile rapid transit corridors the estimated ridership for the two options is about the same because transit network configuration and planned service are similar in both options.

- The fixed guideway component has a limited and centralized direct service area. Transit trips to the central core from areas beyond direct access to fixed guideway would make transfers at fixed guideway stations.

PASSENGER FLOWS

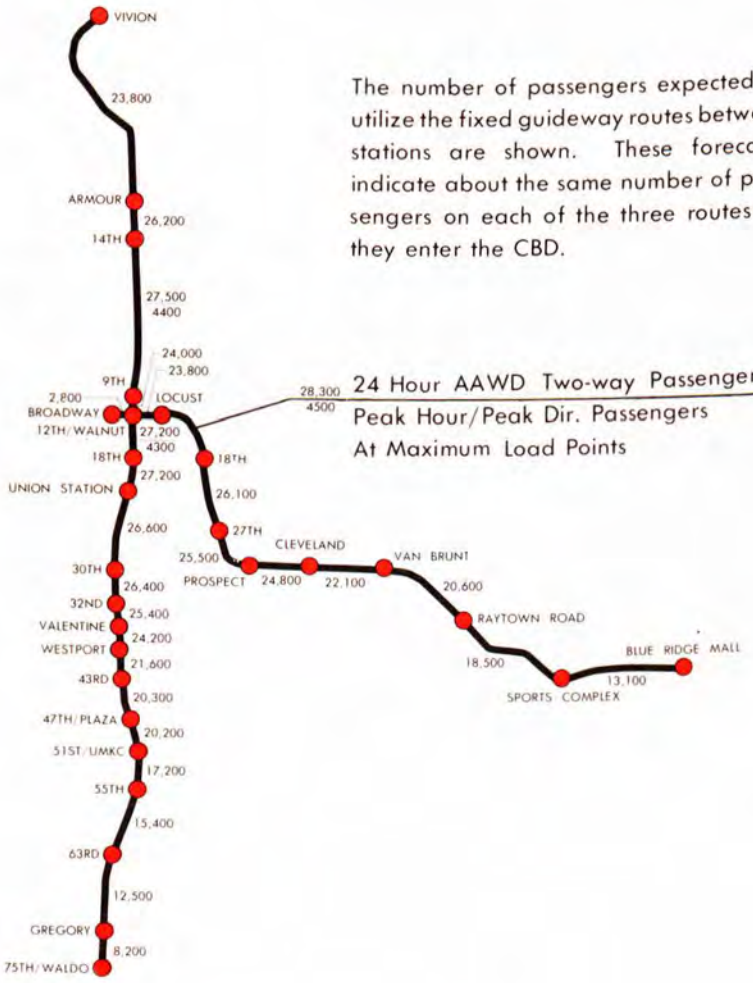
ALL BUS AND BUS & FIXED GUIDEWAY (EXPRESS ROUTES ONLY)

FIGURE 16



Shown graphically on the map are the major passenger volumes in the Long Range Transit Plan. The width of the band is proportional to the number of people expected along these corridors and includes both the All Bus and the Bus & Fixed Guideway option. The numbers shown represent the number of two-way passengers on an average annual weekday (AAWD) for the target year.

FIGURE 17
PASSENGER FLOWS
FIXED GUIDEWAY ALIGNMENT



The number of passengers expected to utilize the fixed guideway routes between stations are shown. These forecasts indicate about the same number of passengers on each of the three routes as they enter the CBD.

24 Hour AAWD Two-way Passengers
Peak Hour/Peak Dir. Passengers
At Maximum Load Points

- The modeling procedure does not provide a basis for measuring the possible changes in ridership resulting from differences in the relative attractiveness of fixed guideway versus all bus.

- While both options were tested for the same land use, the assumed density of development might not occur without fixed guideway.

However, there are significant ridership differences in corridors directly served by fixed guideway. The greatest patronage change is in the East corridor where the estimated ridership for the fixed guideway option is reduced by approximately one-third when the fixed guideway is replaced with buses. In the Country Club Corridor and the North corridor the corresponding ridership reductions occur due to slower bus speeds consequently resulting in longer trip times when compared to fixed guideway operation.

REVENUES

The potential revenue of the planned transit system includes fare revenue from scheduled and special services and non-fare revenue from the rental of advertising and concession space. Fare revenue estimates were developed from projected revenue passengers and average fares as described below for the two plan options. The amount of non-fare revenue is relatively minor and will vary according to future operating policies. In this Study a conservative estimate of 1% of the fare revenue was assumed for this amount of revenue. For purposes of making a meaningful comparison between revenue and operating costs of the system, all revenue and operating cost estimates are presented at 1974 price levels.

The amount of fare passengers pay for a transit trip has a significant effect on ridership and net revenue. High fare levels will discourage patronage and low fare levels may lead to an excessive deficit. A reasonable fare structure should reflect the service that passengers receive and be competitive with the costs of alternative modes of travel. The existing bus system in the Region has a current basic adult fare of 40 cents, with additional transfer and zone charges for longer trips. This fare structure reflects to some extent the distance traveled on the bus by a passenger. The average length of passenger trips on the KCATA system is about 4.6 miles. When expressed in costs per passenger-mile, the current fare structure has a much lower cost rate than that of operating a passenger car but does not reflect current tax subsidies. Based on these considerations, the current KCATA fare structure was adopted and adjusted for the planned transit system as a basis for fare revenue estimates.

Taking into consideration special fares for senior citizens, the handicapped and children in addition to any discount fares presently available, the current KCATA fare structure yields an average fare of 34 cents for a revenue passenger trip. However, the projected revenue passenger trips for the planned system would have an average trip length of 7.6 miles. This substantial increase in average trip length should be properly reflected in the fare for the planned system. Thus, assuming the current fare structure and adjusting for the increase in average trip length, a 39 cent average fare for bus trips was projected for the planned system.

Fare revenue estimates for the Bus & Fixed Guideway option was based on current fare structures of similar operations elsewhere in the nation. A detailed analysis of several current fare structures for combined fixed guideway and bus operations indicated an average fare of 44 cents for fixed guideway trips including any transfer charges between the two modes. Based on the estimated average fares for bus and fixed guideway trips and weighted by the relative proportions of projected passenger-miles on each mode, the average fare of a revenue passenger trip for the fixed guideway option was estimated to be 40 cents at 1974 price levels.

Based on the estimated average fare and annual ridership with a regional population of 2 million, the annual fare revenue for the All Bus option was estimated to be $32.5 million, of which $0.8 million are generated by special services and $31.7 million from scheduled service. Including 1% for non-fare revenue, the total annual revenue estimate is $32.8 million. Following the same procedure, the fixed guideway option was estimated to generate a total annual revenue of $35.7 million for scheduled service, $0.8 million from special services, and $0.3 million from advertising and concessions.

The above estimates of revenues were based on an assumed fare close to present transit fare levels. Based on the experience of other cities a reduced fare would attract more riders but also result in increased deficits. As an example, the Atlanta transit system reduced fares by 62% in 1973 from a base fare of $.40 to $.15. This resulted in an increase of approximately 28% in daily riders (which was partially the result of improved service). However, the operating deficit also increased substantially.

Fare levels are matters of policy when considering transit as a public service. Even keeping the fare constant in an inflating economy is, in effect, a fare reduction. In view of this, no change in the fare policy is to be recommended as part of the study but consideration should be given to such items as, reducing fares during off-peak periods to increase ridership, free fare zones in the CBD and monthly passes for commuters. Many innovative fare programs are being tested in major metropolitan areas and these should be monitored for their applicability to transit service in the KCMR.

OPERATING COST

Operating costs for a transit system,as defined in this study include transportation, fuel, maintenance, marketing, administration, management, employee benefits, tax costs, and amortization of deferred charges, but exclude depreciation. All of the operating cost estimates and other dollar values cited below are in 1974 dollars to be consistent with the average fares used to project revenues.

For bus operations, two principal system operating variables were used-vehicle-miles and vehicle-hours. The unit cost rates were derived from analyses of current cost data and indicated unit cost rates of $0.54/vehicle-mile and $9.40/vehicle-hour to be presently in effect. Application of the unit cost rates to the estimated annual vehicle-miles and vehicle-hours resulted in the annual operating costs for bus operations.

For the fixed guideway component of the Bus & Fixed Guideway option, operating costs for scheduled service were estimated from car-miles generated and the cost per car-mile derived from analyses of current cost data of similar fixed guideway operations across the nation. This resulted in a unit cost of $1.30 per car-mile operated. Operating costs of special services were estimated separately as described below.

Based on the operating characteristics, planned service, and projected patronage, the All Bus option is expected to generate 54.36 million bus-miles and 3.05 million bus-hours annually. Based on the vehicle-mile and vehicle-hour unit cost rates of $0.54 and $9.40, respectively, the All Bus option was estimated to generate about $58 million annually in operating costs for scheduled revenue service.

The bus component of the Bus & Fixed Guideway option is estimated to generate about 48.16 million bus-miles and 2.73 million bus-hours annually. Application of the vehicle-mile and vehicle-hour unit cost rates indicated annual operating costs of $51.7 million. The fixed guideway component is estimated to generate 3.92 million car-miles annually. Using the unit cost of $1.30/car-mile, this component was estimated to generate an annual operating cost of approximately $5.1 million. Combining the two components, the Bus & Fixed Guideway option was estimated to generate an annual operating cost of approximately $57 million for scheduled line haul service.

Because of the unique nature of Dial-A-Ride, its operating costs were estimated separately. Based on an estimated fleet size of 50 vehicles and an annual operating cost of $50,000 per vehicle from current experiences with this type of operation, Dial-A-Ride was expected to incur an additional $2.5 million annually for each option.

Therefore, system total annual operating costs for the All Bus and the Bus & Fixed Guideway options are $61 million and $60 million, respectively. The similarity between these estimates is mainly due to the limited nature of the fixed guideway network in the Bus & Fixed Guideway option and hence its minor contribution to total system operating costs. Fixed guideway operation is inherently more efficient than bus service in terms of operating speeds and passenger-carrying capacity. Thus, bus lines intended to replace the fixed guideway lines in the All Bus option must provide significant improvements in level of service in order to maintain comparability with fixed guideway operations. This accounts for the slightly higher annual operating costs for the All Bus option.

From a comparison of revenues and operating costs for both options, it is obvious that the regional transit system will require a substantial annual subsidy. This is similar to the experience found in other metropolitan areas in the United States. Based on the revenues and operating costs summarized above, the All Bus option would require an annual subsidy of approximately $28 million while the subsidy required for the Bus & Fixed Guideway option would be approximately $23 million.

It should be noted that these cost statistics are based on the system-wide patronage forecasts for the year 2000 using current operating cost and transit fare levels. The estimates are, therefore, hypothetical and quoted primarily for the purpose of scale and order of magnitude analysis, not for financial planning.

CAPITAL COST

Previous sections have described the services and facilities included in the Long Range Transit Plan and the ridership, revenues, and operating costs which each system might generate. In this section, the capital investment required to provide the facilities will be summarized.

Estimating the cost of major public works projects is a speculative effort in these days of rapidly increasing costs. Nevertheless, it is an essential part of a feasibility study to measure the financial requirements by drawing upon the experience of similar projects in other cities and applying this experience to conditions in the KCMR.

While it is obvious that the transit facilities would be constructed over a long period of time, it is necessary to first establish their cost at current levels. This provides a basis of comparing alternatives and permits applying appropriate escalation factors to these costs when staging particular elements.

Earlier in the Study, before developing the alternative test systems, cost factors were prepared which were used to estimate costs of these systems on an order of magnitude basis. As part of refining the Long Range Plan, these cost factors were refined and up-dated to the second quarter of 1975. It is important to note that during this period, 1973 to 1975, certain heavy construction items have increased over 60% in the Kansas City area.

BASIS OF COST ESTIMATES

To develop the costs presented here, prototype design sections were prepared for the fixed guideways, busways, stations and other facilities to which were applied unit costs and from this, cost estimates were computed. To the basic construction costs, two factors were then applied - 12% for design and construction management costs and on top of this 15% for contingencies. Contingencies are expected to cover many items not covered in the rather broad unit cost factors, as well as, an allowance for unforseen field conditions which might only be determined from detailed surveys, borings and final designs.

The cost of acquiring right-of-way for the required facilities was prepared with the assistance of professional appraisers in order to establish current market values and/or possible damages. To these market values an additional 15% was added to cover the cost of acquisition and contingencies. In addition, the cost of relocating families and businesses was estimated, based on recent experience on other projects and included in the total right-of-way cost. For right-of-way utilized by transit facilities in the South Midtown Freeway corridor, an average cost per square foot was determined and applied to the transit share of right-of-way utilized. No right-of-way costs were included for publicly owned land although when funding these projects, the market value of these lands can be established and considered as part of local matching funds for capital assistance under the Federal Grant Program.

It should be noted that the cost estimates for the fixed guideway system were based on an assumed employance of a tram or light rail vehicle system. It is believed that this technology has been fully developed and it offers the appropriate characteristics for the Kansas City area. This does not, however, foreclose the adoption of a different transit technology for the fixed guideway component. It would be expected that a review of available technology would be made before any sections of the fixed guideway are committed to final design to determine if any other system would offer cost, speed, or operating advantages for this Region. It is, therefore, viewed more as a yardstick system rather than the selection of a specific transit technology.

Similarly, certain special bus facilities being suggested in the Plan were developed in order to prepare the cost estimates and would be subject to more rigorous design studies before commitments are made to a final design.

TOTAL SYSTEM COSTS

Summarized in Table 8 are the total costs by major element of the All Bus and the Bus & Fixed Guideway Plan based on current costs (second quater 1975). These costs include construction of the complete facilities, design and construction management, contingencies, right-of-way acquisition, relocation costs, and the purchase of the necessary vehicles.

Subsequent tables in this section present a more detailed breakdown of the major elements. In addition to this, various technical memoranda were prepared by the Consultant to provide documentation of the engineering studies and cost estimates prepared as part of the Plan refinement.

As can be seen from Table 8, there is a significant difference in capital costs between the All Bus Plan and the Bus &

TABLE 8

SUMMARY OF CAPITAL COSTS LONG RANGE TRANSIT PLAN

(Costs in $Millions — 2nd Quarter 1975)

Major Element	All Bus	Bus & Fixed Guideway
Fixed Guideway Facilities		578.36
Busways & Preferential Bus Lanes	92.98	7.61
Vehicles - Fixed Guideway		40.85
Standard Buses	79.30	68.25
Compact Buses	1.10	1.10
All Other Facilities	63.56	48.57
TOTAL	236.94	744.74

Note: All costs include construction cost, engineering, contingencies, right of way, and relocation costs.

Fixed Guideway Plan. This is primarily due to the extremely high cost of constructing fixed guideway facilities within the 24 miles of highly developed corridors. These costs for the fixed guideway are significantly higher than estimates prepared in the development of the Provisional Plan which, again, reflect the large increases in heavy construction costs during the past two years. As part of the Plan refinement, it was found that several of the special bus facilities outside the 24 mile corridors were not justified, based on more realistic criteria regarding the provision of special busways along the other corridors in the Region. This resulted in reducing the overall costs of both plans but was of greater significance in the All Bus option.

A major difference between the two options is the fact that the fixed guideway option requires a large initial financial commitment for the first link and the essential maintenance support facilities to be constructed. The All Bus option can be financed on an "as-you-go" basis in direct response to demand increases. Even busways represent little risk. If express transit is to be curtailed in the future, express lanes can be used for mixed traffic operations.

Preferential bus lane, Los Angeles Freeway

TABLE 9

SUMMARY OF CAPITAL COSTS SPECIAL BUS LANE FACILITIES

(Costs in $Millions — 2nd Quarter 1975)

Segment	Location	Type	Length* (Miles)	Estimated Cost Const.	R/W	Total
North-South				32.35	8.71	41.06
Vivion Road to CBD	Broadway/Burlington	Excl. Busway	5.6	0.64		0.64
Kansas City, Mo. CBD	Various Alignments	Pref. Lane	5.0	0.79	0.33	1.12
CBD to 43rd St.	Main/Walnut/Broadway	Pref. Lane	3.7	11.44		11.44
43rd St. to Waldo	Country Club R/W	Excl. Busway	4.2			
East-West				6.67	1.20	7.87
Truman Road to 31st	South Midtown Fwy.	Excl. Busway	1.9	9.98	3.48	13.46
S.M.F. to Van Brunt	31st St.	Excl. Busway	2.1	9.81	0.30	10.11
Van Brunt to Sterling	U.S. 40	Add. Lanes	4.4	6.09	1.19	7.28
31st St. to U.S. 50	South Midtown Fwy.	Excl. Busway	1.9			
	TOTAL		28.8	77.77	15.21	92.98

*Two Directions

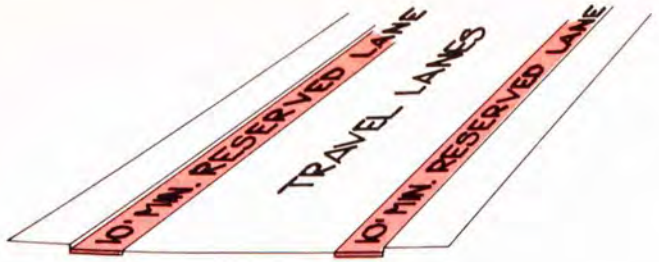
SPECIAL BUS LANE FACILITIES

Foregoing parts of this Chapter described the special bus lane facilities which were included as part of the All Bus option. The cost and other data on the seven segments of special bus lanes within the 24 miles are summarized in Table 9. One additional section of exclusive bus lanes outside the 24 mile major corridors is proposed for the South Midtown Freeway between 31st Street and U.S. 50, with provisions for continuation to 75th Street. The design of the freeway should be adapted to provide for exclusive lanes and to accommodate the fixed guideway. The cost of these lanes is not included in the estimates.

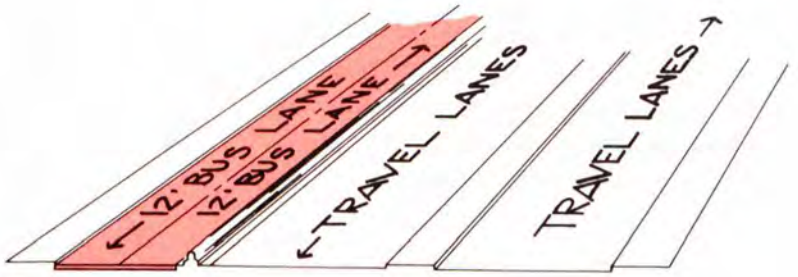
Figure 18 shows examples of some typical sections of special bus lanes that would be utilized and on which these cost

TYPICAL SECTIONS
BUS OPTION

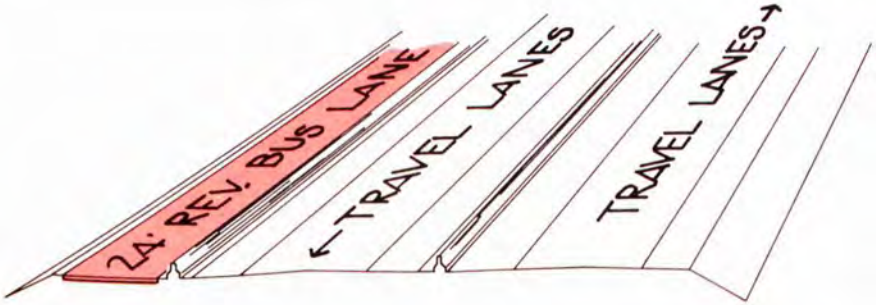
FIGURE 18



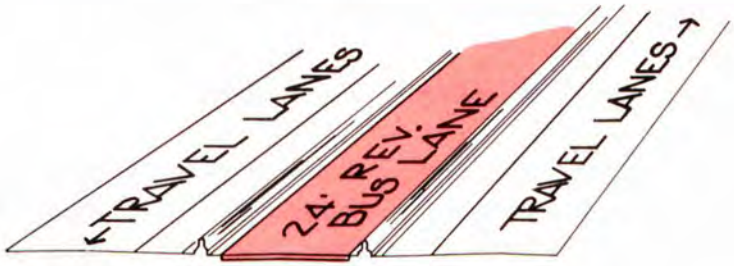
PREFERENTIAL BUS LANES
ON ARTERIAL STREET



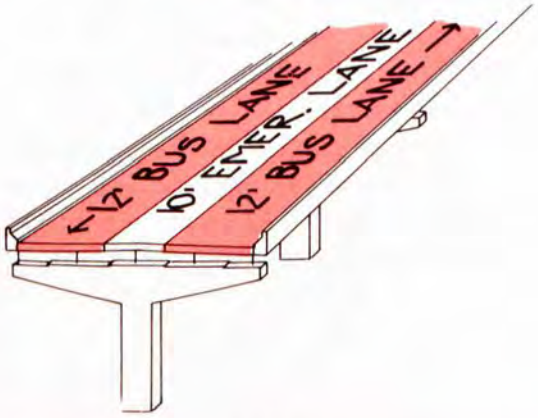
EXCLUSIVE BUS LANES
ONE SIDE OF ARTERIAL STREET



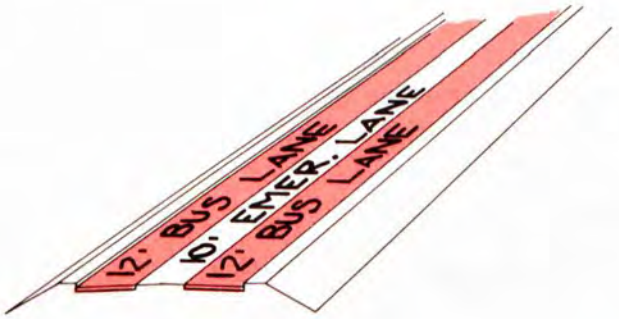
REVERSIBLE BUS LANE
PARALLEL TO FREEWAY



REVERSIBLE BUS LANE
IN FREEWAY MEDIAN



EXCLUSIVE BUSWAY
AERIAL STRUCTURE



EXCLUSIVE BUSWAY
AT GRADE

These cross-sections show the various types of bus lanes which might be incorporated into the Long Range Transit Plan. Preferential lanes might only be utilized during rush hours, in the peak direction, while the exclusive lanes and busways would be devoted exclusively to bus vehicles in the major corridors. Many of the exclusive busways in the Plan are located so they could be eventually converted to fixed guideway operation.

estimates are based. These range from preferential lanes along major arterials to exclusive grade separated busways, each of which, have their appropriate application in the Long Range Plan. Some would apply only to the All Bus option while others, such as preferential lanes, would be utilized under either option.

It should be noted that of these facilities listed in Table 9, over 13 miles of exclusive busway have a common location with the fixed guideway facilities in the major corridors. Of these 13 miles, 10 would not require specific right of way acquisition since the busways would be located along State Highways or within publicly owned property.

FIXED GUIDEWAY FACILITIES

The 24 miles of fixed guideway alignment is separated into five sections with costs summarized in Table 10. Indicated are the length, construction and right of way costs of each section. These estimates reflect the cost of the fixed guideway alignments described earlier in this Chapter and are based on the typical sections shown in Figure 19.

It was noted earlier that certain alternative alignments had been considered during the development of the Provisional Plan and are discussed below:

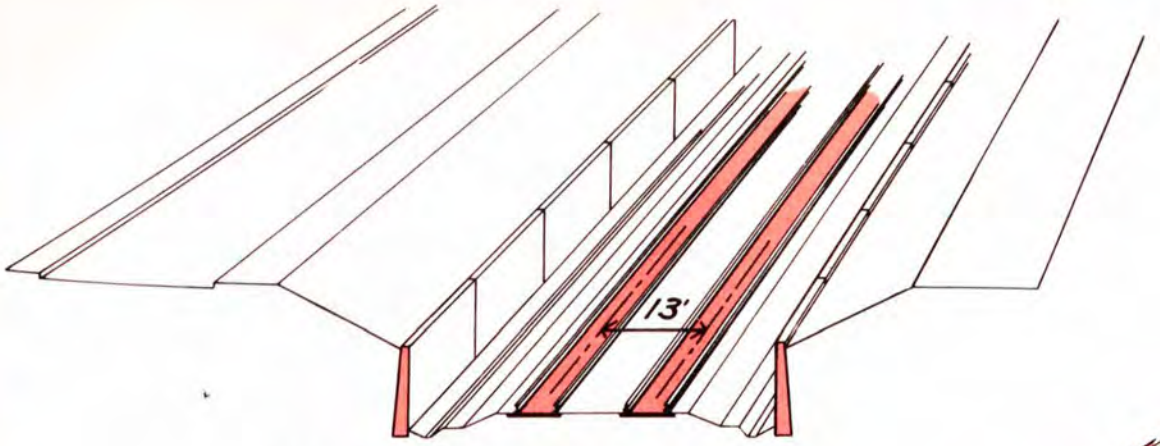
Burlington Road - The Provisional Plan suggested that both the busway and fixed guideway be located at grade along the west side of Burlington Road between North Oak and 12th Street. While this would result in a lower construction cost than an aerial structure in the median, it would result in a higher cost of right-of-way due to the damages to commercial property fronting on Burlington where access would be restricted and, south of 12th St., where the acquisition of a strip of right-of-way to provide for the necessary cross-section is also required. The alignment on which the estimates are based proposes fixed guideway on an aerial structure in the median of Burlington Rd. from North Oak to the River at an additional total cost of approximately $10 million.

Broadway Corridor - The alternative of constructing the fixed guideway in open cut generally along Washington Street instead of subway under Broadway was considered earlier. The subway would reduce the right-of-way costs and property acquisition substantially but would still result in an increase in total cost of about $44 million. It would provide, however, an additional 1.75 miles of common alignment which would not require additional right-of-way should a fixed guideway system be implemented instead of a bus preferential treatment.

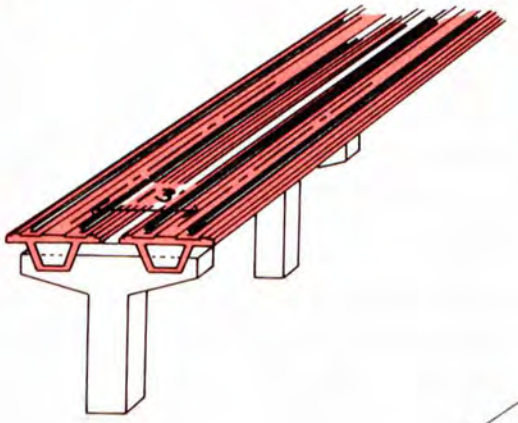
South Midtown Freeway - The Provisional Plan suggested that the fixed guideway be located within the South Midtown right-of-way from 21st Street to 31st Street. The alignment now proposed for the fixed guideway would be to carry it in the median of the South Midtown Freeway as far north as Truman Road and then tunnel under the existing interchange to 12th Street. This results in an increase in total cost of $11.4 million but would provide an additional .6 mile of common alignment with the busway facility.

TYPICAL SECTIONS
FIXED GUIDEWAY OPTION

FIGURE 19

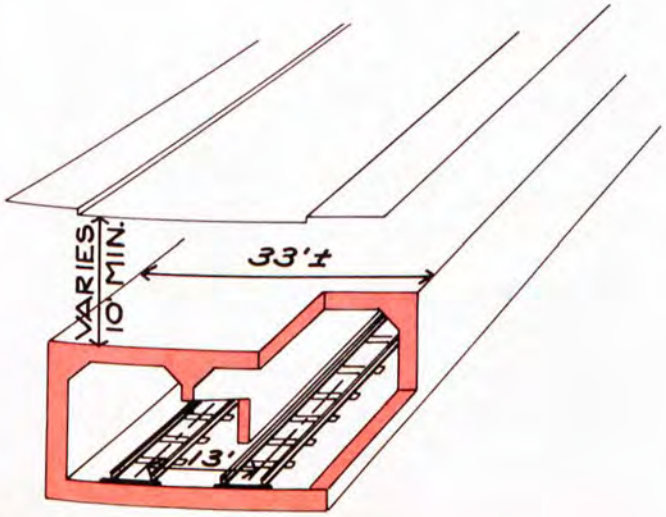


DEPRESSED SECTION

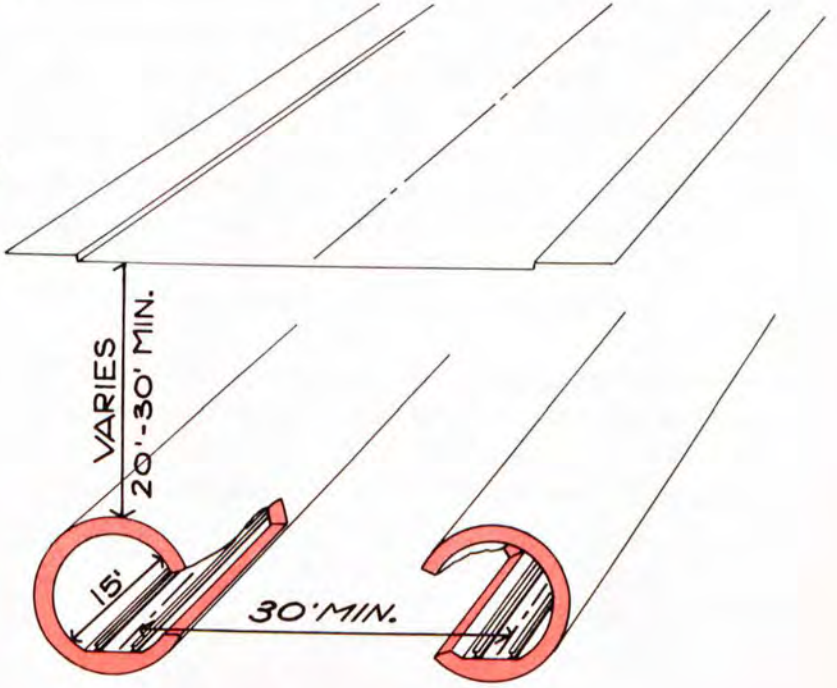


AERIAL STRUCTURE

These sections show some of the types of construction included in the fixed guideway facilities. They vary in cost and must be adapted to the local conditions and surrounding development. The advantage of the light rail system is that it can be operated at-grade with grade crossings or, as shown on these sections, fully grade separated from other traffic. Stations can be provided for all of the types of construction shown here.



CUT & COVER SUBWAY



BORED TUNNEL SUBWAY

If the above three original alignments were incorporated into the plan, the cost of the fixed guideway facilities summarized in Table 10 would be reduced by $65 million to $513 million.

These estimates have been based on certain engineering studies regarding the physical location and profile of the fixed guideway. They are considered to be in the most desirable location at this time, but could be modified with a resulting decrease in construction cost by putting certain sections at grade rather than in subway or open cut. This, however, would result in some speed restriction on the fixed guideway but takes advantage of the flexibility of the light rail technology where crossings can be permitted at grade. This procedure is being used in many cities in Europe as the first stage of a light rail system.

One yard and maintenance shop is proposed as part of the fixed guideway component. This would be located in the vicinity of 86th Street and Prospect on land presently owned by the City and could be connected to Waldo by a single track along the existing Country Club right-of-way. Any initial operating segment of the fixed guideway would have to include a yard and shop. If the Country Club line was not included in the first segment an alternative location would have to be found.

A summary of the types of construction included in the 24 miles of fixed guideway is shown below:

Type of Construction	Length (Miles)
At Grade	12.4
Aerial	2.8
Open Cut	3.0
Subway	5.2
TOTAL	23.4

TABLE 10

SUMMARY OF CAPITAL COSTS FIXED GUIDEWAY FACILITIES

(Costs in $Millions - 2nd Quarter 1975)

Section	Length (Miles)	Total Costs Const.[1]	R/W[2]	Total
North-South Line				
Vivion Rd. to 9th St.	5.68	84.61	0.93	85.54
9th St. to 47th St.	4.44	239.11	6.62	245.73
47th St. to Waldo (Inc. Yard & Shop)	3.51	46.45	0.30	46.75
Subtotal	13.63	370.17	7.85	378.02
East-West Line				
Broadway to Van Brunt	5.09	149.61	5.29	154.90
Van Brunt to Blue Ridge Mall	4.71	44.70	0.74	45.44
Subtotal	9.80	194.31	6.03	200.34
Total	23.43	564.48	13.88	578.36

[1]Construction costs include engineering and contingencies.

[2]Right-of-way costs include market value, acquisition costs, and relocation.

Table 10 includes all of the costs necessary to initiate operations on the 24 miles of fixed guideway, except for the cost of the vehicles which are described later on in this section.

TRANSIT VEHICLES

A comprehensive regional transit system would require a family of vehicles to satisfy special needs. The vast majority of these vehicles would be the standard urban bus similar to those presently used by KCATA. These 47-seat vehicles are undergoing substantial research and development work as evidenced by the experimental Transbuses being developed under the sponsorship of the U.S. Department of Transportation.

TABLE 11

SUMMARY OF CAPITAL COST VEHICLES

(Costs in $Thousands - 2nd Quarter 1975)

	All Bus			Bus & Fixed Guideway		
Type	No.	Unit Cost	Cost	No.	Unit Cost	Cost
Fixed Guideway				86	$475	$40,850
Standard Bus	1,220	$65	$79,300	1,050	$65	$68,250
Mini Bus	50	$22	$1,100	50	$22	$1,100

In order to supply the needs for demand responsive or Dial-A-Ride service a compact bus or "mini-bus" is more appropriate. These might be 15-20 passenger vehicles, some of which would have special facilities for permitting use by handicapped passengers in wheel chairs. Development is underway on a battery-powered electric bus of this size which reduces pollution and noise and is being tested in several cities in the United States.

The fixed guideway vehicles assumed for the Long Range Plan are the U.S. Standard Light Rail Vehicle similar to those now being manufactured for San Francisco and Boston. These 73-foot long articulated vehicles seat up to 68 passengers and can carry a maximum load of 219 passengers. They can be operated as single units or in two or three-car trains. Single, non-articulated units are presently not manufactured in the United States but development work is going on in this Country and in Canada as well as by European manufacturers. If the light rail system were adopted for Kansas City, an analysis should be made to determine whether the single unit or articulated vehicles are most appropriate in terms of cost-effectiveness.

Table 11 below summarizes the number and types of vehicles required for the All Bus and the Bus & Fixed Guideway Plan, along with their present unit costs and total costs. During the last two years, there has been a significant increase in the cost of all three types of vehicles shown. The standard urban bus which is listed below at $65,000 per vehicle was available in 1973 for $48,000. The number of vehicles listed in the Table reflect the fleet

TABLE 12

SUMMARY OF CAPITAL COSTS
OTHER FACILITIES

(Cost in $Millions - 2nd Quarter 1975)

Item	All Bus Plan				Bus & Fixed Guideway Plan			
	Number	Const.	R/W	Total	Number	Const.	R/W	Total
Bus Maintenance Facility - Major	1	12.88	1.20	14.08	1	12.88	1.20	14.08
- Minor	3	20.09	1.20	21.29	2	13.40	0.80	14.20
Park & Ride Facilities	27	8.54	2.84	11.38	20	5.01	1.96	6.97
Major Transfer Stations	13	3.22	---	3.22	11	2.25	---	2.25
Bus Shelters	1,225	6.31	---	6.31	1,150	5.92	---	5.92
Bus Stop Signs	10,000	0.40	---	0.40	10,000	0.40	---	0.40
Special Signal Systems	75	1.88	---	1.88	50	1.25	---	1.25
Bus Turnouts	200	0.60	0.40	1.00	100	0.30	0.20	0.50
Support Vehicles and Miscellaneous	---	4.00	---	4.00	---	3.00	---	3.00
TOTAL		57.92	5.64	63.56		44.41	4.16	48.57

required to provide service for the forecast demand based on appropriate load factors, peak hour patronage requirements and vehicle spares.

OTHER FACILITIES

In addition to the special bus facilities and fixed guideway facilities and vehicles, other support facilities are needed to provide the comprehensive level of service envisioned in the Long Range Plan.

The costs of these are summarized in Table 12. It might be well to note the following in connection with these items:

- Bus Maintenance Facilities - At least one major repair and administrative facility would be required similar to the transportation center soon to be under construction by the KCATA. In addition, minor maintenance and storage facilities would also be required. A specific location for these facilities has not been determined at this time but it is expected that one would be in Wyandotte County and one in Jackson County.

- Park & Ride Facilities - Plans presented earlier in this Chapter show the suggested location of park & ride facilities some of which would be separate facilities acquired by the KCATA while others would be through an arrangement with major shopping centers, the Sports Complex, etc. Facilities included would be shelters, platforms, and waiting rooms. The costs listed include acquisition and construction of these facilities.

- Major Transfer Stations - The function of these stations would be to provide a convenient off-street transfer of passengers from local to express buses and between major routes. They would be situated throughout the area and could be constructed as part of a joint use facility with a commercial development. Therefore, no right-of-way costs have been included. In effect, the transit operation would be a tenant to this joint development.

- Bus Shelters - A large number of protected bus shelters should be provided at all major stops throughout the Region. These shelters could provide route information as well as telephone communication with a dispatcher. A staged expansion of the shelter program should be developed.

- Bus Stop Signs - In order to make transit more visible, particularly for the convenience of the transit rider, a special design bus stop sign should be developed and installed at all bus stops thoughout the system.

- Special Signal Systems - To provide for special turning movements of bus vehicles, the existing signal system should be adapted to permit preferential treatment. Specific locations for these systems have not yet been selected and must be coordinated closely with the municipal traffic departments.

- Bus Turnouts - In order to permit convenient loading and unloading on major streets, bus turnouts permit the vehicles to leave the normal lane of traffic to discharge and pick up passengers.

- Support Vehicles and Miscellaneous - This item includes all of the necessary supervisors' vehicles, special towing and repair vehicles as well as miscellaneous equipment throughout the system.

Preferential bus lane, Downtown Los Angeles

CHAPTER III

IMPACTS AND BENEFITS

CONCEPT OF IMPACTS

It is the purpose of this Chapter to examine the direct effects of the public transportation system discussed in this Report. Economic effects are by far the most critical. However, other aspects such as environmental considerations, energy conservation, social concerns, physical aspects and certain opportunities for developing specific transit facilities jointly with other transportation facilities, or with private and public building developments, are of importance in evaluating available options and identifying steps for plan implementation.

The ultimate objective of the impact evaluation is to assure the public that the transit system eventually recommended for implementation will benefit the Kansas City metropolitan area both socially and economically. Since the state-of-the-art is such that no specific impact evaluation process is generally accepted, the transit team developed its own procedure for assessing the impact of public transit systems on the urban area. Of necessity, this procedure relies to a great extent on qualitative, rather than quantitative, judgements. Although it is recognized that values change over time, the impact evaluation hopefully reflects contemporary values as they relate to any capital investment in public transportation.

Evaluation of the transit system as a whole, as well as individual lines, particularly the 24 mile inner core rapid transit, focused on the following aspects: land use disruption due to transit construction; planning objectives as stated by public policy; aesthetics; impacts of transit-related buildings and structures; noise and vibration; land absorption; open space, geology, waterways, and vegetation; historic landmarks; air pollution and noxious odors. In addition to the All Bus and Bus & Fixed Guideway options, the impact of no transit improvements ("No-Build") are also presented. This assumes that the present bus system would operate in the design year. Where appropriate, the impacts are identified in terms of their effects on the user, the community and the operator.

REGIONAL STRUCTURE

THE PROCESS OF DECENTRALIZATION

In the 1950's, Kansas City began to change from a highly centralized urban area to the decentralized metropolis it is today. Some 25 to 30 years ago, Kansas City, Missouri, was considered "the city" and all surrounding communities were suburbs. The city's central business district (CBD) was the undisputed hub of all commercial and administrative activities of the urban area. Perhaps 60 to 75 percent of all daily trips to work were destined for the central business

and industrial districts, which extended from downtown Kansas City, Kansas, through the Central Industrial Area, the CBD of Kansas City, Missouri, and the industrial areas in North Kansas City into the northeast bottoms and the northern part of the Blue Valley, located partly in Kansas City, Missouri, and partly in Independence.

Dramatic changes in this development pattern occured during the 1950's and 1960's, resulting primarily from the construction of an urban freeway system in the metropolitan area. At the same time that Federal policy helped make possible the mass production of single family homes, the construction of an extensive highway network in the Kansas City region made these large new residential tracts accessible. Decentralization was the end result.

As the population of the area moved to the suburbs, commerce and industry also began to decentralize. In order to be closer to the labor market and attracted by the prospect of lower taxes, industry shifted to the suburbs. Determined to capture the available retail dollar, the investment dollar, and the service dollar, the commercial community followed suit and soon shopping centers of unprecedented size opened in the Kansas City region. Municipal governments, particularly those of Kansas City, Missouri, Kansas City, Kansas, and Independence, Missouri, responded by embarking on ambitious, far-flung annexation programs which almost quadrupled the size of the central city within a decade. These city governments were convinced that if they did not undertake these annexations, numerous small cities would spring up ill-equipped to cope with suburbanization. Furthermore, the older cities recognized that a large number of small, new cities could eventually strangle them economically.

In assessing the probable impact of the transportation facilities presently being considered, it should be kept in mind that the urban development of the 1950's and 1960's, including the construction of a modern highway system, was in direct response to public demands and was possible because of the favorable economic climate of the times. Without strong economic support to develop or redevelop the inner city, no transportation system, however sophisticated, will have much impact on a declining area.

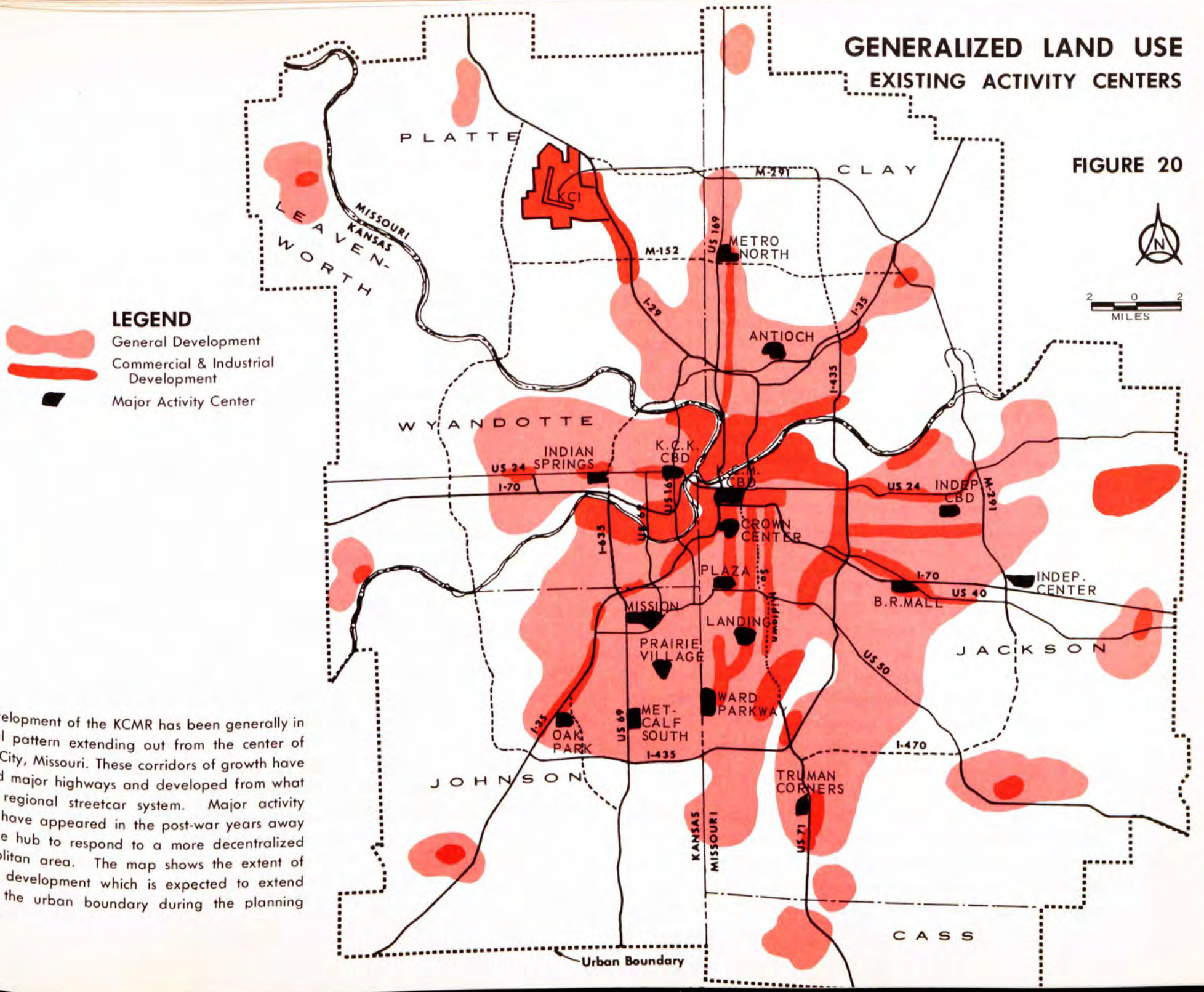
THE NEW LAND USE PATTERN

When Kansas City's land use pattern was centralized, it resembled a wagon wheel, the hub being the central commercial and industrial district. Today, the land use pattern of the decentralized metropolitan region resembles a spider web as illustrated by Figure 20. The former centralized area has become one of several strong concentrations of commerce and industry in the Region. The most significant economic focal point of the area is still the Kansas City CBD, which has a large concentration of high-rise buildings within the downtown freeway loop. However, the impressive development of Crown Center, 10 blocks south of the CBD, has added a new dimension to the area by providing a link between the CBD and the Country Club Plaza. This could provide a strong impetus towards corridor development between Broadway and Main Streets to 47th Street.

To the East this commercial investment corridor is flanked by public and quasi-public developments along McGee and Troost, from the public medical facilities and colleges at Hospital Hill to the Art Institute and Art Gallery to the campus of UMKC. To the West is the struggling Central

GENERALIZED LAND USE
EXISTING ACTIVITY CENTERS

FIGURE 20



The development of the KCMR has been generally in a radial pattern extending out from the center of Kansas City, Missouri. These corridors of growth have followed major highways and developed from what was a regional streetcar system. Major activity centers have appeared in the post-war years away from the hub to respond to a more decentralized metropolitan area. The map shows the extent of present development which is expected to extend toward the urban boundary during the planning period.

Industrial District and the Central Business District of Kansas City, Kansas. Immediately north of the Missouri River is the thriving city of North Kansas City with its strong industrial development. If this urban core area from Armour to 55th Street and 18th Street west to Prospect Avenue is considered as an entity, then indeed, the metropolitan region still has an economic focal point containing a high percentage of the labor force. However, it is no longer the strongest retail focal point since impressive regional shopping centers have developed throughout the entire suburban sector of the region, including Antioch Shopping Center North, Independence Shopping Center and Blue Ridge in the East; Ward Parkway and Red Bridge in the South; Metcalf and Oak Park in the Southwest; and Mission and Indian Springs in the West. The assumption that this major central core will retain its relative population and employment position within the metropolitan region during the planning period has been used in evaluating the impacts of transit alternatives in this Chapter.

Kansas City has always been relatively well organized from the standpoint of urban land utilization. From the 1890's to the early 1920's, the park and boulevard system gave the city its basic definition, with the most expensive residential developments occuring along the boulevards and the middle range developements occupying the areas between them. While industry and commerce were located along the rivers, the tributary valleys formed the early railroad and truck highway corridors.

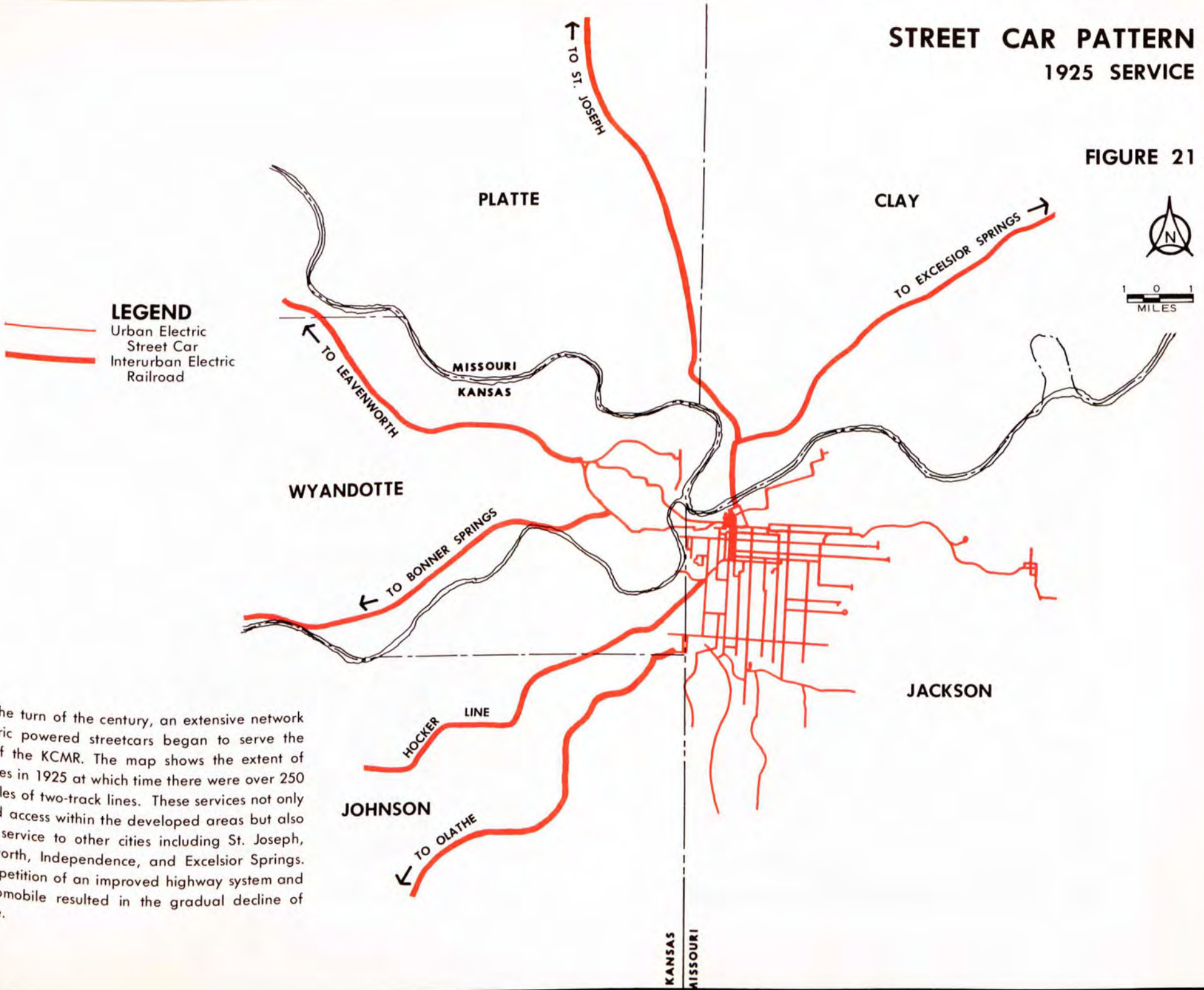
During the 1920's and 1930's an extensive streetcar network induced development along its routes. (See Figure 21). Land values were highest close to the streetcar lines, decreasing as walking distance increased. The suburban expansion of the 1950's and 1960's resulted in the development of major neighborhoods and communities between the transportation corridors. The private automobile became the principal mode of transportation, although a residual element of the once all-important public transportation system managed to survive.

Due to the efforts of planners in public and private practice throughout the area, most of the new neighborhoods were well laid out and included the full complement of municipal and school services. Paralleling the suburban residential development was the earlier mentioned out-migration of commerce and industry, creating the land use pattern which now characterizes the Kansas City Region.

When present daily traffic flow diagrams of the area are compared to similar diagrams of the 1940's and 1950's, it is immediately apparent that the central focal point orientation of the earlier period has been superseded by a multi-focal arrangement. This is the main reason why today only a few of the original transit lines have the patronage required for continued operation. They are the midtown lines of Broadway, Main Street, Troost, Prospect, 39th Street, 18th Street, Truman Road and Independence Avenue, the Quindaro Line and the 7th Street Parallel. These lines serve primarily short trips between 3 and 5 miles and are patronized by people within general walking distance of the bus stops. Commuter traffic by public transportation has not developed in the Kansas City region and to date, attempts by the Area Transportation Authority to establish a reasonable level of commuter service have not been truly effective.

STREET CAR PATTERN
1925 SERVICE

FIGURE 21



Before the turn of the century, an extensive network of electric powered streetcars began to serve the needs of the KCMR. The map shows the extent of these lines in 1925 at which time there were over 250 route miles of two-track lines. These services not only provided access within the developed areas but also offered service to other cities including St. Joseph, Leavenworth, Independence, and Excelsior Springs. The competition of an improved highway system and the automobile resulted in the gradual decline of their use.

Harry S. Truman Library

Harry S. Truman Sports Complex

Kansas City, Kansas City Hall

JOINT DEVELOPMENT OPPORTUNITIES

The concept of joint development refers to the planning and construction, and sometimes financing, of major public transportation improvements in conjunction with a public or private non-transportation project. The key element of this concept is the initial acquisition of right-of-way for both the planned transportation and non-transportation purposes. It has been well documented that major transportation facilities will often induce substantial investment, in turn producing land uses which tend to benefit directly from the proximity of the transportation facility. For example, the proximity of rapid transit stations is considered to be highly desirable when locating high intensity residential and commercial buildings as shown in the photograph which illustrates the Toronto experience. Consequently, the development of major public transit facilities offers unusual opportunities to implement those aspects of official public plans relating to the private development sector of the local and regional economy.

On the other hand, it is important to recognize that the physical attributes of transit facilities constitute only one element in the development process and that other incentives are required to bring about the desired end result. Economic conditions, both local and nationwide, are particularly critical considerations.

In the course of the regional transit study, the probable impacts of joint development on the various test systems were analyzed in detail. The 24 mile rapid transit element of the final plan will undoubtedly have the greatest impact in this regard. In order to better understand the potential

Development in vicinity of rapid transit stations - Toronto, Canada

joint development opportunities of the 24 mile rapid transit element, several specific situations were identified and analyzed, for both the fixed guideway option and the express bus option. The amount of land development likely to be induced by public transportation would be substantially greater with the fixed guideway facilities than with the busways. Nevertheless, certain bus facilities would have impacts similar to a fixed guideway.

FIXED GUIDEWAY IMPACTS

As part of the fixed guideway option, 29 stations are proposed along the 24 mile inner core rapid transit system. Four of these stations are clustered in the downtown area and constitute a special category. The results of the joint

development analysis of five key locations are shown in Table 13. Experience in other cities, particularly Toronto, demonstrates quite clearly that it is impossible to predict in advance where and in what sequence joint developments are likely to evolve. However, some conclusions can be drawn from the experience in those North American cities where fixed guideway transit systems have been installed in recent years.

Downtown - It is assumed that joint development efforts in the central business district will consist primarily of relating the CBD stations to several significant downtown improvements which are already under construction or which appear to be reasonably committed. The most important of these improvements is the H. Roe Bartle Convention Center which would be provided direct access by the system.

Other key improvements include the new Mercantile Bank Building, the high-rise officebuilding at 11th and Walnut; and perhaps the proposed Regency-Hyatt Hotel at 12th and Wyandotte. The joint development effort would provide convenient connections between the downtown stations and as many of the new or existing key buildings as possible. A cut-away view of this two-level station is shown in Figure 22. Eventually, an underground system of walkways would facilitate pedestrian movement, possible

TABLE 13

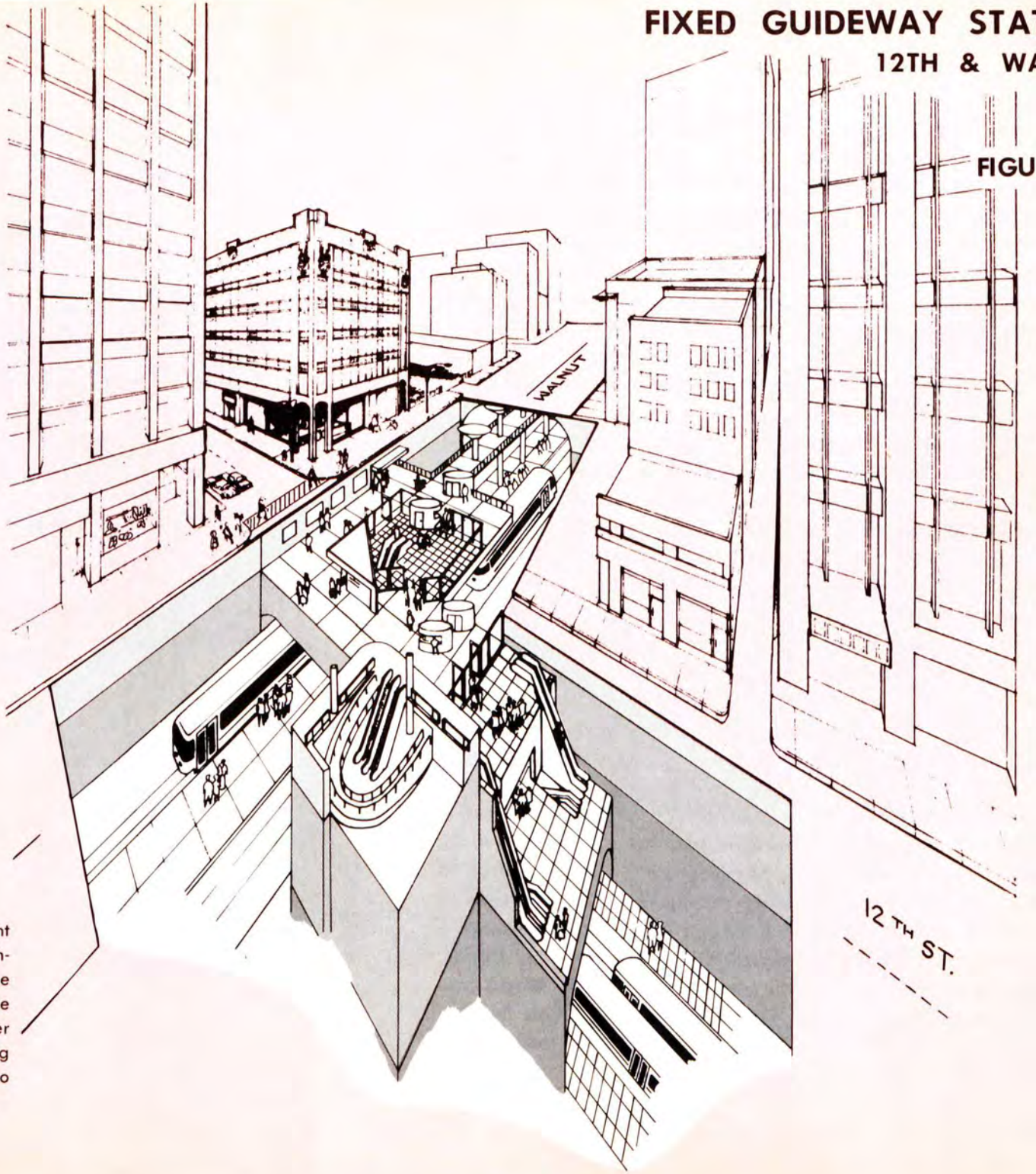
ILLUSTRATIVE JOINT DEVELOPMENT OPPORTUNITIES
SELECTED STATION LOCATIONS
FIXED GUIDEWAY

Station Location	Gross Acres	Acquisition Cost	Present Tax Revenue	Proposed Land Use	Construction Cost	Probable Annual New Tax Revenue
12th & Walnut	0	Underground Connections to Existing and Proposed Commercial Buildings in the Area				
27th & Highland	12.4	$610,000	$14,640	Apartments	180 Apts. = $2,700,000	$64,800
31st & Cleveland	7.8	400,000	9,600	Single Family & Duplexes	42 Units = $ 800,000	$19,200
47th & Main	3.0	650,000	9,200	High Rise Apartment	150 Units = $1,985,000	$47,640
63rd & Brookside	3.0	500,000	7,400	High Rise Apartment	120 Units = $1,485,000	$35,640
75th & Wornall	11.0	$2,010,340	$40,200	Low Rise Commercial	300,000 Sq. Ft. = $7,500,000	$180,000

FIXED GUIDEWAY STATION

12TH & WALNUT

FIGURE 22



The hub of the fixed guideway lines will be the joint two-level station at 12th & Walnut where the north-south and east-west lines cross. This station could be linked to major buildings nearby and might be expected to be used by over 40,000 passengers per day in the year 2000. The light rail cars would bring passengers to either level with convenient access to the street or for transfer to the other route.

even augmenting it with a secondary transit subsystem between the civic center on the East and the convention and hotel area on the West. The key axis of the system would be 12th & Walnut, which would also accommodate the fixed guideway transit in subway. Correspondingly, the intersecting north-south line under Walnut Street would tie in with key banking and office locations. Together with a local distribution system entirely separated from surface traffic, the system might in time become a key factor in the continued refurbishing of the central business district.

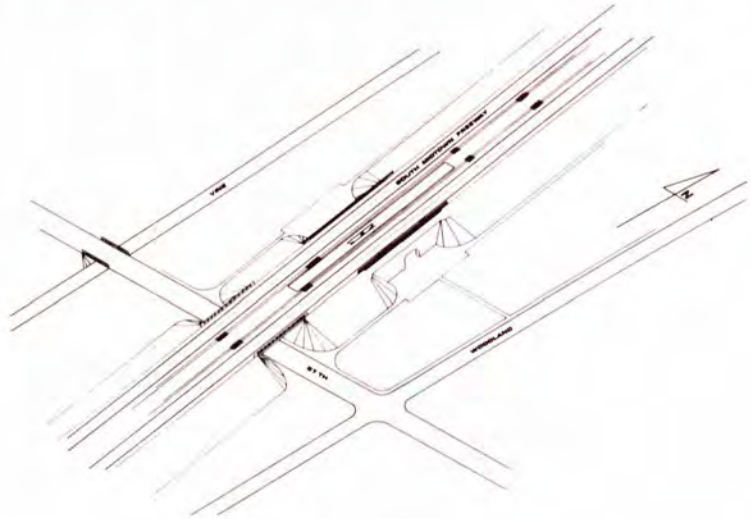
27th and Highland - The station at 27th and Highland on the South Midtown Freeway is located in the heart of the Lincoln Redevelopment Project Area (Figure 23). This is a multi-use area which includes a shopping center, the Martin Luther King Hospital, and a variety of housing types. A two-block section in the vicinity of the proposed station is considered a potential for joint development. The principal redevelopment use here would be cluster housing and apartments, approximately 180 units. The number of new dwelling units which would be provided here would exceed the number of units eliminated by right-of-way acquisition for the entire optimum system (96 dwelling units).

31st and Cleveland - This station is located in the heart of the inner city, which is badly in need of standard housing. There is no immediate plan by any public agency to provide such housing. However, it is reasonable to assume that a transit facility in this location might become a catalyst for a housing project. Following prevailing trends, the emphasis may well be on the single-family homes and duplexes. Approximately 42 units were assumed, but this could be expanded if the necessary funding and market potential were to be realized.

FIGURE 23

JOINT DEVELOPMENT OPPORTUNITIES

LINCOLN REDEVELOPMENT



47th and Main - This station is located between the Country Club Plaza and the apartment area along 47th Street. A 150-unit apartment building with some convenience, commercial accessory uses may well be a feasible joint development project.

63rd and Brookside - Comparable to 47th and Main, joint development for multi-family construction appears a possibility in this location. Some 120 units are assumed to be an attainable objective.

75th and Wornall - This terminal station could assume considerable importance as a development catalyst, even beyond the $7.5 million joint development level shown in Table 13. Traditionally, terminal stations have been considered extremely desirable locations for concentrated retail business and services. Since the Waldo district is a strong secondary commercial area in Kansas City, the chances for induced joint transit and private development are quite promising. (See Figure 24.)

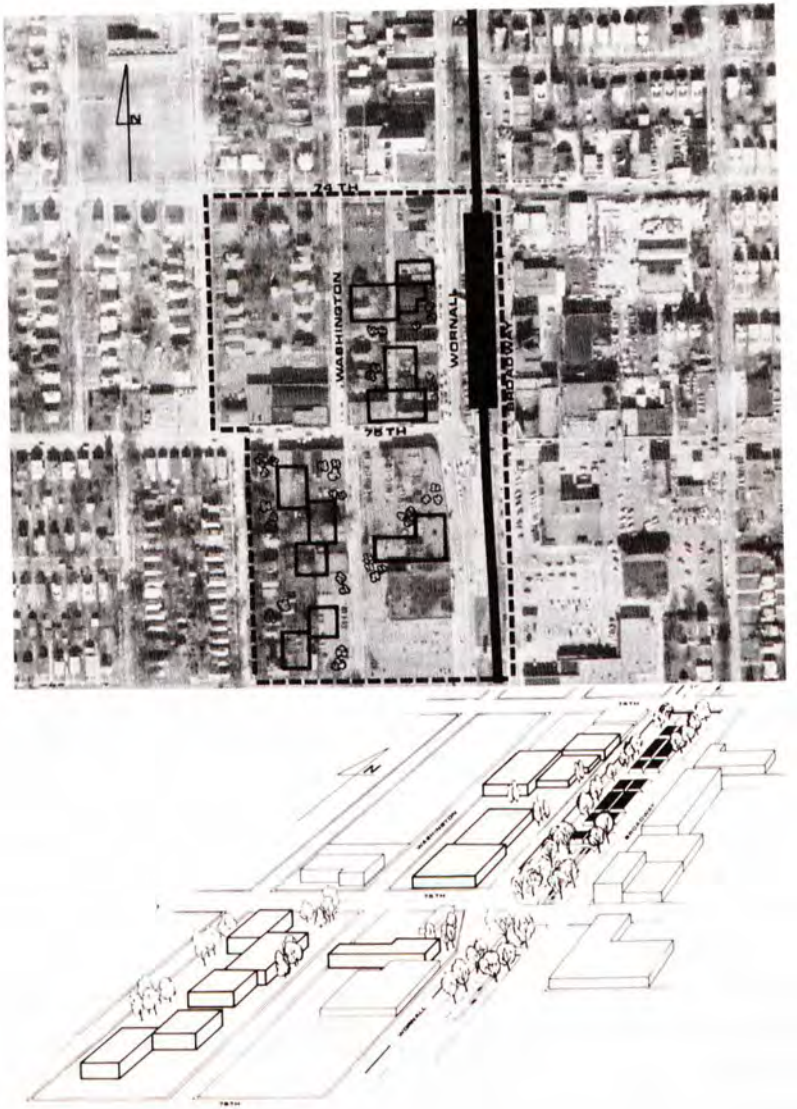
It must be emphasized that the mere programming of transit will not bring about an economic atmosphere conducive to substantial investment by the private sector. Nevertheless, based on the estimates presented in Table 13 for selected key locations, it is reasonable to assume that, on the average, $3 million might be invested by the private sector in the vicinity of fixed guideway stations outside the Central Business District.

Since 25 such stations are contemplated as part of the 24 mile fixed guideway option of the rapid transit element, approximately $75 million would be generated as a spinoff of the public investment in the transportation system. This is not to say that this type of investment might

FIGURE 24

JOINT DEVELOPMENT OPPORTUNITIES

75TH STREET & WORNALL



not happen elsewhere in the metropolitan area, but definition of the transit corridors by additional public facilities, such as public transit, will lend greater certainty and an element of discipline to the wide possible range of investment decisions. Also, many investment decisions are made outside of the Kansas City region, particularly by East coast insurance and banking interests. A community which makes the effort to update its physical plant through major public investments is more likely to attract the attention of the potential investor than one which allows things to drift, providing overspending into a precarious financial position does not result. Competition for the investment dollar is keen and anything that a local community can do to add confidence to the investment decision-making process will place it in a superior competitive position.

BUSWAY IMPACTS

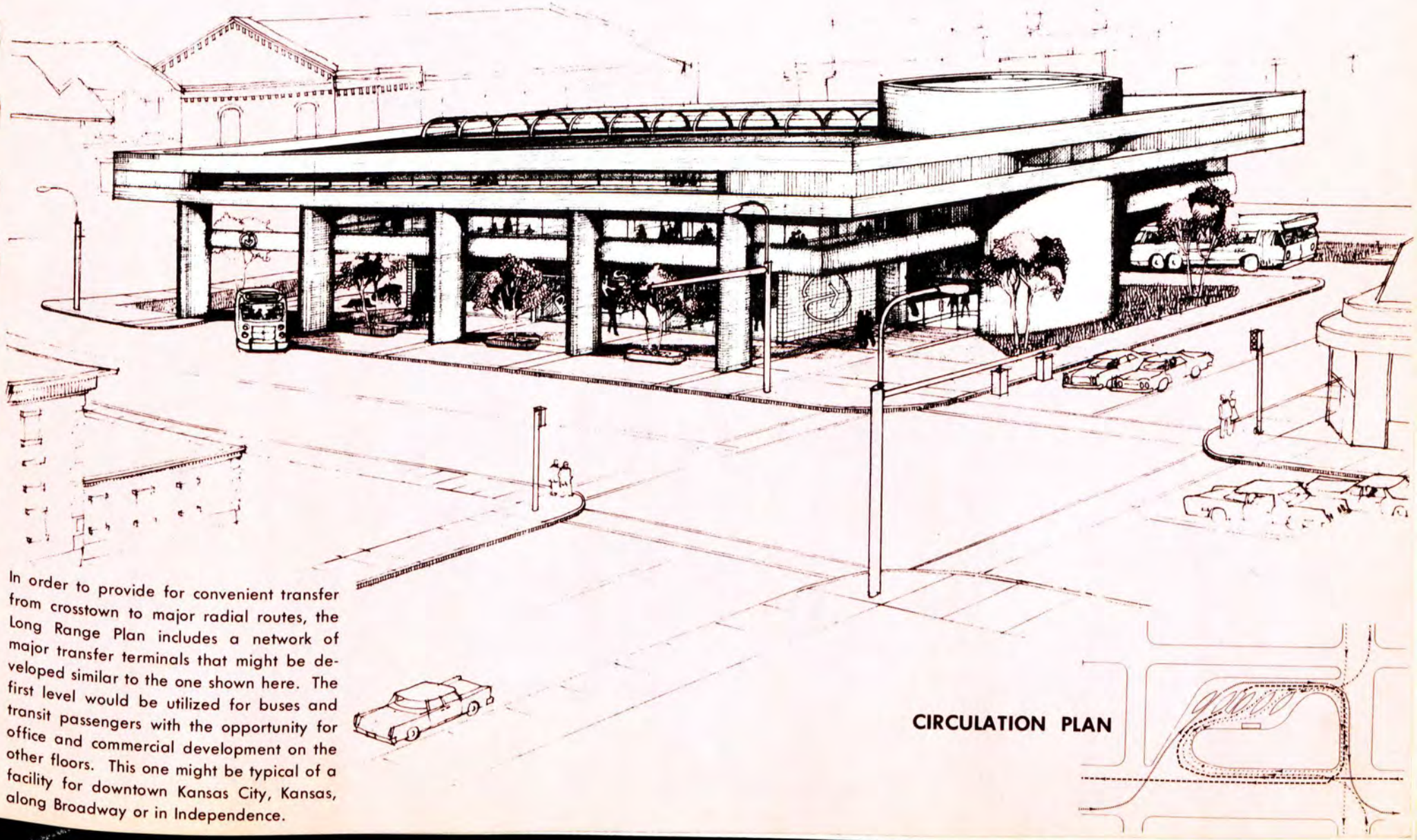
The impact of busways on land development is likely to be greatest where entirely new facilities are construced, rather than where improvements to existing facilities are made. Consequently, the construction of 31st Street from the South Midtown Freeway to Van Brunt Boulevard is likely to have an impact comparable to that of a fixed guideway in the same right of way; presently the street is so badly deteriorated that any significant public investment is likely to substantially bolster confidence in the area. The development considered likely to occur with a fixed guideway system at 27th & Highland and at 31st and Benton (see Table 13) would probably be similar under the all bus option. The impact of a major bus terminal facility at 75th & Wornall, in the Waldo business district, would also be comparable to that of a terminal fixed guideway station.

Those sites where bus terminals or transfer stations are contemplated will have a more pronounced effect on private investment decisions for joint development than ordinary bus stops, as illustrated by Figures 25, 26, 27 & 28. Bus transfer points in strategic locations are likely to result in the concentration of larger numbers of people during certain hours of the day, always an attractive feature for the retail business and service establishment. Some 10 or 12 such stations are likely to be built over the next several years in the metropolitan area. If, based on experience elsewhere, each of these could attract between $2.5 and $3 million in private investment, some $30 to $35 million of total measurable impact may well be anticipated.

Park & ride facilities would also provide joint development opportunities in the way of convenience shopping, office buildings and other commercial space. The proposed downtown transportation terminal at 11th and Grand is illustrated in Figure 29. The terminal would be on two levels with access from Grand Avenue and Walnut Street. Between the two transportation arteries is envisioned a plaza area with a high-rise tower that could accommodate offices or apartments or possibly both. Because the location is unique and the facility would be striking, it might prove highly attractive for an investor interested in the characteristics of both site and building. While it is idle speculation to put a dollar figure on the investment potential of the downtown terminal, $12 to $15 million is not inconceivable. Such a building, in addition to providing a much needed public transportation facility, would be in keeping with the city's objectives for downtown and would lend tremendous interest to the area.

TRANSFER TERMINAL

FIGURE 25

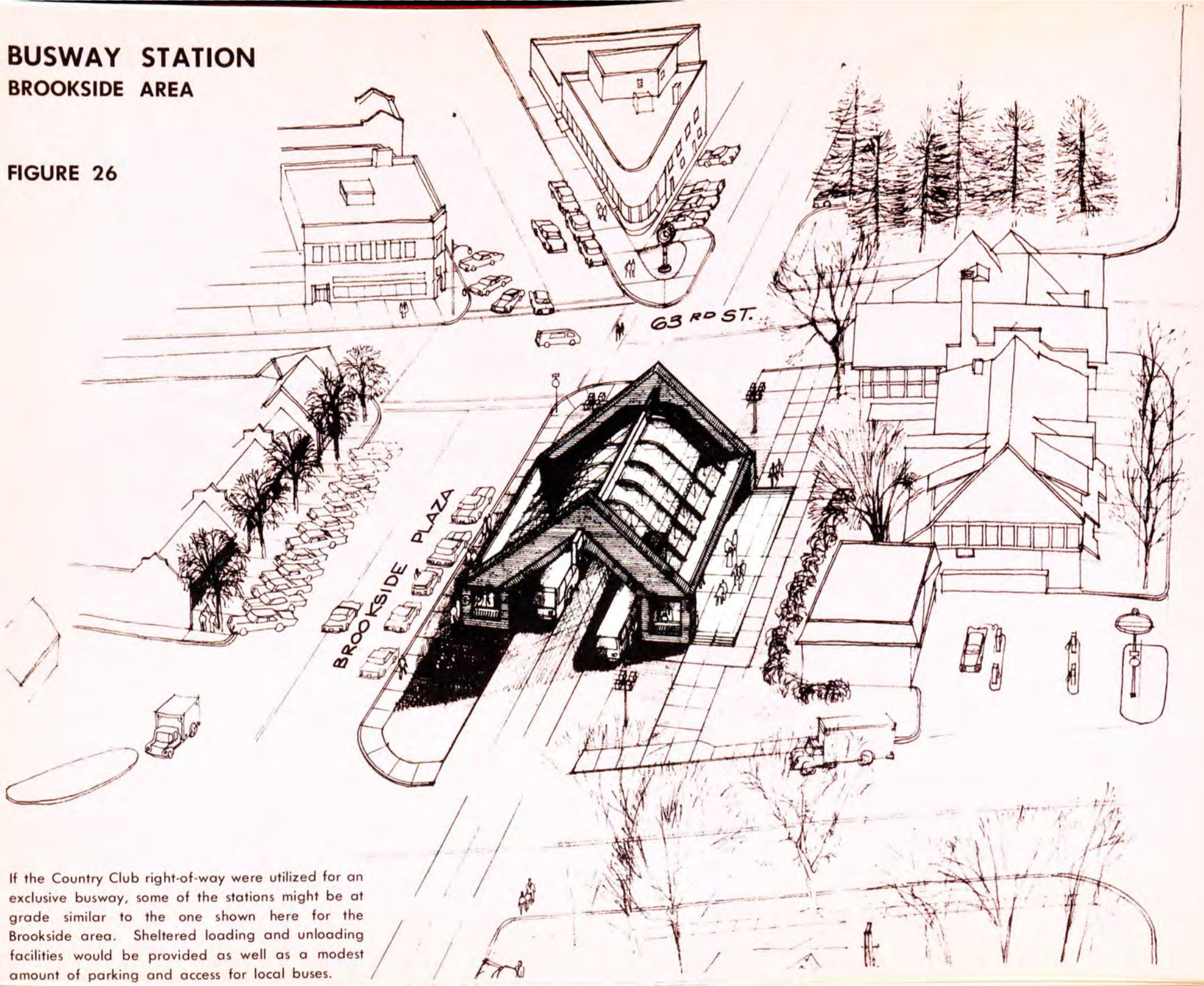


In order to provide for convenient transfer from crosstown to major radial routes, the Long Range Plan includes a network of major transfer terminals that might be developed similar to the one shown here. The first level would be utilized for buses and transit passengers with the opportunity for office and commercial development on the other floors. This one might be typical of a facility for downtown Kansas City, Kansas, along Broadway or in Independence.

CIRCULATION PLAN

BUSWAY STATION
BROOKSIDE AREA

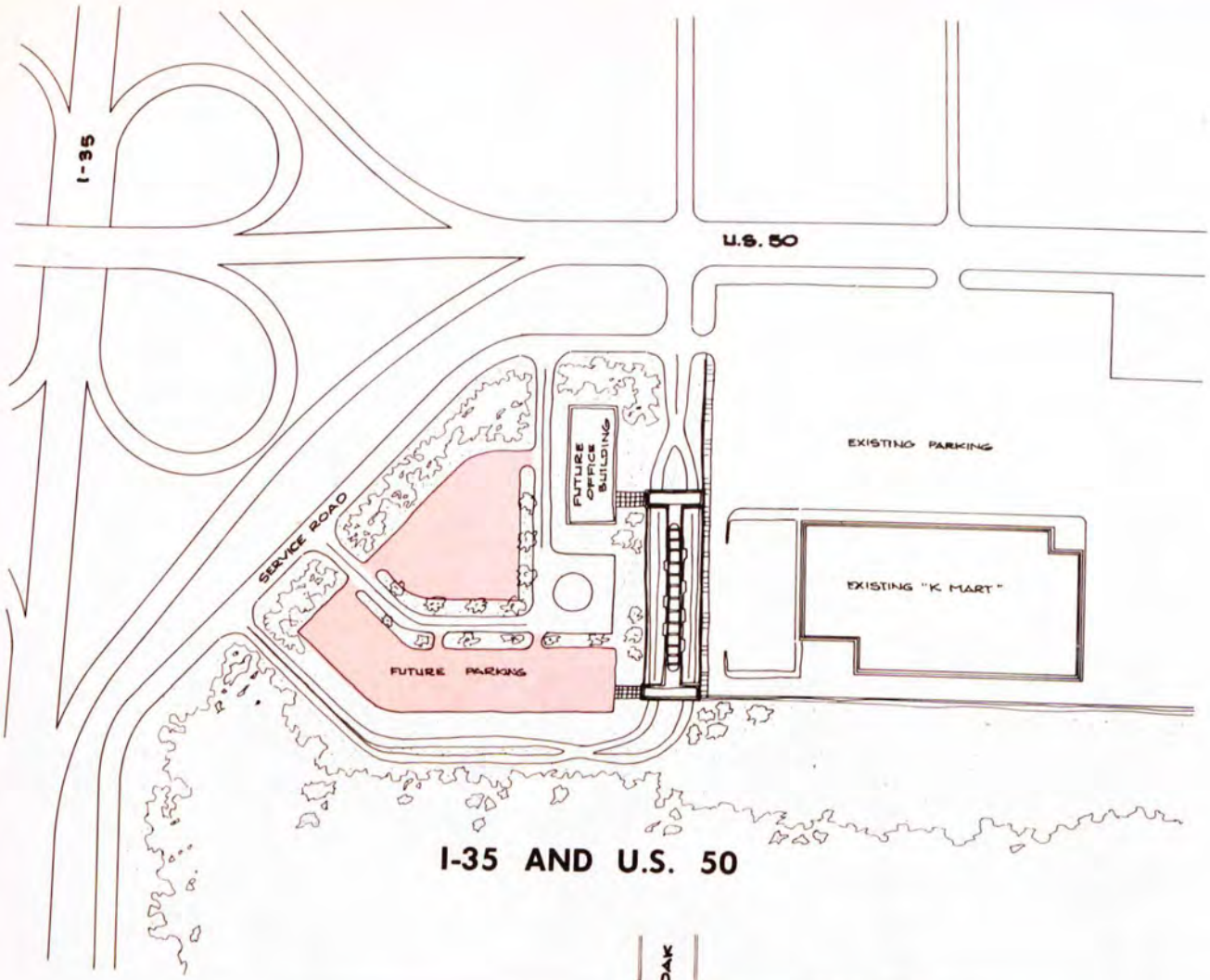
FIGURE 26



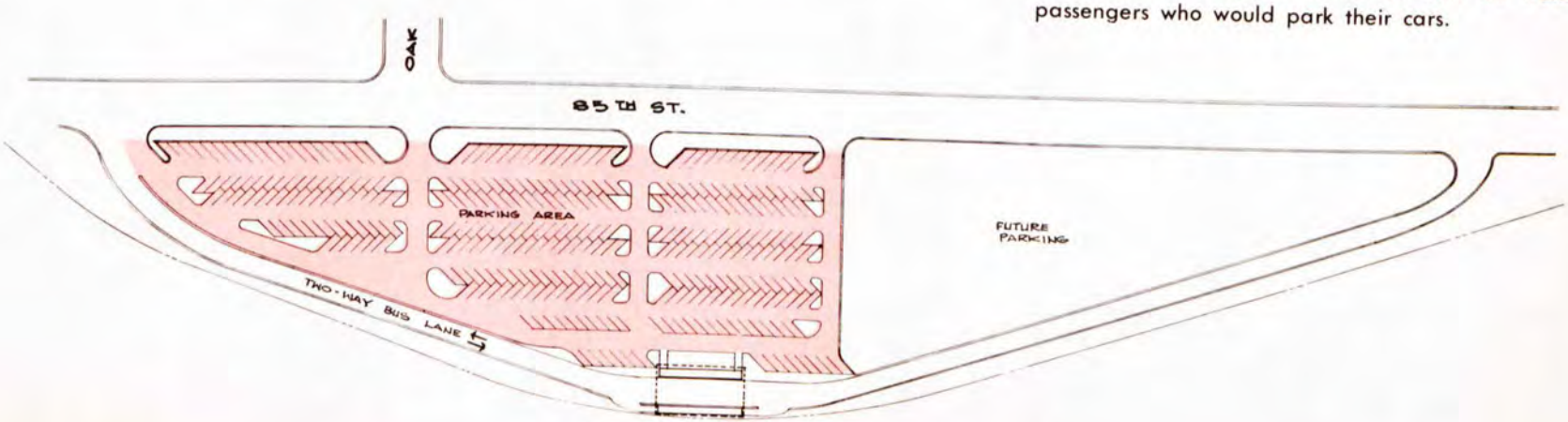
If the Country Club right-of-way were utilized for an exclusive busway, some of the stations might be at grade similar to the one shown here for the Brookside area. Sheltered loading and unloading facilities would be provided as well as a modest amount of parking and access for local buses.

PARK & RIDE SITES
SELECTED LOCATIONS

FIGURE 27



I-35 AND U.S. 50



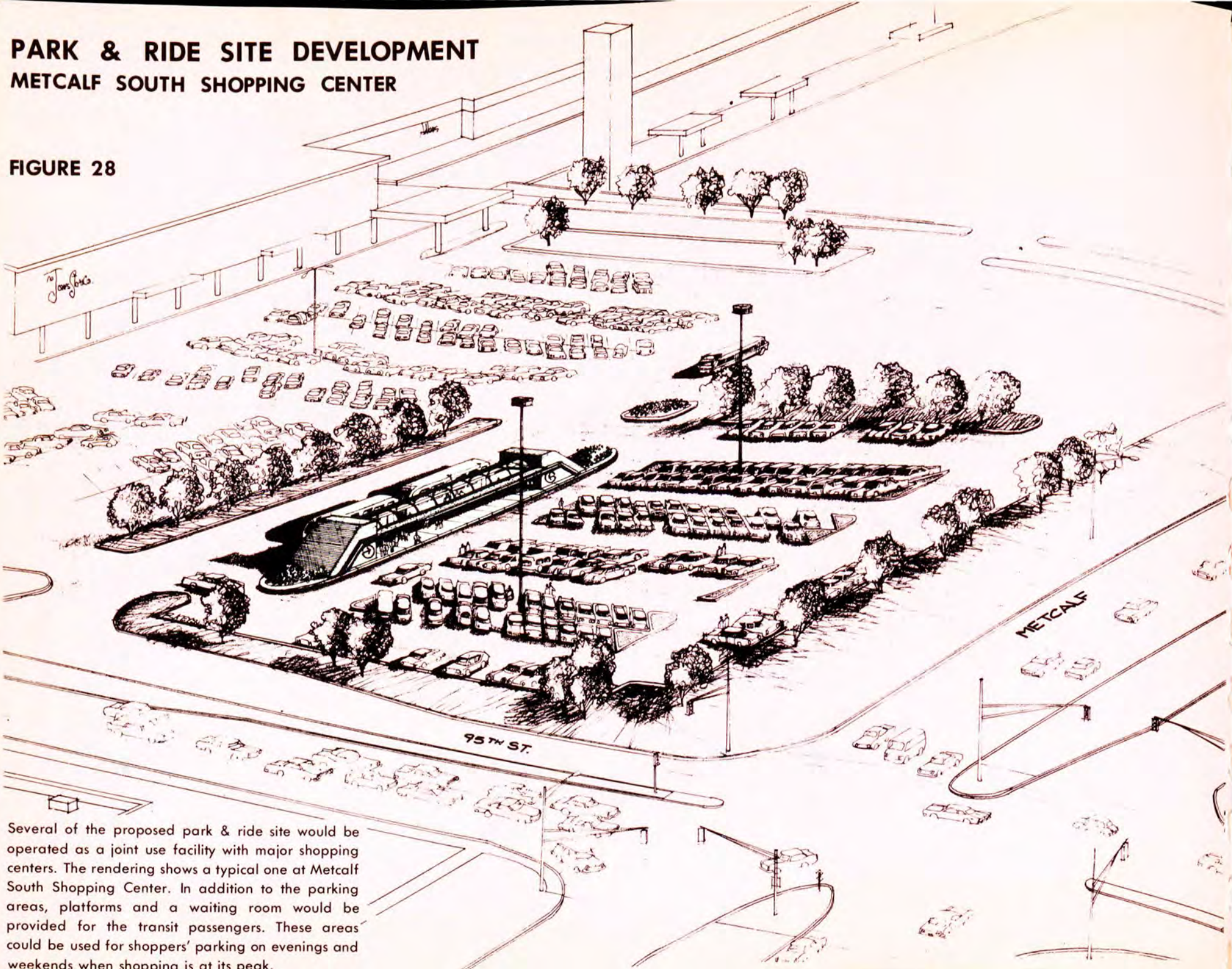
85TH AND OAK

Shown here are two examples of separate park & ride facilities that are part of the Long Range Plan. On the left is a major facility suggested for Johnson County at the intersection of I-35 and U.S. 50. The station would also offer the opportunity for commercial joint development and easy access to the major highways serving the area.

The lower plan shows a suggested park & ride site along 85th Street near Oak which utilizes part of the old Country Club right-of-way and provides access for local and express buses as well as transit passengers who would park their cars.

PARK & RIDE SITE DEVELOPMENT
METCALF SOUTH SHOPPING CENTER

FIGURE 28



Several of the proposed park & ride site would be operated as a joint use facility with major shopping centers. The rendering shows a typical one at Metcalf South Shopping Center. In addition to the parking areas, platforms and a waiting room would be provided for the transit passengers. These areas could be used for shoppers' parking on evenings and weekends when shopping is at its peak.

amount of parking and access for local buses.

SYSTEMS IMPACT

Undoubtedly, both the express bus and the fixed guideway options for the rapid transit corridors would have an effect on land development in the metropolitan area. It is impossible to judge either option by the probability of impact; however, both investments would be so substantial that it is inconceivable that they would not encourage the private sector to invest in joint development. There is admittedly greater experience in North America with the direct impact of fixed guideway facilities, although in the four cities which can be studied in this regard — Toronto and Montreal in Canada, San Francisco and Washington, D.C. — joint development occurred during periods of accelerated urban growth.

As stated earlier, busways and their terminal and transfer facilities, would probably attract substantial investment capital. It would be concentrated more around the transfer ways, but nevertheless it could be substantial. Regardless of the ultimate mode in the inner 24 mile core, transfer stations will be located throughout the region; therefore, a certain amount of overlap is likely to occur between public and private investment, whether or not the alternate solution is a fixed guideway operation.

If it is a city's immediate concern to create opportunities for joint development as part of a broad reclamation effort, it is important to realize that steps other than the mere programming of the transit facility are essential. It will be necessary to merge such measures as the Missouri Redevelopment Corporations Act, Missouri or Kansas Revenue Bonds, revenue sharing funds for other public facilities, and favorable zoning into an aggressive development package, to be presented to the investment community by the respective city councils.

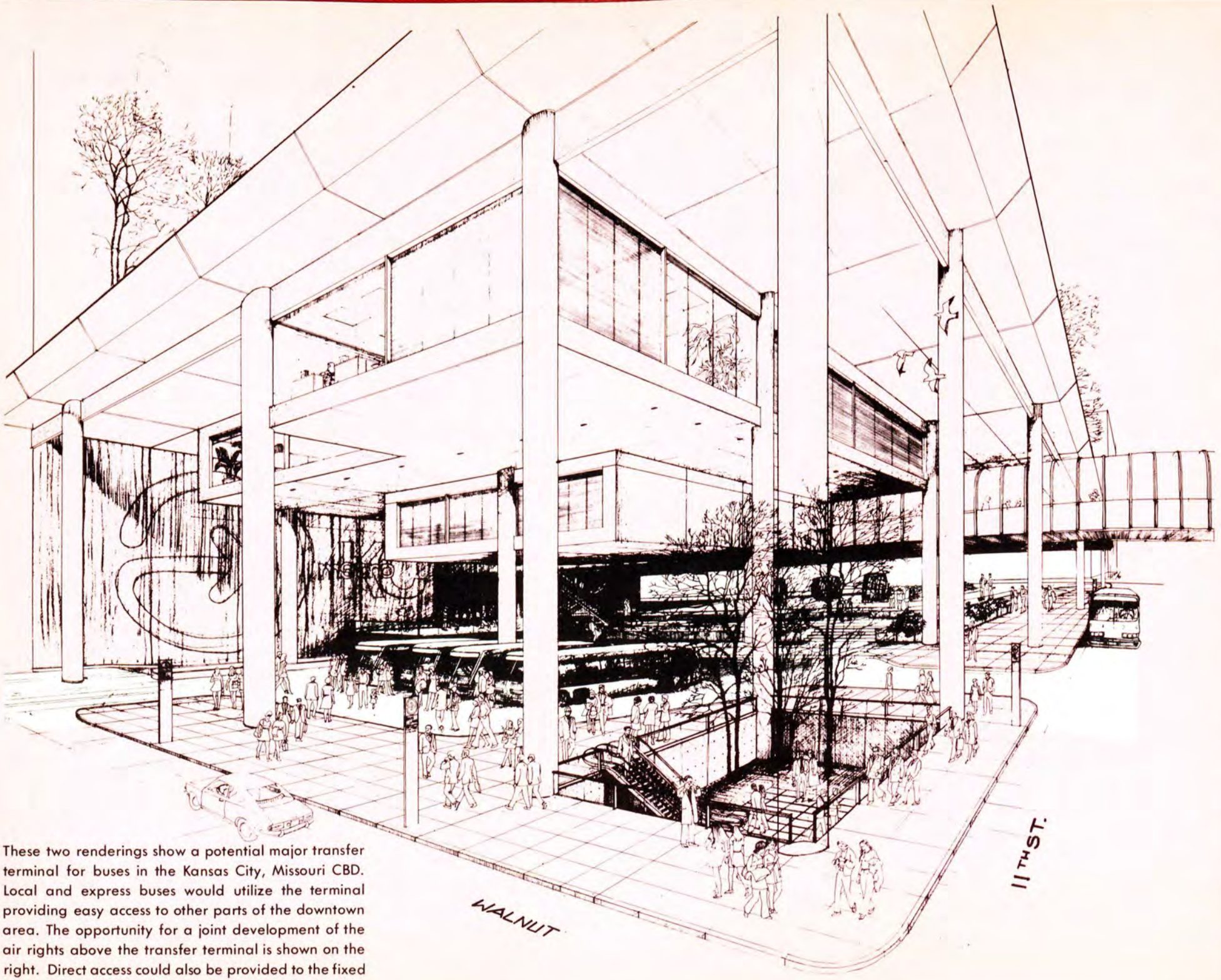
The Mid-America Regional Council cannot accomplish this alone. It will require the full faith and credit of the legally constituted municipalities and the prestige of the mayors and city councils to bring about major involvement by the private sector. The private sector will look upon these opportunities as a framework within which it might succeed, but it will not expect transit improvements per se to be the single stimulant for investment.

URBAN DESIGN CONSIDERATION

IMPACT OF STRUCTURES

The proposed transportation plan includes 24 miles of rapid transit in two major corridors. It would also provide an additional 335 miles of express bus routes and a fairly extensive network of local and feeder bus lines connecting the main corridors with the remainder of the urban area. Near the stations or stops as well as in other strategic locations, parking facilities would be provided to facilitate usage of the rapid transit system.

If a fixed guideway system is constructed, it would consist of four types of guideways: underground, on aerial structure, in open-cut and at-grade. Examples of typical aerial structures are illustrated in Figure 30. These could be used as a busway or fixed guideway. Except for economic and geological impacts, the underground sections are the easiest elements to evaluate. Conversely, the aerial structures are the most noticeable facilities and

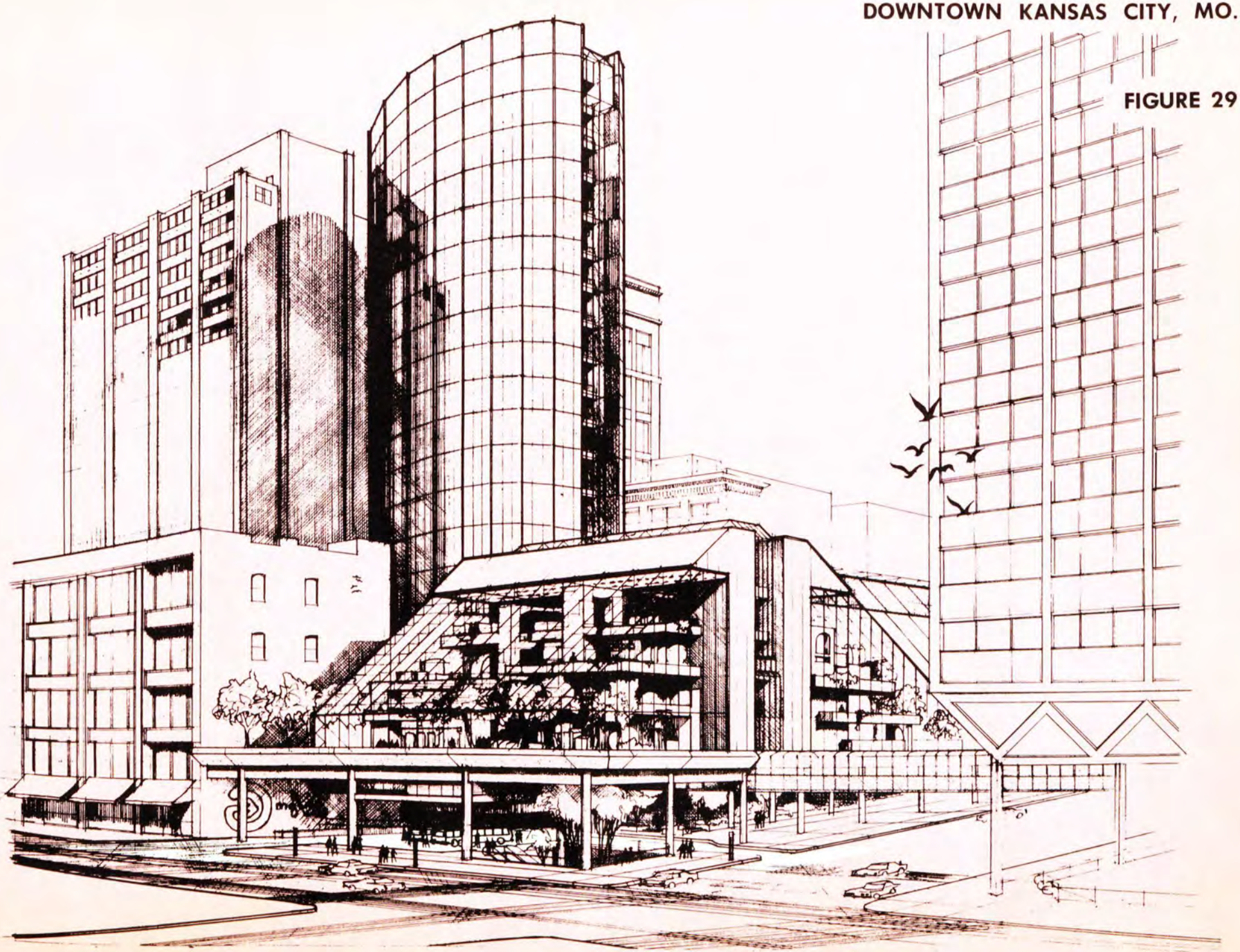


These two renderings show a potential major transfer terminal for buses in the Kansas City, Missouri CBD. Local and express buses would utilize the terminal providing easy access to other parts of the downtown area. The opportunity for a joint development of the air rights above the transfer terminal is shown on the right. Direct access could also be provided to the fixed guideway station nearby.

amount of parking and access for local buses.

TRANSFER TERMINAL
DOWNTOWN KANSAS CITY, MO.

FIGURE 29



will have the greatest environmental impact. The open-cut and at-grade sections constitute the middle ground. Obviously, impact is relative to land use. In industrial areas, it will be of little consequence where the transit way is situated so long as it does not obstruct traffic circulation. In commercial areas, the type of facility skirting or penetrating such areas as the CBD, the Country Club Plaza or a regional shopping center will normally be very significant since it could encourage or discourage the public from patronizing such areas. Residential areas, of course, are more sensitive to the many possible adverse effects of transit operations. Equally sensitive are public areas and open spaces of high aesthetic quality. Care must be taken in constructing transit facilities which relate environmentally, physically, and visually to such public areas.

If subways are used, impacts will be less noticeable because of the general absence of surface structures. The principal impacts will be the bus transfer stations and the above discussed joint development opportunities. From an urban planning standpoint, the Long Range Transit Plan is rational in that it tends to provide service to all major sections of the metropolitan area and ties major activity centers together. Furthermore, the compactness of the 24 mile rapid transit element is likely to encourage inner-area reclamation. As demonstrated by the freeway impact experience of the last 20 years, extending a transportation system into the outlying areas would encourage decentralization and long commuter trips. If public policy, indeed, is to encourage more concentrated urban growth and to redevelop the partly abandoned and largely blighted inner city sections, the plan is likely to contribute substantially toward the realization of such a policy.

HISTORIC PRESERVATION

The Long Range Plan will have no adverse impact on historically or culturally significant buildings and grounds. Union Station is the only building directly affected by the systems in the sense that it would become more accessible and could serve, as it has for years, as a secondary transfer point. Under the fixed guideway plan, the station is actually located east of Union Station using in part an existing baggage tunnel. A high level of service would be offered by both bus and fixed guideway plans to the Union Station area.

LAND ABSORPTION AND DISPLACEMENT

Table 14 shows the land required for rights of way and the displacement of housing units and non-residential establishments. As the table indicates, both are minimal and will certainly not constitute an obstacle to construction. The dwelling units to be acquired under the most desirable plan, with maximum use of existing rights of way, could theoretically be replaced by one joint development project. Actually, the displaced occupants would probably desire to relocate throughout the market area, since there is a considerable surplus of dwellings on the market.

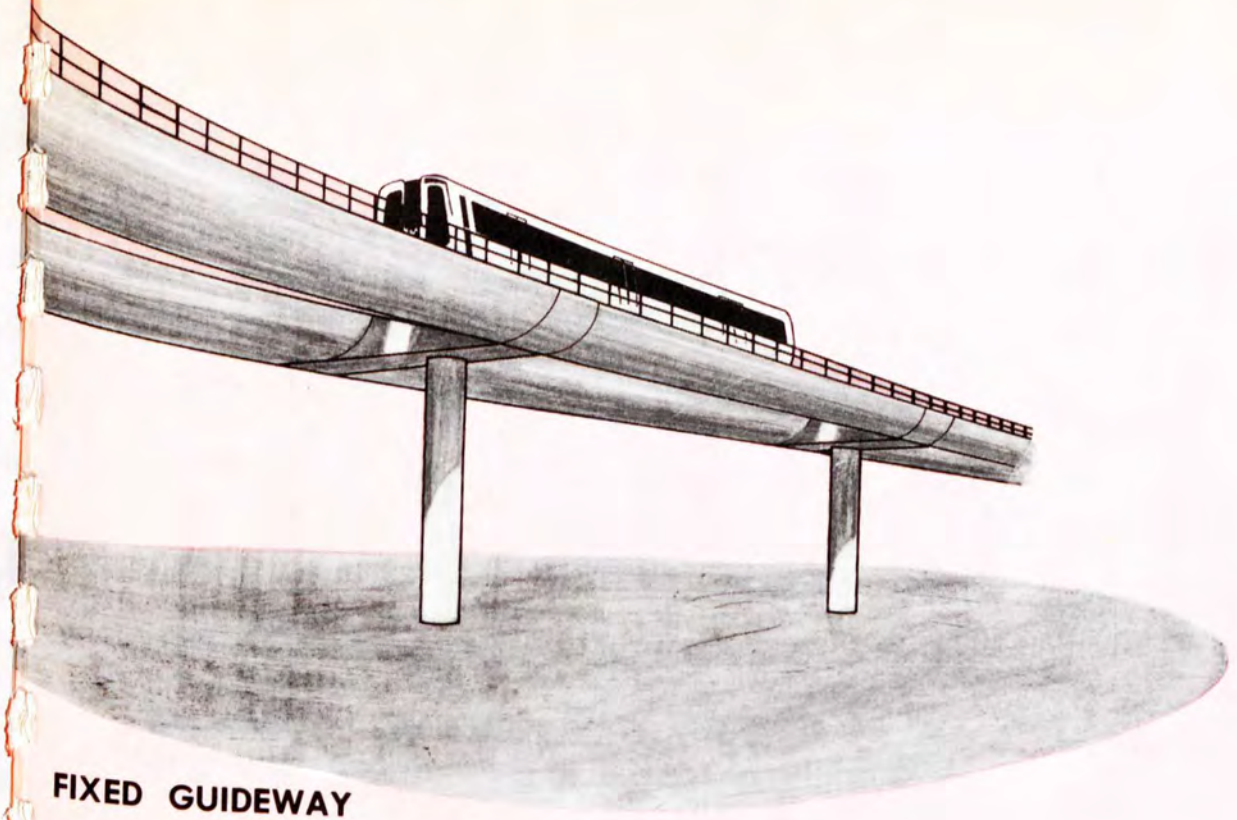
ENERGY CONSUMPTION

Energy consumption and pollution generation by transportation systems are difficult to assess short of developing detailed specifications for design, construction and operation of such systems. Nevertheless, certain valid conclusions may be drawn on the basis of pertinent

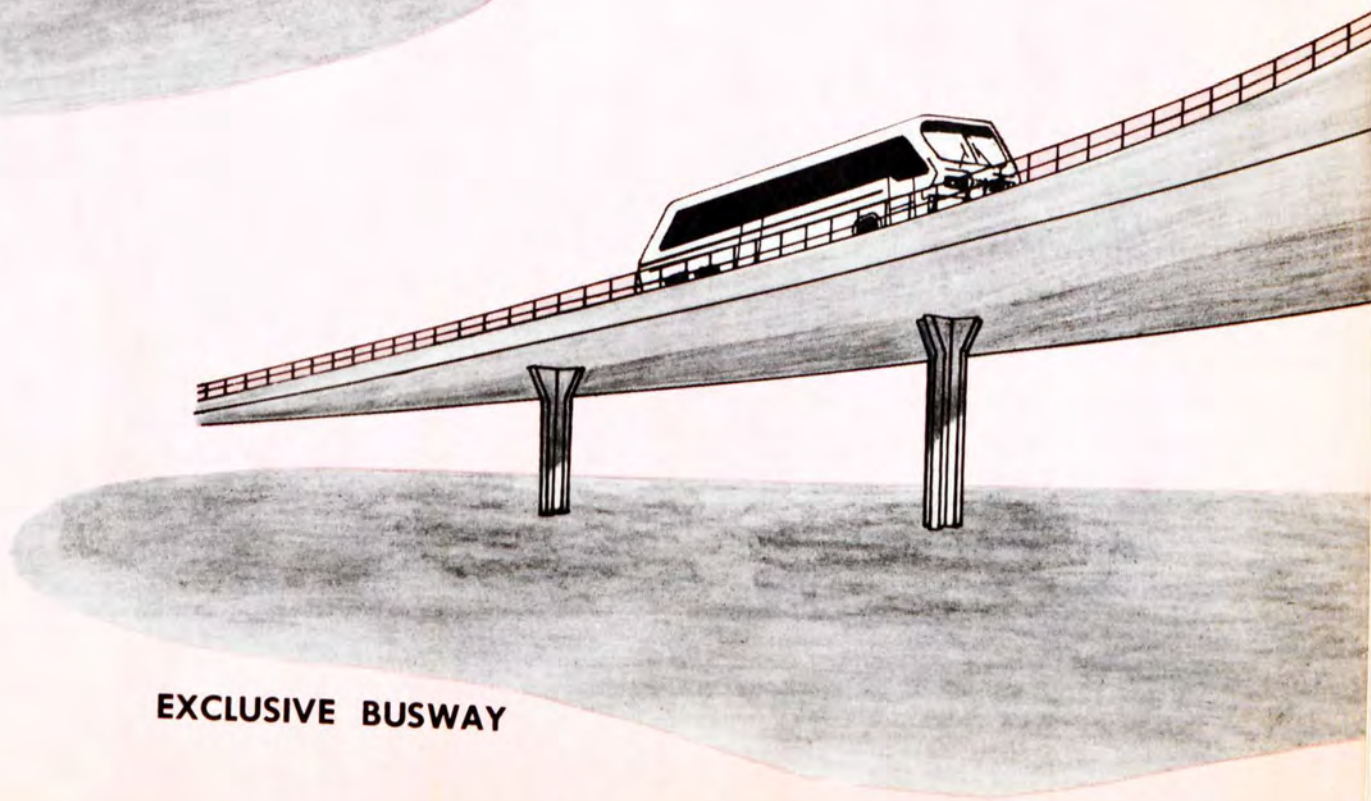
amount of parking and access for local buses.

AERIAL STRUCTURES

FIGURE 30



FIXED GUIDEWAY



EXCLUSIVE BUSWAY

It is essential that any transit facilities be aesthetically pleasing and blend in with the surrounding area. Shown here are sketches of aerial structures which might be utilized for either exclusive busways or the fixed guideway. High standards of architectural design would be established. Landscaping and other improvements would be an essential part of the construction.

TABLE 14

LAND REQUIREMENTS AND DISPLACEMENTS

Bus & Fixed Guideway

Item	Housing Units			Business Units	Costs ($Millions)			
	Own	Rent	Total		Market Value	Acquisition Cost	Relocation Cost	Total
Fixed Guideway (Prov. Plan)	86	194	280	157	21.58	3.09	2.89	27.56
Fixed Guideway (Final Plan)	46	42	88	133	10.65	1.35	1.70	13.69
Special Bus Lanes					1.19			1.19
Maintenance Facilities					1.74	0.26		2.00
Park & Ride Facility	4	4	8		1.65	0.25	0.06	1.96
Turnouts					0.17	0.03		0.20
Total (Prov. Plan)	90	198	288	157	26.33	3.63	2.95	32.91
Total (Final Plan)	50	46	96	133	15.40	1.89	1.76	19.04

All Bus

Special Bus Lanes	36	28	64	76	12.64	1.49	1.08	15.21
Maintenance Facilities					2.09	0.31		2.40
Park & Ride Facility	4	4	8		2.42	0.36	0.06	2.84
Turnouts					0.34	0.06		0.40
	—	—	—	—			—	
Total	40	32	72	76	17.49	2.22	1.14	20.85

amount of parking and access for total

industry standards and prevailing local conditions. Both are interrelated and must be clearly understood in evaluating transit options. Accordingly, with the assistance of Midwest Research Institute, analyses were made of comparative energy conservation and pollution effects. The findings are summarized here.

REGIONAL MODAL REQUIREMENTS

Future Kansas City regional energy requirements will depend primarily on mode efficiency and the number of auto, bus, and light rail vehicle miles necessary to satisfy transportation demands under the three alternative systems: no transit improvement; transit using fixed guideways and buses; and transit improvement with express and local buses. Changes in mode efficiency were considered to the extent possible. Because of recent price fluctuations and the uncertainty of future energy resources, the cost of energy utilized by various modes in Table 15 was based on 1974-75 prices.

The U.S. Department of Transportation (DOT) reports that in 1974 new cars averaged 14 mpg; and DOT anticipates that by 1980 fuel efficiency will increase to approximately 20 mpg. This 1980 level of auto efficiency seems reasonable given the increased demand for smaller cars, commitments made by the automobile industry to develop more efficient automobiles, and the present mood of Congress to legislate penalties against large cars. The most recently published U.S. Department of Commerce statistics (March 1975) indicate that the average price for automobile gasoline in the Kansas City metropolitan area is 53 cents per gallon.

TABLE 15

MODE EFFICIENCY AND ENERGY COST

Mode	Mode Efficiency	Energy Cost
Auto	20 miles per gallon	53¢ gal.
Diesel Bus	4.5 miles per gallon	34.75¢/gal.
Electric Bus	3 kw-hr./mile	3¢/kw-hr.
Light Rail Car	6.86 kw-hr./mile	3¢/kw-hr.

Source: U.S. Department of Commerce, **Survey of Current Business,** March 1975 and communications with Department of Transportation, San Francisco Municipal Railway and KCP&L officials.

On an annual basis ATA buses average 4.5 mpg and it is anticipated that the proposed Transbuses of the future will maintain a fuel economy level in this range. ATA is exempt from federal tax but pays a state fuel tax of 7 cents per gallon. Diesel fuel is purchased at a bulk rate for 27.75 cents per gallon. For purposes of this study, a price of 34.75 cents per gallon was used in calculating diesel fuel costs. The light rail car considered a standard for the fixed guideway alternative will consume an estimated 6.86 kw-hr per vehicle mile.

One emergency option under the Long Range Plan could involve conversion of approximately one-third of the buses to electric trolley buses. Based on San Francisco's operating experience with electric trolley coaches, 3 kw-hr per vehicle

mile was used to calculate the power requirements for the electric bus option.

Based on a strict comparison of energy costs, the diesel bus is less expensive to operate in Kansas City than an electric bus--7.7 cents per mile versus 9 cents per mile. In terms of total operating cost, however, the electric bus has fewer moving parts and has an estimated useful life of approximately 25 years as compared to 12 years for the standard diesel bus.

COMPARISON OF ENERGY REQUIREMENTS

The total annual energy consumed for personal transportation was estimated for the three solutions and for the electric bus emergency option. In order to facilitate comparisons of fuel and electric power requirements, quantities were converted into total dollar values and British Thermal Units (Btu) of equivalent heat energy. (See Table 16).

In terms of reduced dependency on petroleum for transportation, the light rail plan would represent an 8 percent or 40 million gallon annual reduction in petroleum product consumption over the "No-Build" alternative. In the same context, the All Bus system would reduce annual petroleum consumption by 33 million gallons. The one-third electric bus option under either program would save an additional 3.6 to 4 million gallons of petroleum.

Total dollar value for transportation energy consumed ranged from $247.6 million for the Bus & Fixed Guideway option to $269.0 million for the "No-Build" alternative. There was negligible difference in energy cost when comparing the all diesel bus mode with the electric bus option. Annual energy costs for the systems were comparable, with a variance of only $1.6 million.

The traffic forecast indicates that the average number of passengers per private automobile would be about 1.5. Assuming that it were possible to induce more efficient use of automobiles through some form of taxation or benefits, and the occupancy ratio could be increased only 20 percent to 1.8 persons, it is reasonable to conclude that fuel consumption would, for private transportation, decline by about 20 percent. The projected fuel requirements assuming no further transit improvements are 506.1 million gallons per year. If 20 percent could be saved, the required gasoline would be reduced to 404.9 million gallons. This is less than any of the alternatives evaluated, based on the estimated ridership (see Table 16). It must also be pointed out that a significant increase in transit ridership over that estimated would likewise reduce the fuel consumption in the region.

ENERGY SUPPLY

A major consideration in determining the impact on KCPL of supplying electricity for transit is the peak hour demand. Currently, the annual KCPL peak load requirements occur in the summer months between 3 p.m. and 6 p.m. From 1963 to 1974, KCPL peak load requirements increased at an average annual rate of 7.1 percent and are forecast to increase approximately 5 percent annually.

The light rail option with the electric bus provision, which will require more electricity than the other alternative

amount of parking and access for

TABLE 16

ANNUAL ENERGY REQUIRED FOR PERSONAL TRANSPORTATION KCMR-YEAR 2000

	"No-Build"	Bus & Fixed Guideway	All Bus	Assuming One-Third of Buses Electric: Bus & Fixed Guideway	Assuming One-Third of Buses Electric: All Bus
Annual Vehicle Miles (Millions					
Auto	10,122.0	9,160.0	9,265.0	9,160.0	9,265.0
Diesel Bus	9.4	48.2	54.4	32.1	36.3
Electric Bus	0.0	0.0	0.0	16.1	18.1
Light Rail	0.0	4.1	0.0	4.1	0.0
Energy Consumed[1] (Millions)					
Auto Gasoline (Gal.)	506.1	458.0	463.2	458.0	463.2
Diesel Bus Fuel (Gal.)	2.1	10.7	12.1	7.1	8.1
Total Petroleum	508.2	468.7	475.3	465.1	471.3
KWH Bus Electricity	0.0	0.0	0.0	48.3	54.3
KWH Light Rail Car Electricity	0.0	28.1	0.0	28.1	0.0
Total Btu's for Transportation Energy[2] (Times 10^6)	68.6	63.6	64.2	63.6	64.2
Total Dollar Value of Energy[3]	$269.0	$247.3	$249.7	$247.4	$249.9

[1]Assumes autos 20 mpg, diesel buses 4.5 mpg, electric buses 3 KWH per mile, and light rail car 6.86 KWH per mile.
[2]Assumes 135,000 Btu's/gal. gasoline or diesel fuels and 10,600 Btu's/KWH of electricity. (Approximate heat cycle equivalent for electricity).
[3]Assumes 53¢/Gal. gasoline, 34.75¢/gal. diesel fuel, 3¢/KWH electricity.

Source: MRI

transit plans, was used as a basis for assessing the effect of increased peak power demand on KCPL's generating capability. An engineering analysis of power requirements for the light rail cars indicates an estimated 1-hour peak demand of 16.5 megawatts. The total system requirement is 45.9 megawatts. The power requirement for electric buses used in an otherwise all bus system was estimated to by 32.1 megawatts.

Power requirements for 1990 maximum transit use would represent less than 1 percent of KCPL's total capacity. KCPL officials have indicated that this power requirement is relatively insignificant; since company planners strive for 5 percent accuracy in their projections, KCPL would not make special plans for adding capacity to its system. Considering the available options, including contingency electrification, the Long Range Plan would substantially improve the overall efficiency of transportation--public and private--by better utilization of two basic fuel sources (coal and oil) and by reducing gasoline and diesel fuel consumption.

ENVIRONMENTAL ASPECTS

AIR POLLUTION

Public concern with air and water pollution is of key importance in all major public undertakings today. Since water would not be affected by transit in Kansas City, the investigation conducted by Midwest Research Institute focused on air pollution. The three major pollutants of urban air, primarily attributable to automobile emissions, are carbon monoxide (CO), oxides of nitrogen (NOx) and nonmethane hydrocarbons (HC). Of these pollutants, only nitrogen dioxide has been monitored over a sufficiently large portion of the Kansas City region to characterize regional air quality. The average NO_2 values in the Kansas City region have been found to be only half of the allowable maximum specified by the national air quality standard.

Based on spot measurements of nonmethane hydrocarbons, it has been determined that no significant problem presently exists. Monitoring of CO has been conducted at one or two sites in Kansas City for about three years. These limited measurements indicate that levels of CO are close to, but not in excess of, the allowable limit under federal standards. Consequently, it is not surprising that the U.S. Environmental Protection Agency did not define a necessary transportation control strategy for this region with respect to air quality standards for CO. The Long Range Plan viewed from an operational standpoint will not produce large concentrations of buses with tight headways anywhere in the metropolitan area. The largest concentration of buses with 30 to 45 second headways would occur in the CBD during peak hours, but the number of vehicles involved would not create unacceptable conditions. For comparison with the "No-Build" system, total vehicles entering the CBD during the peak hour will be reduced by 16% with the Bus & Fixed Guideway option and by 8% with the All Bus option. Buses entering the CBD during the peak hour would be reduced by 43% with fixed guideway in place of an all bus operation.

The analysis concludes further that there are no other adverse environmental effects such as vibration, water pollution, objectionable odors, adverse effects on vegetation, geology and the like.

amount of parking and access for

SOCIAL CONSIDERATIONS

LOW INCOME AREA ACCESSIBILITY

Service to low income areas is a principal goal of transit planning. Census tracts with a mean income level for households and unrelated individuals of $5,000 per year or less are considered at poverty level. Figure 31 shows census tracts in this category, based on 1970 census data. Relating these tracts to the Long Range Plan, it is apparent that they would receive satisfactory service east and south of the Central Business District. While local service would not be much more than present bus service, most of the area is also served by the rapid transit corridor. This becomes even more apparent if the next higher income group, up to $8,000, is considered. (See Figure 31).

In 1970, the total number of households and unrelated individuals in the census tracts with a mean annual income of $5,000 or less was 41,300. All of these households are less than one-quarter mile from transit lines proposed in the plan. Approximately 5,800 persons, or 14 percent, are within one-quarter mile of rapid transit corridors, or within a band one-half mile wide. Taking the census tracts with a mean income of $8,000 per year, the total number of persons would be 382,600. Of these, 257,000, or 67 percent, have transit access within one-quarter mile. Some 14 percent, or 55,000 are within one quarter mile of rapid transit. Accessibility for both categories is excellent.

GENERAL POPULATION AND EMPLOYMENT ACCESSIBILITY

On the basis of 1970 U.S. Census data and year 2000 population and employment assignments, the number of people who would have access to the 24 mile rapid transit corridors within one-quarter mile have been estimated. Table 17 shows that 1970 population would include 115,562 persons within the stated distance of any of the two routes. For the design year, the number would increase to 130,700. If the feeder and express bus system is included, the number of persons served by the total transit system would be between 1.4 million and 1.5 million. This is not to say that the remaining 500,000 or 600,000 potential riders would be without service. It merely means that the service pattern of buses operating in the outlying areas would be a substantially greater distance from some residents. If the whole system were in operation at this time, 1.1 million people would be within walking distance of a service line. This is so because the system would be out of scale in proportion to the existing 1.3 million population in the study area, as it is designed for a level of 2 million.

Figure 31 and Table 17 show employment accessibility. If the future system were in operation in 1970, 90 percent of all jobs would be within one-quarter mile walking distance of a route. For the year 2000, the percentage would be 78. It is, therefore, readily apparent that from the standpoint of accessibility to place of residence as well as accessibility to jobs, the rapid transit element and the total system including feeder and express buses would serve the anticipated population exceedingly well.

ECONOMIC CONSIDERATIONS

TRAVEL COST COMPARISONS

An analysis was made by Midwest Research Institute of the relative costs of travel within each of the three major plan options: the "No-Build" program; the fixed guideway plan; and the all bus option. The results are summarized as follows:

- The transfer of auto trips to transit under the Long Range Plan with or without fixed guideways will reduce the numer of auto miles driven by approximately 900 million and decrease auto-related operating expenses by over $120 million annually.

- Operation, maintenance and equipment replacement expenses for the "No-Build" alternative will be $14.1 million annually as compared to $77.9 million for the plan with fixed guideways and $70.2 million for the All Bus program. In terms of distributing this expenditure on a per passenger mile basis the "No-Build" alternative will cost 12.9 cents while the plan alternatives are lower with costs of 8.7 cents and 9.6 cents per passenger mile, respectively.

- The out-of-pocket cost per trip or transit fare for the "No-Build" alternative will be slightly less than for the Long Range Plan; however, the per passenger mile cost will be higher—8.5 cents as compared to slightly over 5 cents.

- In terms of total direct regional transportation costs—transit operating, maintenance and replacement, and auto operating expenses—the plan systems will realize an annual savings of $71 million with fixed guideway and $64 million without fixed guideway. On the basis of out-of-pocket expenditures for personal transportation—transit fare costs and auto operating expense—this annual savings will be over $95 million.

- The savings in transportation cost of the proposed system alternatives is not the result of auto trips being

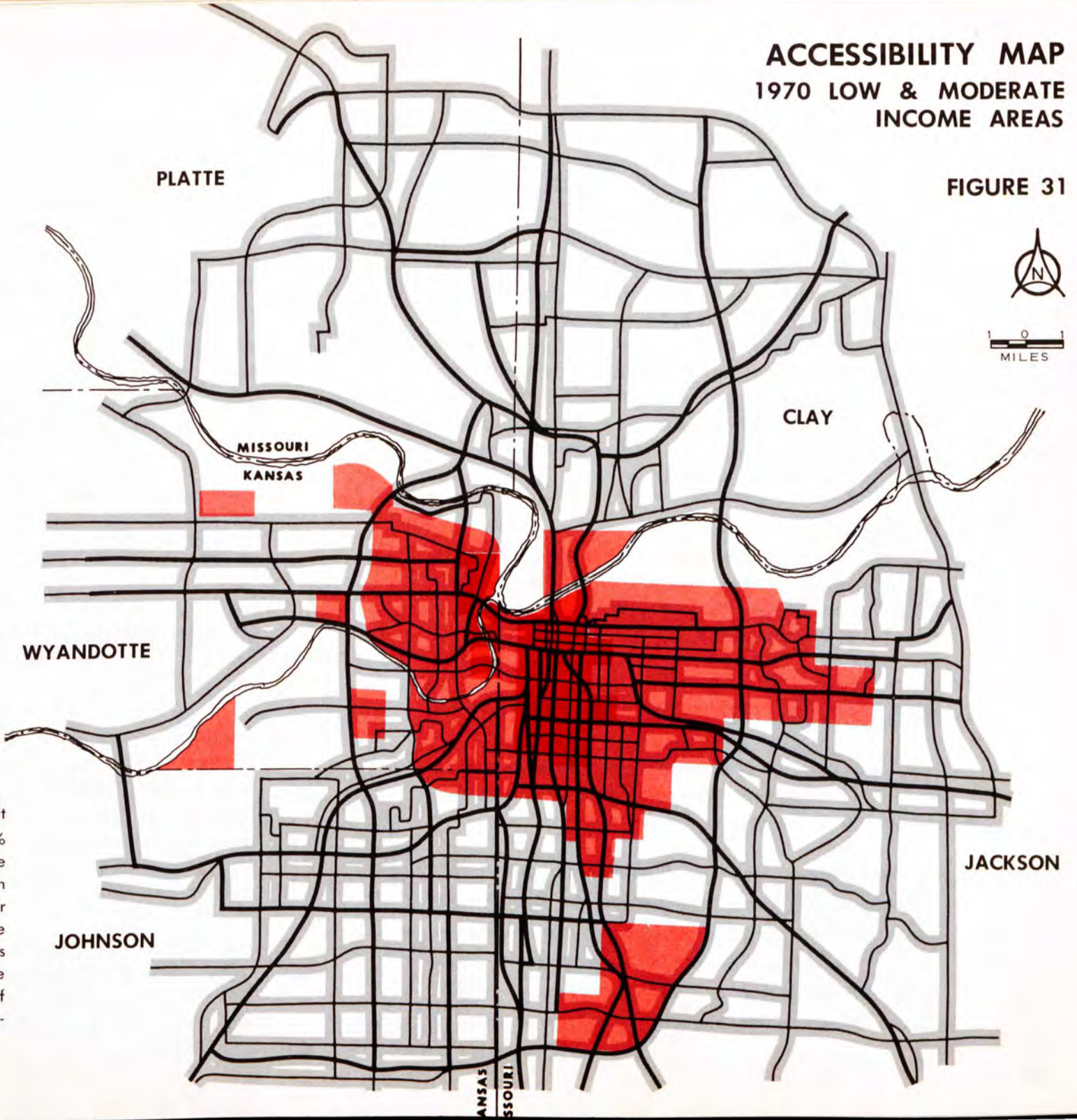
TABLE 17

POPULATION AND EMPLOYMENT ACCESSIBILITY ¼ MILE OF TRANSIT LINES

	Total System		Rapid Transit	
	1970	2000	1970	2000
Population	1,125,000	1,500,000	115,562	130,700
Low Income	41,300		5,800	
Moderate Income	382,600		55,000	
Employment	512,000	740,000	125,700	162,000

ACCESSIBILITY MAP
1970 LOW & MODERATE INCOME AREAS

FIGURE 31



LEGEND

¼ Mile Transit Accessibility

Income $5,000. and under

Income $5,000. to $8,000.

The Long Range Plan will provide transit service within walking distance of 75% of the forecast population and 78% of the jobs. Particular emphasis was placed on providing easy accessibility to transit for the lower income areas. The map here shows those determined by the 1970 census to be predominantly low and moderate income and indicates the high level of accessibility to be provided by the proposed transit routes.

converted to less expensive transit trips. The reduction of transportation cost is a result of the shorter and fewer trips generated by the projected higher density and urban core redevelopment.

- The systems of the Long Range Plan would require between 9.5 million and 10 million more man-hours of travel time than the "No-Build" alternative. This increase in travel time is the result of transfers from auto with an average trip time of 16 minutes to transit with a higher average door-to-door trip time. The additional travel time required is equal to an indirect transportation cost of $28 million with fixed guideway and $37 million for the all bus operation.

- In summary, regional travel cost would be reduced by $43 million and out-of-pocket expenses would decrease by $78 million annually under the Long Range Plan with fixed guideway. Savings under the All Bus option would be in the range of $27 and $58 million respectively.

IMPACT OF CONSTRUCTION AND OPERATION

MRI analyzed the overall effect of transit development on employment in the Kansas City region and summarized this theoretical impact as follows:

- Because the major source of funding for both transit alternatives will come from outside the Region—approximately 80 percent would be Federally funded—construction expenditures for these projects would generate secondary or induced economic activity. This is known as the multiplier effect of primary income, producing effects on the service industry, manufacturing and other sectors of the regional economy. The multiplier concept explains how a major public or private expenditure, which is an increase in final demand, will have a cumulative effect on income and employment much larger than the initial expenditure. This impact is illustrated in Figure 32.

- Construction expenditures for transit with fixed guideway will generate approximately four times more employment and income than a system without fixed guideway: 98,000 man-years and $1,080 million in income as compared to 21,000 man-years and $230 million in income. Table 18 shows the probable effect in 1975 dollars for each solution.

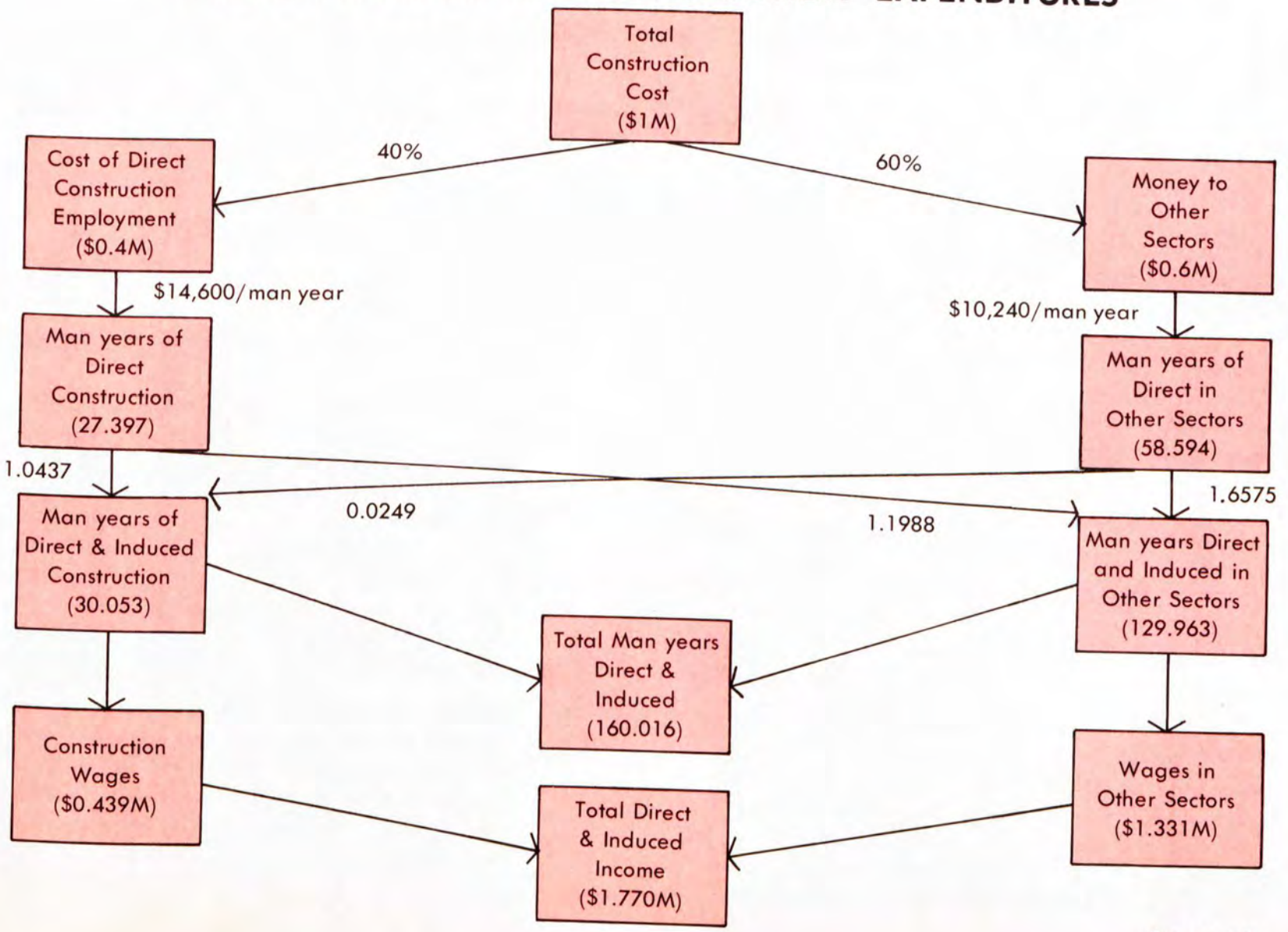
- Assuming a 10-year construction period, the fixed guideway option would create an average demand for between 1,600 and 1,700 on-site construction workers annually.

- The displacement of housing units and business property through right-of-way acquisition could possibly exert some pressure within the region for additional construction. The magnitude of this economic stimulus would depend primarily on existing residential vacancy rates and the availability of leasable business property at the time of construction.

- The increase in personnel required to operate either system under the Long Range Plan would create an additional 2,000 permanent job opportunities, generating an increase of over $24 million annually in wage income. (See Table 19.)

FIGURE 32

METHODOLOGY FOR EVALUATING THE MULTIPLIER EFFECT PER MILLION DOLLARS OF CONSTRUCTION EXPENDITURES



Source: MRI

TABLE 18

CONSTRUCTION EXPENDITURES EMPLOYMENT AND INCOME EFFECT

	"No-Build"	All Bus	Bus & Fixed Guideway
Direct Construction Cost ($ Million)	$9.7	$129.4	$610.4
Direct Employment (Man-Years)			
Construction Sector On-Site	265.8	3,545.2	16,723.1
Other Sectors Off-Site	568.4	7,582.1	35,765.8
Subtotal	834.2	11,127.3	52,488.9
Induced Employment (Man-Years)			
Construction Sector	25.7	343.7	1,621.3
Other Sectors	692.8	9,235.1	43,563.6
Subtotal	718.5	9,578.8	45,184.9
Total Employment Effect (Man-Years)	1,552.7	20,706.1	97,673.8
Total Income Generated ($ Millions)	$17.2	$229.1	$1,080.4

Source: MRI

- In comparison to recently completed public projects funded through local bond issues, shown in Table 20, the construction of either transit system is unique from a regional economic standpoint. The primary difference stems from the fact that this would represent an opportunity to attract a sizable investment in the urban system financed primarily from outside Federal funds.

However, the local cost—20 percent matching funds required for capital outlays and subsidies needed for operation and maintenance— will have to be weighed against the economic and transportation benefits which may or may not be derived from the transit improvement program.

TABLE 19

PERSONNEL REQUIREMENTS AND ANNUAL PAYROLLS

Employment Category	"No-Build" System	All Bus	Bus & Fixed Guideway
Transportation	527	2,364	2,197
Maintenance	139	430	416
Administration	33	125	125
Total Employees	669	2,919	2,738
Wage Income	$8,607,000	$35,742,544	$33,533,000

Source: MRI

FREEWAY ACCIDENT DELAYS

A principal incentive to the use of public transportation is the delay often experienced by automobile drivers using the metropolitan freeway system. The individual tripmaker is most cognizant of such delays when they occur during peak hours. They are usually the result of restrictions imposed by highway construction, accidents and vehicle breakdowns.

During the six-month period from January to June 1972, accident records maintained by the Missouri and Kansas Highway Patrols and the Traffic Analysis Section of the Kansas City, Missouri Police Department were reviewed.

Figure 33 shows the locations of the most frequent accidents on the Kansas City regional freeway system during this period. Interestingly enough, 75 to 80 percent of all accidents in a typical 24-hour weekday period occurred during the hours of 6 to 9 a.m. and 3 to 6 p.m.

Relating this data to total daily traffic periods and assuming that a driver's time is valued at about $3.60 per hour, it appears that the traveling public in the Kansas City area during the six-month survey period lost the following estimated dollars:

In Missouri	$993,000
In Kansas	473,000
Total	$1,466,000

In a special investigation conducted for the project, Midwest Research Institute compared probable accident rates under conditions of no transit improvements and under conditions of the proposed public transportation plan, both with the fixed guideway option and with the all bus option. It was concluded that the proposed plan with either option would, without question, result in a savings of at least $10 million annually in accident costs (based on

1975 dollars). The number of fatalities would likely be reduced by 7 percent and the number of transportation-related personal injuries by about 4 percent. According to the analysis, there is no discernible difference between the fixed guideway and the busway rapid transit options. However, the safety benefits conceivably could be much greater than estimated, because of the largely unknown effect of exclusive right-of-way mileage for transit vehicles. In any event, the tragedies and inconveniences resulting from accidents due to transportation are considerable and it would appear that transit improvements as envisaged by the Long Range Plan will make a substantial contribution towards their reduction.

COMPARISON OF COSTS FOR ALTERNATIVE SYSTEM

In order to make realistic comparisons between the costs of the present transit system, the All Bus system and the Bus & Fixed Guideway system, it is necessary to make several adjustments to the basic cost figures. These adjustments are designed to do the following:

- Correct for the fact that each of the three systems has a different distribution of costs through time.

- Correct for the fact that each of the systems uses a different type of technology with different useful lives on many of the component parts. The useful life of a bus, for example, is about 12 years whereas that of a light rail transit vehicle is about 25 years.

While the above adjustments give equivalent aggregate cost estimates for different systems, it should be emphasized that they tell us nothing about what these costs mean in terms of transportation service provided.

TABLE 20

COMPARISON OF MAJOR KCMR CONSTRUCTION PROJECTS WITH TRANSIT OPTIONS

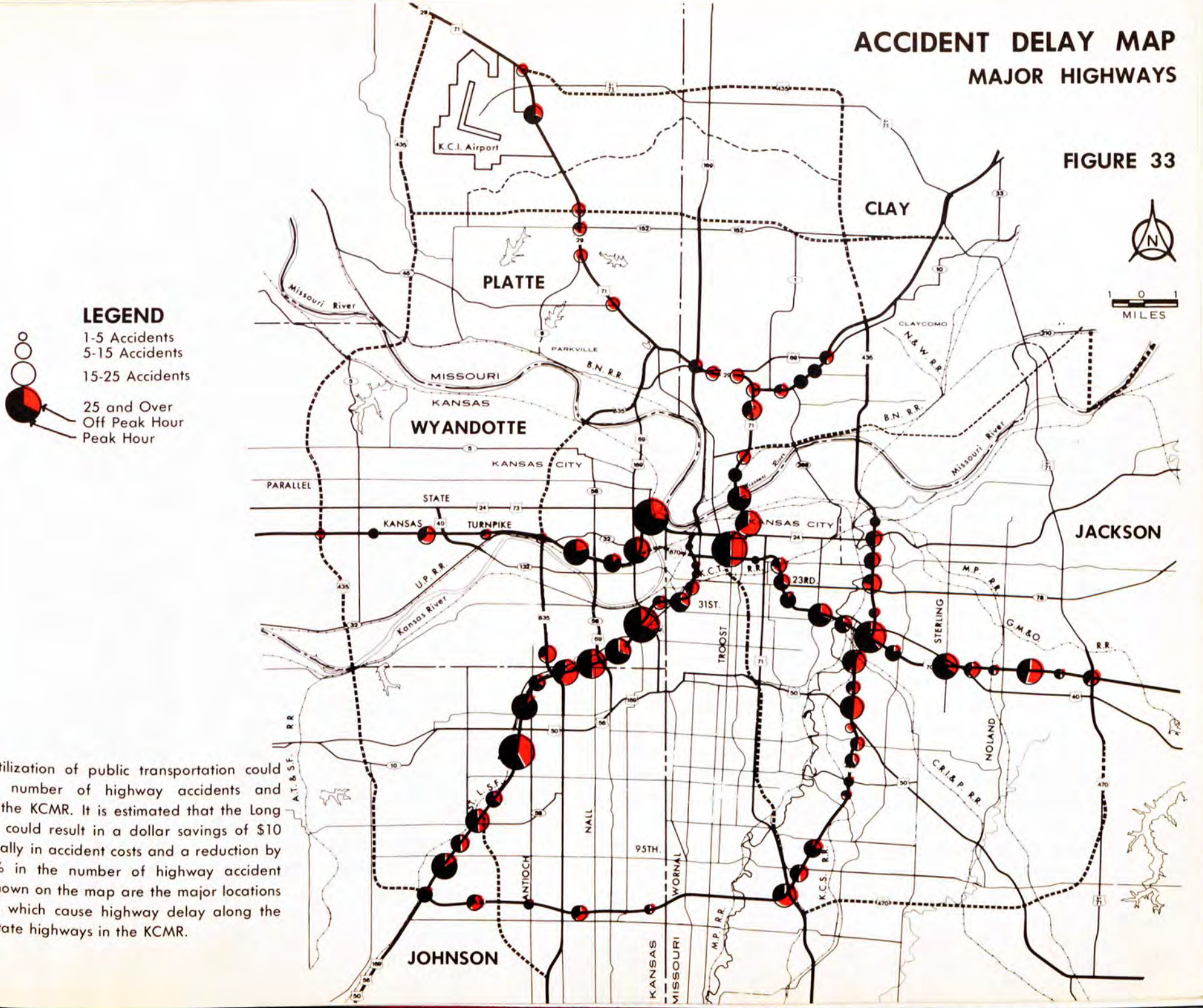
Project	Estimated Cost Based on 1975 Dollars (Millions)
KCI	$339
Harry S. Truman Sports Complex	90
Crown Center	248
Kemper Arena	17
Worlds of Fun	24
H. Roe Bartle Convention Center	20
Proposed Transit Systems	
Bus & Fixed Guideway	129.4
All Bus	610.4

Source: MRI

Table 21 shows the net capital costs of the three systems. These costs reflect the present worth of all capital outlays in the period 1975 to 2000, less the present worth of the estimated terminal value of each system in 2000. In other words, the table shows how much capital each system would consume during the planning period.

ACCIDENT DELAY MAP
MAJOR HIGHWAYS

FIGURE 33



Increased utilization of public transportation could reduce the number of highway accidents and fatalities in the KCMR. It is estimated that the Long Range Plan could result in a dollar savings of $10 million annually in accident costs and a reduction by at least 7% in the number of highway accident fatalities. Shown on the map are the major locations of accidents which cause highway delay along the major Interstate highways in the KCMR.

The costs shown in Table 21 are based on assumptions as to when the fixed facilities required by each alternative system would be constructed and when service capacity would be increased to its year 2000 level. The staging assumptions used here are only one set drawn from a number of possibilities and are used here only to add realism to the comparison of costs between systems. However, given the factors which determine staging, such as the relatively long time it takes to make fixed transit facilities operational and the timing of growth in demand. Thus, there are constraining limits on the number of staging possibilities.

The staging which underlies the net capital cost figures in Table 21 imply that outlays for right-of-way acquisition and construction of fixed facilities for both rapid transit systems would be concentrated in the 1980-1990 decade. Service on the rail transit component was assumed to begin in 1985. The bus fleet was assumed to rise at a more or less constant rate from the present level to the year 2000 level, with capital outlays in any given year being a function of net fleet additions plus replacement requirements.

The terminal values shown in Table 21 are based on standard useful lives for the facilities involved. Thus, a facility which goes into service in 1985 and has a useful life of 25 years, will have a terminal value equal to 10/25 of its initial cost. The amounts shown in Table 21 represent the present worth of the year 2000 terminal values.

Table 22 shows operating costs for the three systems. Again, these are expressed in terms of present worth. To some extent, the level of operating costs at any given time is determined by the number of fixed facilities in operation at that time. In the case of the two options, and specifically the all bus system, it is more dependent upon the number of

TABLE 21

NET CAPITAL COSTS OF ALTERNATIVE SYSTEMS

(in millions of 1975 constant dollars)*

Cost Item	Present System	Long Range Plan: All Bus	Long Range Plan: Bus & Fixed Guideway
Fixed Facilities	6.75	63.92	273.81
Buses	9.07	25.27	21.33
Sub-Total, Outlays	15.82	89.19	295.14
Less: Terminal Values			
Fixed Facilities	--	(7.56)	(37.51)
Buses	(0.81)	(4.10)	(3.50)
Dial-A-Ride	--	(0.05)	(0.05)
Sub-Total	(0.81)	(11.71)	(41.06)
Net Capital Costs	15.01	77.48	254.08

*All costs are discounted to their present (1975) worth at 10%.

TABLE 22

OPERATING COSTS FOR ALTERNATIVES

(in millions of 1975 constant dollars)*

Cost Item	Present System	Long-Range Plan: All Bus	Long-Range Plan: Bus & Fixed Guideway
Bus Operations	112.68	248.87	239.60
Rail Operations			12.26
Dial-A-Ride		10.52	10.52
Total	112.68	259.39	262.38

*All costs are discounted to their present (1975) worth at 10%.

buses in use, which is only indirectly related to fixed facilities. In both options it is assumed that the bus fleets increase at a uniform rate between 1975 and 2000. The fixed guideway portion is assumed to begin half-scale operation in 1985 and full-scale in 1990.

Table 23 summarizes the cost estimates based on present worth. Considering both capital and operating costs, the Bus & Fixed Guideway system is the most expensive system, exceeding the cost of the All Bus system by approximately $180 million, or about 53 percent. It should be pointed out that

TABLE 23

SUMMARY OF COST ESTIMATES

(in millions of 1975 dollars)*

Cost Item	Present System	Long-Range Plan: All Bus	Long-Range Plan: Bus & Fixed Guideway
Net Capital Costs	15.01	77.48	254.08
Operating Costs	112.68	259.39	262.38
Total	127.69	336.87	516.46

*All costs are discounted to their present (1975) worth at 10%.

this analysis is restricted to the cost of the alternative systems and does not reflect benefits which would result. These previously discussed impacts and benefits are summarized in the concluding section. In addition, the costs in Table 23 only include the transit component of the Region's transportation system and does not consider the cost of additional highway investments which might be required if the Long Range Transit Plan is not implemented. This aspect is being investigated as part of MARC's Long Range Highway Plan.

CONCLUSIONS FROM BENEFITS AND IMPACTS ANALYSIS

Table 24 entitled "Summary of Impacts & Benefits" provides in capsule form an overview of the preceeding analysis of probable impacts of various potential transit improvements for the Region. Physical as well as economic, social, and resource impacts have been taken into consideration. Each of the major aspects subjected to analysis was fitted into one of four subdivisions of the Table and ranked in an order which attempts to describe the degree of desirability and effectiveness within each analysis category as related to the three alternatives: the "No-Build" policy; the Bus & Fixed Guideway option; and the All Bus option. It should be noted that for many of the measures in Table 24, the Bus & Fixed Guideway and the All Bus option system show minor differences.

The principal subdivisions of Table 24 cover the following:

Transportation Cost Measures - These include both transit related costs -- capital and operating -- as well as total transportation costs which reflect the combined costs of auto and transit.

Transit Usage and Quality Measures - Various measures of transit usage, coverage and convenience are summarized in addition to user cost for each of the three alternatives.

Measures Reflecting Community Objectives - Many of the social, economic and environmental considerations discussed previously are summarized where they could be quantified.

Measures Reflecting National Objectives - These measures include air quality and use of petroleum under the three alternatives.

While these measures are individually quantifiable, each has its own level of importance or weight in the evaluation process and does not share any one common index of measurement. They, therefore, must be subjectively compared.

The concept of cost-effectiveness is one means of evaluating the relative worth of various courses of action. A simplistic view of this technique suggests that all transit alternatives would be compared to a single, common standard of effectiveness in selected regional transit objectives. The alternatives would then be evaluated in terms of a single measure of cost with the least costly considered the most cost-effective. This does not mean that the most cost-effective is the most desirable. The Summary of Impacts and Benefits in Table 24 ranks the system alternatives by various transit measures in irder to determine the most effective transit network to fulfill Regional goals.

Based on all available planning data and these analyses, it appears that the All Bus option will provide the most cost-effective solution for the foreseeable future although not necessarily for the long term future. This conclusion was confirmed by independent analysis conducted by the Midwest Research Institute which has been incorporated into this chapter. However, in recognition of the uncertainties of the times and the virtual impossibility of making very long range plans for any major public improvement, it is considered prudent to retain the concept of a possible future change from bus operations to a different level of technology.

When under 2% of the total daily trip-makers in the metropolitan area currently avail themselves of transit service and even when it is reasonably forecasted that not more than 6% of the trip-makers will use a significantly improved service, then it would appear that the service can only be provided on the basis of an investment level which is commensurate with that modest usage. In evaluating the problem of cost-effectiveness and in weighing the pros and cons of the many aspects that one must consider with respect to investments in public transport, it is significant to note that the land use and planning concepts presented here are all based on the assumption that at some future point in time there will be two million people in this metropolitan area. Recent and current fluctuations in growth trends makes it very difficult to predict when that level will be reached. Investment decisions cannot be based on speculative growth but must relate to actual discernible facts and short range trends in which one can have a high level of confidence. This is not to say that it is not legitimate for the general long range land use plan to postulate that at some time in the future there will be two million people in this region and when this population level is achieved, that certain travel patterns would evolve with the various consequences evaluated in this study.

The concept of cost-effectiveness applied to public transportation planning will then logically lead to this notion. Presently, the Kansas City regional transit system operated by the ATA is attempting to build ridership. The first five-year program under the Long Range Plan is designed to induce greater transit usage by providing a higher level of service, better equipment and facilities for the patrons, improved maintenance and management, and by a systematic, rational, monitored approach to service extensions through well-tested traditional methods and by means of carefully designed innovative practices. If it is possible over the next five years to reverse the past trends of attrition and of fluctuation in transit patronage, then a solid basis will exist upon which to build a broader transit system.

If the public opts for more transit, the Long Range Plan can be implemented on the basis of choice and specific policy. As was pointed out earlier in this Chapter, development policy and choice have often been the sole criteria of public investment here and elsewhere. Transit decisions may well be placed in the same category. If this is so, the Long Range Plan provides an initial blueprint of the steps to be taken and it outlines the probable impacts and consequences which can reasonably be expected of each phase.

TABLE 24

SUMMARY OF IMPACTS AND BENEFITS

		Measurement Indices	Ranking of Alternatives[1]	Comments
TRANSPORTATION COST MEASURES				
Transit Related Cost				
1. Transit capital cost	No Build	$34.2 (mil)	1	Includes capital cost of replacing the present system and right of way, construction and equipment cost for each option.
	All Bus	237.0 (mil)	2	
	Bus & FGW	744.7 (mil)	3	
2. Annual transit operating deficit	No Build	4.2 (mil)	1	Represents the difference between required operation and maintenance expenditures and fare collections.
	All Bus	27.7 (mil)	3	
	Bus & FGW	22.7 (mil)	2	
3. Operation, maintenance and replacement (O, M&R) cost per mile	No Build	15.1¢	3	This index represents a distribution of total O,M&R cost on a per passenger mile basis. The shorter trips in the No Build increases the per passenger mile cost above the other two alternatives.
	All Bus	11.1¢	1	
	Bus & FGW	11.6¢	2	
Annual Regional Transportation Cost — Auto and Transit Aggregated				
4. Annual transportation cost	No Build	$1,431 (mil)	3	Includes the total annual cost for personal transportation in the KCMR—operation and depreciation for both auto and transit modes.
	All Bus	1,367 (mil)	2*	
	Bus & FGW	1,362 (mil)	1*	
5. Annual dollar value of travel time	No Build	$1,841 (mil)	1	Increases in travel time cost under the options is the result of transfers from auto to transit.
	All Bus	1,877 (mil)	3	
	Bus & FGW	1,868 (mil)	2	
6. Annual traffic accident cost	No Build	$248 (mil)	3	The lower traffic accident cost for the options reflect the transfer of auto trips to the safer transit mode of travel.
	All Bus	238 (mil)	2*	
	Bus & FGW	235 (mil)	1*	
TRANSIT USAGE AND QUALITY MEASURES				
1. Transit usage (AAWD person trips)	No Build	72,220	3	The difference in trips generated under the All Bus and Bus & FGW options to be relatively insignificant in measuring the overall effectiveness of these alternatives.
	All Bus	288,948	2	
	Bus & FGW	316,830	1	
2. Percentage of total person trips on transit	No Build	1.4	3	The two options should attract 5.5 to 6.0 percent of total person trips in the KCMR, as opposed to on 1.4 percent for the No Build.
	All Bus	5.5	2	
	Bus & FGW	6.0	1	
3. Transit system coverage to CBD and other activity centers (AAWD trip ends CBD)	No Build	43,324	3	Although the option with FGW produces a slightly higher transit usage to the CBD, they both represent an expanded capability over the No Build in serving major activity centers.
	All Bus	121,095	2	
	Bus & FGW	140,938	1	
4. Transit availability for mobility deficient people	No Build	--	2	Both options equally serve the low income, elderly and handicapped in providing access to jobs, shopping, health care and other facilities.
	All Bus	--	1	
	Bus & FGW	--	1	
5. Rider convenience (average speed of transit vehicles MPH)	No Build	13.1	3	Both options represent a shorter trip time between destination points because of the increase in vehicle speed allowed by the exclusive busway and fixed guideway elements of the systems.
	All Bus	17.2	1*	
	Bus & FGW	17.3	2*	
6. Transit user per mile cost	No Build	8.5¢	3	Both options will benefit the transit user through a lower per passenger mile fare cost.
	All Bus	5.2¢	1*	
	Bus & FGW	5.4¢	2*	

TABLE 24 (Continued)

SUMMARY OF IMPACTS AND BENEFITS

MEASURES REFLECTING COMMUNITY OBJECTIVES

		Measurement Indices	Ranking of Alternatives[1]	Comments
1. Land use objectives (regional core employment/population in thousands)	No Build	--	3	Assuming that a significant increase in transit service would create an atmosphere for more efficient use of land resources and public facilities through higher densities along major transit corridors, the Bus & FGW option would be more beneficial in achieving this goal.
	All Bus	--	2	
	Bus & FGW	--	1	
		residences/businesses		
2. Displacement of residences/businesses and tax base impact	No Build	--	1	The displacement of property and tax base is slightly higher with the Fixed Guideway. The tax base loss will be offset to some extent from joint development opportunities.
	All Bus	72/76	2	
	Bus & FGW	96/133	3	
		man-years/jobs		
3. Employment benefits during construction (man-years)/operation (jobs)	No Build	1,552/699	3	Construction expenditures for the Bus & FGW option would have a significant impact on employment in the construction sector and in support industries. Both options would create an additional 2,000 permanent job opportunities.
	All Bus	20,706/2,919	2	
	Bus & FGW	97,674/2,738	1	
4. Noise Impact	No Build	No	--	The transfer of auto trips to transit is not anticipated to have a measurable effect on auto related noise. The buses and light rail cars will not exceed federal noise guidelines for urban land uses.
	All Bus	measurable	--	
	Bus & FGW	difference	--	
		CBD/KCMR		
5. Total auto miles, AAWD	No Build	436,000/36,500,000	3	Due to the higher density land use plan B assumed for both options, these systems will show an increase in traffic in the CBD over No Build although they show a decrease in area wide traffic.
	All Bus	471,000/34,200,000	2	
	Bus & FGW	445,000/33,800,000	1	
6. CBD traffic congestion (volume/capacity ratio)	No Build	1.30	3	All three systems will experience traffic exceeding design capacity, but only the No Build will experience serious congestion in the CBD. This problem is amelioriated under both options by increased use of public transit.
	All Bus	1.14	2	
	Bus & FGW	1.04	1	
		injuries/fatalities		
7. Traffic safety (annual KCMR personal injuries/fatalities)	No Build	22,018/283	3	Public transit is safer than private auto usage. The increase in transit usage and the fewer and shorter trips assumed for both options (land use plan B) will reduce the number of transportation related fatalities by 7 percent and injuries by 4 percent over the No Build alternative.
	All Bus	21,425/265	2	
	Bus & FGW	21,153/262	1	

MEASURES REFLECTING NATIONAL OBJECTIVES

1. Air Quality (million pounds of CO emissions)	No Build	93.01	3	The primary air pollution problem originating with mobile sources in the KCMR is carbon monoxide. The transfer of auto trips to transit under either option will result in a slight reduction in carbon monoxide emissions.
	All Bus	88.17	2	
	Bus & FGW	86.86	1	
2. Reduced dependency on petroleum (million gallons consumed per year)	No Build	508.2	3	The All Bus and Bus & FGW options will save between 33 and 40 million gallons of petroleum annually as a result of the transfer of trips to the more fuel efficient public transportation.
	All Bus	475.3	2	
	Bus & FGW	468.7	1	

[1]Ranked on a scale of 1 most preferred to 3 least preferred. Where two alternatives are given the same rank there is no difference in the measurement index. An asterisk (i.e., 1*) indicates the difference is not significant.

Source: MRI

CHAPTER IV

STAGING, SERVICE CRITERIA AND EFFECTIVENESS EVALUATION

In Chapter II, the Long Range Plan with both options was presented. Developing a staging strategy capable of bringing this Plan to fruitation is as important as determining the final plan itself. Traditionally, long range transportation studies have identified interim sub-plans necessary to achieve the Long Range Plan by time increments. This approach has the inherent difficulty that the interim sub-plans may not be consistent with current population, land use or patronage demands. Thus, investments might be made in a program which are not appropriate for the level of transit demand that actually exists.

To account for these shortcomings, an innovative solution has been developed for the KCMR using a Monitoring Program. This Program will, over time, evaluate features of the transit system and the highway networks in terms of passenger loadings, highway congestion, and other measures of regional travel to determine which periodic improvements or investment decisions should be made. These improvements may include minor route extensions which increase area coverage, headway reductions to increase frequency of service, reserved lanes and busways for preferential bus treatment, or ultimately, the need for fixed guideway operation. At present, the state-of-the-art in public transportation planning has not defined rigid criteria to determine which and when these improvements should be made. However, considering established regional goals and policies for public transportation and using a combination of many level of service factors, generalized criteria have been developed for recommending improvements to the existing KCATA system which, in turn, will evolve to subsequent stages of the Long Range Plan.

The fundamental concern underlying the staging strategies and the development of service criteria is how effective these plans will be in achieving the Region's goal of an efficient transit network. This is essentially a measure of the effectiveness of the transit system in terms of various travel measures. Included among these measures are such items as transit speeds, transit travel times, ridership, and transit's impact upon use of competing highway facilities. The effectiveness evaluation may also be conducted on an individual corridor basis so that certain usable segments may be implemented long before the entire Long Range Plan is a reality.

It must be strongly emphasized that these measures of effectiveness are not the sole parameters in evaluating alternative systems. Regional goals such as encouraging development opportunities within the CBD, reduced

petroleum dependency, environmental and aesthetic considerations are all important factors in selecting an alternative. Only by synthesizing the quantifiable travel measures with the more qualitative goal measures can a true effectiveness evaluation be made. Within this Chapter, mobility effectiveness measures have been presented to assist decision makers in evaluating the technical aspects of each alternative.

STAGING

The major question facing the Region, considering the existing KCATA operations and ridership, is how this existing system will evolve to the Long Range Plan. Essentially, this problem is reduced to one of developing a staging strategy involving a complex interweaving of considerations, illustrated by the following investigations:

- Type and number of improvements needed.
- Implementation schedule of these improvements.
- Regional distribution of improvements.
- Availability of local and Federal funding.

TYPE AND NUMBER OF IMPROVEMENTS NEEDED

Final options of the Long Range Plan include both bus and rail modes, each uniquely different within the major corridors by vehicle technology and capital investment. However, within the initial stage of plan implementation, certain improvements are necessary which can be common to either option such as an enlarged bus fleet, substantial additons in bus shelters, bus stop signs and park & ride facilities. In addition, segments of private rights of way common to both options should also be acquired during the first stage.

This approach permits the system to grow in a flexible manner, keeping the door open to the rail mode until the monitoring of mobility conditions and/or policy decisions suggest a firm commitment.

IMPLEMENTATION SCHEDULE OF IMPROVEMENTS

The present KCATA system adequately serves the transit demands of those areas of the KCMR in which it provides service. In order to achieve regional goals of a more efficient and attractive alternative to the automobile, incentives to induce latent demand and to lure auto travelers toward transit must be provided. This may be accomplished through a highly judgmental, trial and error process of instituting a level of service improvement and measuring the resulting demand. Thus, the staging program behaves as a catalyst, spurring increases in ridership. The advantage of this method is that service improvements are made on a gradual basis with cautious monitoring of overall mobility conditions and avoids making a major commitment to a large capital intensive project in which the transit demand may not warrant the investment.

REGIONAL DISTRIBUTION OF IMPROVEMENTS

A significant element of staging the Long Range Plan is determining an equitable regional distribution of improvements. Consideration must be given to those participating

communities or jurisdictions regarding their need for increased transit services, reduced highway congestion, increased development opportunities and changing growth patterns. These factors must be carefully weighed within the framework of elected official and agency influences in addition to available local funding sources.

AVAILABILITY OF LOCAL AND FEDERAL FINANCING

The availability of both local and Federal funding acts as a governing mechanism upon the rate of staging implementation. Thus, each successive stage of the Long Range Plan will be limited, independent of transit demand and desired system design and configuration, by available capital and operating financial resources. This approach, although very pragmatic, tends to dangerously encourage a short-sighted view of the Long Range Plan.

Due to the dynamic changes in all of these above issues, in addition to the complex interdependency of ridership and service, a prudent staging program would not be as bold as defining a specific time frame for each stage of the Long Range Plan. A more realistic and practical course of action would set successive short term objectives by levels of service and expected patronage. Each group of objectives will define an intermediate plan which will be upwardly compatible with the ultimate Long Range Plan. By monitoring the ridership generated by the improved levels of service, in addition to other factors which may contribute to increased transit usage, conclusions may then be drawn for advancing to the subsequent stage of implementing the Long Range Plan.

In order to create an impetus for the existing system to begin generating ridership, a definite first stage (5-year) service objective has been identified. Also included within this immediate stage is a two-year Early Action Program. The strategy in this effort is to set the machinery in motion to begin generating increased transit usage, by making visible transit improvements, strengthening the case for future investments in higher levels of service. It must be emphasized that at present, transit demand in Kansas City falls well below the available supply of transit service. The rationale that the region should consider adopting is one of being willing to make the investment in an improved transit system, completely cognizant of the consequences if anticipated demand conditions are slow to respond. Throughout this chapter this notion needs to be realized. The commitment must be made, either as a policy decision or as a positive investment in the KCMR future.

GENERAL STAGING STRATEGY OF THE LONG RANGE PLAN

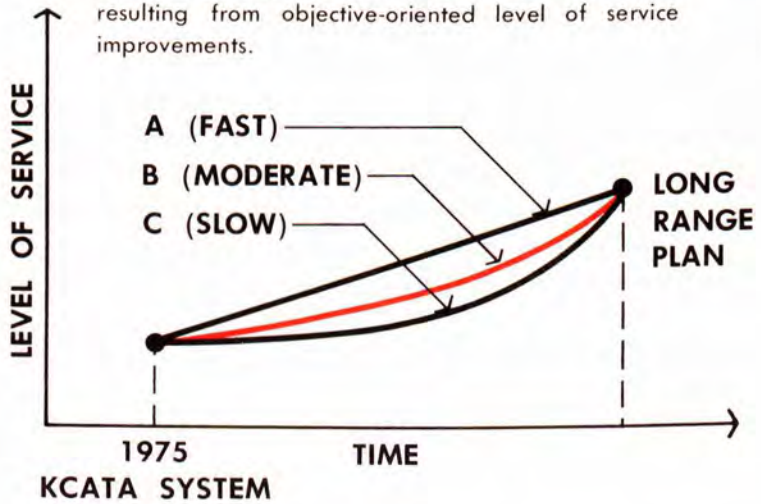
As previously described, the staging methodology of monitoring level of service increases and the attendant patronage responses requires a continuous staging process which becomes a task of bridging the two endpoint systems — the 1975 KCATA system, and the Long Range Plan.

The premise that future patronage within the KCMR will increase only if improved transit levels of service are proviced should be clearly understood. This conclusion must also be qualified by the imminence of fuel shortages and higher gasoline taxes which would encourage a shift to public transportation. A graphical representation of the first instance is shown in Figure 34.

FIGURE 34

POSSIBLE LEVEL OF SERVICE GROWTH CURVES

The three curves represent possible rates of Long Range Plan implementation. The true level of service curve for the KCMR will depend upon the Monitoring Program's evaluation of transit demand resulting from objective-oriented level of service improvements.



This graph shows the variable level of service, to be increasing with time for three possible growth rates. Curve B most realistically stimulates the rate at which improvements may be made to the system. Implicit in this Curve B is the deduction that demand must also be increasing at somewhat the same rate giving justification for the continual increase in level of service as time progresses.

Realistically, Curve B would not be a continuous curve, but rather a discontinuous series of level of service objectives. These may also be considered objective-oriented, level of service plans which would result in a goal-generated patronage. This is shown in Figure 35. It should be noted that outside of Stage I, the individual stages are not restrained to any time frame.

This overall concept is highly dependent upon the Monitoring Program which is described in subsequent sections. However, it is this Monitoring Program which evaluates conditions of congestion delay, transit demand, fuel consequences and funding availability and points out the need for progressing to the succeeding stage.

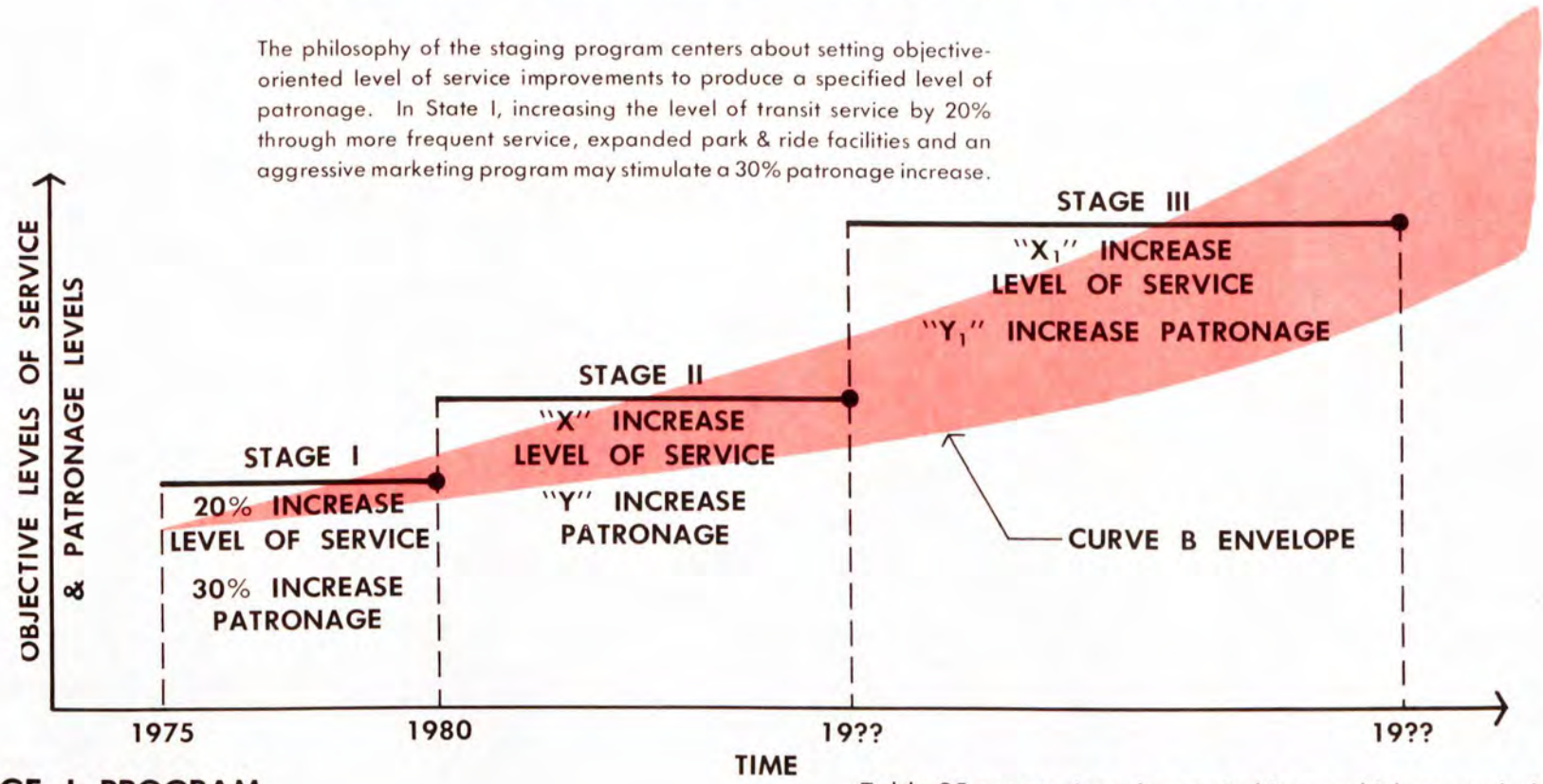
Thus, by defining these short range plans in terms of level of service objectives without referencing to specific years, the monitoring process will guide the transit system through each short range plan towards the Long Range Plan. This staging concept is illustrated in Figure 36.

The more critical decisions in this entire staging process involve the advance acquisition of necessary rights of way for busways or fixed guideway. Since the justification for a fixed guideway network, or an extensive bus system of preferential treatments is based upon transit demand plus other social and economic factors, it is mandatory that a strong regional commitment be made towards a vastly superior public transportation system. This commitment will probably be based on providing transportation alternatives to a responsible body of elected officials whose intent is to improve overall transportation mobility and to pre-empt any future energy crisis in this metropolitan area.

FIGURE 35

STAGING BY OBJECTIVE — ORIENTED INCREMENTS

The philosophy of the staging program centers about setting objective-oriented level of service improvements to produce a specified level of patronage. In State I, increasing the level of transit service by 20% through more frequent service, expanded park & ride facilities and an aggressive marketing program may stimulate a 30% patronage increase.



STAGE I PROGRAM

Stage I may be the single most important stage in the long range implementation program as it will be the first opportunity to test the KCMR's responsiveness to significantly improved transit services. The thrust of this first stage, for either option is to strenously improve present KCATA operations through increased levels of service and an agressive marketing program.

Table 25 summarizes the capital items which are included in the Stage I Program. This Program was developed cooperatively with the KCATA and other agencies involved in the Transit Study. The costs shown include a 22.5% escalation based on an assumed 7% increase per year compounded, as an average for the five years. As noted, several of the proposed items will require more specific engineering and planning studies before proceeding. The Program can be adopted in concept as part of the Long Range Plan.

STAGING THE LONG RANGE PLAN

FIGURE 36

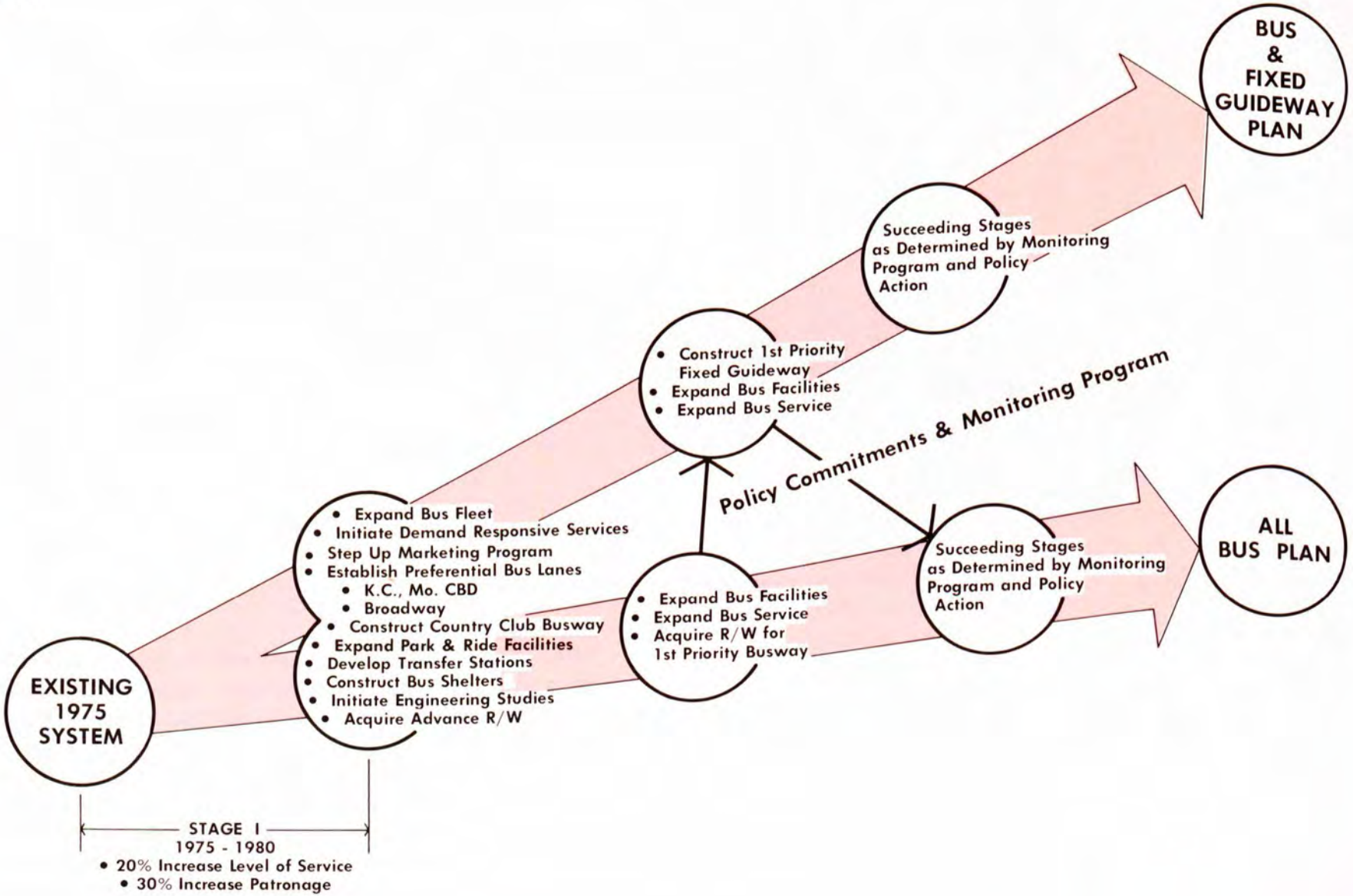


TABLE 25

STAGE I CAPITAL COSTS

Item	Quantity	Description or Location	Cost*
Standard Buses	160	44 to 47 Passenger	$12,740,000
Compact Buses	20	15 to 20 Passenger	540,000
Bus Shelters	300	System-wide	1,470,000
Bus Stop Signs	6,000	System-wide	294,000
Major Park & Ride Facilities**	4	I-35/U.S. 50 - Vivion Road/I-29 - Bannister Road/I-435 85/Holmes - I-435/Winner Road	2,630,000
Joint Use Park & Ride Facilities**	3	Sports Complex - Metcalf South - Indian Springs Antioch or Metro North - I-435/U.S. 50	180,000
Major Transfer Stations**	2	Downtown, K. C., Mo. - Downtown, K. C., Ks. Broadway/39th - Truman/Noland	610,000
Preferential Lanes**	2 Projects	Kansas City, Mo. CBD - Broadway, 31st to 47th	115,000
Exclusive Busway**	1 Project	Country Club R/W - Volker to 75th	4,000,000
Signalization for Buses**	6 Projects	To be Determined	300,000
Bus Radios and Related Equipment		For Present and Future Buses	1,555,000
Miscellaneous Improvements		Bus Pulloffs, Information Modules, Support Vehicles, etc.	2,000,000
Advance R/W Acquisition**		To be Determined	5,000,000
KCI Express Acquisition		Fixed Assets	500,000
Complete & Furnish ATA Maintenance Center		18th & Lydia	1,450,000
Rehabilitate Garage for Demand Responsive Service		26th & Harrison or 9th & Brighton	150,000
		Total	$33,534,000

*Average costs for 5 year period. Costs based on current estimates +22.5% for escalation.
**Final facility location to be determined from further engineering and planning studies.

The Stage I Program has been structured upon an objective 20% increase in level of service and a goal of 30% increased patronage by 1980. Included within this first stage is the inauguration of special demand responsive systems, within carefully selected pilot areas. Of the 30% patronage increase, 10% would be attributed to demand responsive and local area services.

Within Stage I, a two-year Early Action Program will form the groundwork for initiating the remaining Stage I improvements. Through an extensive inventory and evaluation of existing KCATA operations, system deficiencies and areas requiring substantial improvements have been ascertained. Thus, by identifying market areas for potential transit usage and optimizing existing operations, a compact and efficient system results permitting a maximum patronage return for the improvements instituted.

The nature of the two-year Action Program centers about low cost operational and capital improvements and will include the following:

- Extended Service Days
- Increased Weedend and Holiday Services
- Increased Express Service
- Route Modification
- Reduced Headways
- Expanded Park & Ride Facilities
- Improved Transfer Convenience
- Bus Stop Signs and Shelters
- Signalization Priorities for Transit Vehicles
- Reduced Fares During Base Period Operations
- Improved Public Information Through An Aggressive Marketing Program
- Radio Communication Systems
- Security Systems
- Specialized Demand Responsive Systems

MONITORING PROGRAM

The Monitoring Program will evaluate typical features of the transit and highway networks in the major corridors, much in the same manner as the system user. For instance, the automobile user incurring travel delay is essentially experiencing congestion from a peak hour volume to capacity (V/C) ratio greater than 1.00. Alternately, the bus rider enduring excessive trip times is also experiencing the identical congestion delay in addition to longer waiting time between buses. To reduce this level of congestion to an acceptable level and to decrease headways between buses, some improvements must be made, either increased highway capacity, increased level of transit service, or a combination of both. Consequently the Monitoring Program will investigate individual corridors for deteriorated transit and highway levels of service by evaluating measures of peak hour V/C ratios, transit patronage load factors and passenger attitude surveys. Thus, the Monitoring Program has an application to the Region's highway planning efforts as well.

With the advent of a national energy policy conceivably calling for some form of fuel allocation through a variety of methods such as rationing or fuel taxes, a shift towards increased transit usage, car pooling or even land use changes may be forthcoming. However, speculating upon these developments is at best a supposition. A realistic Monitoring Program must be one that is attuned to gauging Federal and State legislative actions and their implications

upon transit service. This Program would combine the previously described V/C ratios and passenger count monitoring procedures with any legislative actions. For this Program to be successful, a greater emphasis must be placed upon the anticipation of probable adverse impacts rather than strict periodic monitoring of growth conditions.

The rate and magnitude of improvements to the transit system hinges singularly about the availability of local and Federal financing. As the Monitoring Program identifies the need for transit improvements, local funding sources must simultaneously begin accumulating. Hence, all remedial operational improvements and major capital investments are initiated within the context of potential local and Federal financing.

Multi-agency participation in the Monitoring Program will be required in four major efforts:

- Specification and delegation of conditions and system components to be monitored.
- Establishment of transit service criteria and standards.
- Data collection of transit and highway monitoring.
- Data refinement and evaluation.

The cooperative effort of MARC, KCATA, the Kansas and Missouri Highway Departments and the individual municipalities concerned, might be led and administered by the Total Transportation Policy Committee. Recommendations would be made to the policy making bodies regarding courses of action that should be taken for remedying mobility deficiencies and advancing the transit system through the successive short-range programs towards the Long Range Plan.

SERVICE CRITERIA

The level of service criteria developed as guidelines for recommending transit improvements are shown in Table 26 with regard to the user, the operator, and the community. A judgmental evaluation of these elements provided the basis for the system development and service characteristics necessary to achieve the KCMR's transportation goals and objectives.

To satisfactorily serve transit dependent travelers in addition to encouraging competition between the auto and transit modes of travel, high levels of transit service must be provided. Tables 27 and 28 show general service quality criteria which formed the basis of estimating alternative patronage potentials. These values must be recognized only as acceptable minimums while the planned levels of service surpass these criteria as seen in the following section — Effectiveness Evaluation.

Additional criteria have been utilized in justifying capital transit improvements. Table 29 summarizes these criteria by types of transit improvement in ascending order of the capital investment required. While the ultimate level of service of the Long Range Plan will depend upon many other factors including the Region's financial resources and the willingness to pay for such improvements, it is important to note that in order to promote transit usage, a transit plan should offer a level of service not only sufficient to satisfy the projected demand but high enough to stimulate ridership. This is the rationale which was followed in developing the Long Range Plan staging program. It must be made clear that this concept is vitally important to the Kansas City Region as transit demand falls far below available supply at present.

TABLE 26
BASIS FOR SERVICE CRITERIA

Service Characteristic	User Requirements	Operator Requirements	Community Requirements
Accessibility	• "Coverage Ratio"* of 0.65-0.70 • ¼ Mile Walking Distance in Areas of Medium to High Population and Employment Density • ½ Mile Walking Distance in Areas of Low to Medium Population and Employment Density	•Capture Available Transit Market	•Service to Necessity Transit Users •Satisfactory Provision of Transit as a Public Service •Same as User
Travel Time Via Transit	• Minimized Walk, Wait, Transfer and Ride Time • Total Travel Time Must be Competitive with Auto Travel Time for Same Trip Movement	•Same as User in Order to Generate Ridership •Minimize Fleet Requirements	•Expedient and Efficient Regional Transportation •Same as User
Cost - Capital and Operating	• Tolerable Fare as Portion of Available Income • Efficient Use of Fare Revenues and Tax Subsidy for Transportation	•Minimize Subsidy Requirements •Achieve 0.8 Peak Hour Load Factor	•Optimal Use of Federal and Local Funds for Cost-Effective Transportation •Minimize Transit Subsidy Required •Same as User •Attractive Alternative to Automobile
Frequency of Service	• Seat for Each Passenger in Peak Hour • Minimize Waiting Time (See Table 27)	•Provide Sufficient Capacity •Minimize Travel Time for User •Develop Balance Between Headways and Load Factors •Minimize Costs	•Same as User
Service Availability	• Daily, Weekend and Holiday Service • Primary Routes - Peak, Base, Owl Service • Secondary Routes - Peak, Base	•Sufficient Patronage to Warrant Increased Operating Costs	•Same as User
Highway Congestion (V/C Ratios and Highway Speeds)	• Free Flowing Highways for Fluid Mixed Traffic Bus Operation in Peak Hours • Minimize Travel Time (See Tables 27 and 28)	•Same as User	•Operate Highways @ V/C = 1.00; Level of Service "C" •Same as User
Energy Consumption	• Reduce Fuel Use	•Cost of Fuel •Availability of Fuel	•Efficient Use of Regional Energy Resources
Service to Land Uses and Activity Centers	• Satisfactory Service to and From Residential, Employment, and Activity Centers	•Sufficient Patronage to Justify Service	•Same as User
Comfort/Convenience	• Clean, Modern, Air Conditioned Fleet • Minimize Transfers • Direct Routings	•Sufficient Patronage to Justify Added Costs •Provide Attractive Alternative to Automobile	•Same as User

*"Coverage Ratio" - Population Served ÷ Population of Feasible Service Area; Population Served - The Total Number of Persons Whose Dwelling Units Lie within ¼ Mile of a Transit Route in Urban Areas and ½ Mile in Suburban Areas. Population of Feasible Service Area - Total Number of Persons Whose Dwelling Units within those Areas Capable of Supporting Transit Service.

TABLE 27

GENERALIZED HEADWAY CRITERIA FOR VARIOUS TRANSIT SERVICES IN MINUTES

Period of Day	Suburban Local Bus	Urban Local Bus	Express Bus	Fixed Guideway
Peak Hour	15	10	15	5
Base (Mid Day)	60	20	30	10
Balance (Owl & Evening)		30		15

To reiterate the philosophy of the Monitoring Program, it must be emphasized that the concept of flexibility is very important. These checkpoint level of service criteria must be analyzed in view of the flexible nature of the Long Range Plan. Thus, initially, service improvements may be made leaning towards the bus mode and as demand increases, a change can be made towards a fixed guideway operation. The importance of this can be seen in the Stage I Program where right-of-way common to both options has been recommended for acquisition. Thus, as bus operations intensify and can justify acquiring right-of-way for bus preferential lanes or reserved busways there is nothing to restrain the system to the bus mode. A similar evolution process can justify eventual conversion to fixed guideway service. This approach holds for all the level of service recommendations thus permitting the plan to grow in a manner which allows them to be flexibly interchanged as time progresses.

TABLE 28

GENERALIZED PEAK HOUR SPEED CRITERIA FOR VARIOUS TRANSIT SERVICES IN MPH

Operation	Suburban	Outer Urban	Inner Urban	CBD	Other
Local Bus in Mixed Traffic	21	17	13	10	
Express Bus in Mixed Traffic	25	20	16	10	
Local and Express Bus on Preferential Lanes		25	18	15	
Express Bus in Mixed Traffic-Freeway Lanes					30-50*
Express Bus on Exclusive Lanes					30-55**
Fixed Guideway					30-55**

*Will vary with stop spacing and highway speeds.
**Will vary with spacing between stops.

TABLE 29

TRANSIT IMPROVEMENT CRITERIA

Transit Improvement	Criteria
Modernize Fleet	• Average Fleet Age - 6 Years • All Buses Air Conditioned • All Buses Equipped with Radios • Minimize Maintenance Costs
Expand Fleet	• Adequacy for Planned Service Increase • Reduce Spares to 10%
Increase Frequency of Service	• Peak Hour Load Factors Exceed 0.8 • Service Hours Not Consistent with Demand • Consistent with Policy Headways
Expand Local Service	• Accessibility - ¼ Mile High Density Areas ½ Mile Medium Density Areas • Service Responsive to Demand
Expand Express Service	• Load Factors Exceed 0.8 • Service to New Park & Ride Facilities • Highway Congestion at Undesirable Levels
Initiate Demand Responsive Services	• Need Established for Service Area • Operating Responsibility Established
Expand Park & Ride Facilities	• Express Bus Boardings Exceed 100 pass./peak hour at Specific Stop • Site with Good Highway Access Available
Provide Preferential Bus Treatments	• Peak Hour-Peak Direction Bus Volumes Exceed 35 Buses/Hour • Level of Highway Congestion Undesirable • Bus Speeds Lower than those in Table 28
Provide Exclusive Busways	• Peak Hour-Peak Direction Bus Volumes Exceed 80 Buses/Hour • Preferential Lanes Not Available • Level of Highway Congestion Undesirable • Physical Feasibility Established
Provide Fixed Guideways	• Bus Facilities Unable to Handle Forecast Patronage Volumes • Peak Hour-Peak Direction Demand Exceeds 6,000 Passengers

EFFECTIVENESS EVALUATION

As a means of evaluating different transit alternatives, effectiveness measures center about the service attributes of a system. Of the many system-wide and corridor measures of travel impedance the most quantifiable and more commonly used statistics may be classified into three general categories: accessibility, frequency of service, and travel times or speeds. Also, implicit within these broad categories are numerous interrelated factors such as capacity and load factor considerations; walking, waiting, riding, and transfer times; and convenience measures, e.g. comfort and directness in service.

For evaluating the effectiveness of the Long Range Plan options, comparisons have been drawn for each of the alternatives with the "No-Build" year 2000 system. This analysis substantiates the conclusion that the KCMR would be inadequately served by the existing KCATA system, if no improvements are made, in view of anticipated population and land use trends. Table 30 shown in matrix form presents, for selected major travel movements, the percentage reduction in average door-to-door peak hour transit travel times for the Long Range "No-Build", All Bus and Bus & Fixed Guideway alternatives. Significant reductions in travel time via transit can be seen between the two options when compared to the "No-Build" alternative, e.g. the travel movement from the 75th St. and Prospect location to the Vivion Rd. and I-29 intersection. Here, a transit user in the All Bus option through use of bus preferential treatments along the South Midtown busway and the Burlington busway can incur a 40% savings in trip time over the "No-Build" case. While in the Bus & Fixed Guideway option a 60% savings in travel time is realized

TABLE 30

PERCENT REDUCTION IN AVERAGE TRIP TRAVEL TIMES

(Door-to-Door - Peak Hour Transit)

	KCI	Vivion & I-29	KC, Mo. CBD	Sports Complex
KC, Mo. CBD	29/29%	45/58%		
Sports Complex	35/54%	42/71%	41/70%	
U.S. 50 & Noland	20/21%	24/30%	14/14%	
75th & Prospect	33/45%	41/62%	40/53%	
85th & Wornall	33/37%	40/52%	40/37%	21/13%
I-435 & I-35	43/43%	50/55%		

35/54%

35% - Percent reduction in total travel time from "No-Build" to Bus & Fixed Guideway option.

54% - Percent reduction in total travel time trom "No-Build" to All Bus option.

in traveling by bus to 75th St., transferring to the fixed guideway and continuing northward to Vivion Road. By further inspection of Table 30, it may be readily seen that for other selected travel movements within the rapid transit

corridors, the effectiveness of each option in demonstrating marked changes in peak hour transit travel times is quite pronounced.

Since the "No-Build" alternative cannot provide a level of service consistent with year 2000 travel demands, the effectiveness evaluation must investigate the cost-effectiveness of the Long Range, All Bus, and Bus & Fixed Guideway options in terms of satisfying these travel demands. Moreover, the service criteria, as developed in the preceeding portion of this Chapter, must be met when compared to the proposed alternatives' service characteristics.

As a further amplification of the benefits discussed in Chapter III, the effectiveness evaluation must include meaningful information about the outcome or consequences of the alternative systems. Realistically, no one measure of effectiveness can satisfactorily describe all pertinent issues. Thus, the final plan selection can only be based upon the judgemental assessment of the relative merits and liabilities of the various alternatives. For the three alternatives presented below, effectiveness comparisons have been developed. The three alternatives are as follows:

I. Long Range All Bus Option without preferential bus treatments.
II. Long Range All Bus Option with preferential bus treatments.
III. Long Range Bus & Fixed Guideway Option.

The All Bus alternative (I), operating in mixed traffic, serves as a reference benchmark for comparison with the All Bus with preferential treatment (II) and Bus & Fixed Guideway (III) options. Each of the three alternatives are evaluated by the service measures of accessibility, frequency of service and travel times or speeds for reference to the previously established service criteria.

ACCESSIBILITY

Shown in Table 31 are the percentages of persons who reside or are employed within walking distance of planned transit services. Both alternatives provide identical area coverage insuring a maximum effectiveness in capturing the available transit market.

TABLE 31

PERCENTAGE OF POPULATION AND EMPLOYMENT ACCESSIBILE TO TRANSIT SERVICE

(For Alternatives I, II All Bus and Alternative III Bus & Fixed Guideway)

	Urban (within ¼ mile)	Suburban (within ½ mile)	Region (within ¼ mile)
Population	76.2%	66.4%	75%
Employment	85.4%	67.5%	78%

FREQUENCY OF SERVICE

As shown in Table 32, the planned average peak hour headways for selected corridors are displayed by service type. Comparisons with the headway criteria of Table 27 show that planned transit services will fall well within the desired service criteria.

TRAVEL TIMES OR SPEEDS

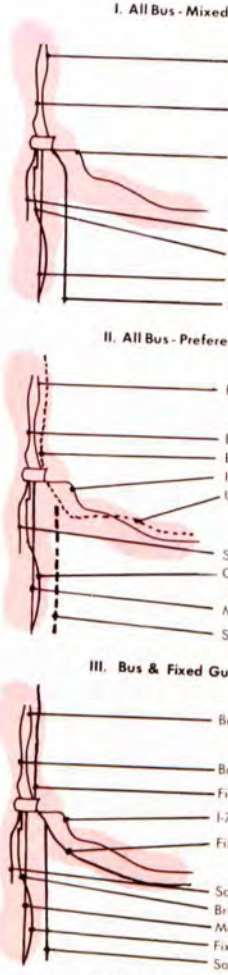
An examination of the impact upon individual corridor travel times or speeds for each alternative is shown for each alternative in Figure 37. Progressive improvements are demonstrated in transit and highway speeds and travel times along those corridors where a major capital intensive rapid transit facility is planned.

A corridor by corridor examination reveals that peak hour transit speeds in the north corridor, for instance, will increase from 15 miles per hour in mixed traffic operation along Burlington to 24 miles per hour on the Burlington busway to 39 miles per hour utilizing the fixed guideway facility. Of major note is the effect produced on the competing highway speeds and travel times. In every case, the highway speeds and travel times are increased and decreased respectively. Thus, the effect of each improved transit system has a two-pronged effect, increased mobility for both transit and highway travelers.

The travel time values presented in Table 33 show the impact of these special transit improvements on total (transit and highway) corridor travel time. It is noted that between alternatives I and II there is approximately a 16% reduction in year 2000 annual person-hours of travel time

FIGURE 37

TRAVEL IMPACTS OF SPECIAL TRANSIT IMPROVEMENTS



	PEAK HOUR TRAVEL IMPACTS*				
	Transit Speed (MPH)	Transit Travel Time (Minutes)	Highway Speed (MPH)	Highway Travel Time (Minutes)	Maximum Accumulation of Buses Along Facility
I. All Bus - Mixed Traffic Operation					
Burlington	15	20	23	13	83
Broadway	17	23	26	15	3
I-70	23	18	27	15	89
Southwest Trafficway	12	36	21	20	2
Broadway	11	42	19	24	78
Main	11	40	19	23	19
South Midtown	20	16	36	9	159
II. All Bus - Preferential Treatments					
Burlington			30	10	
Broadway			31	12	4
Burlington Busway	24	13			102
I-70			33	13	12
U.S. 40 Preferential Lanes - 31st St. Busway - South Midtown Busway	25	18			84
Southwest Trafficway			25	18	3
Country Club Busway - Broadway Preferential Lanes	16	29	24	20	89
Main			23	20	38
South Midtown	24	14	37	9	162
III. Bus & Fixed Guideway					
Burlington			35	9	8
Broadway			37	11	5
Fixed Guideway	39	9			
I-70			38	11	25
Fixed Guideway	39	15			
Southwest Trafficway			28	16	3
Broadway			26	18	29
Main			26	17	29
Fixed Guideway	25	17			
South Midtown	24	14	38	9	57

*Within the special improvement corridor in peak direction.

TABLE 32

AVERAGE PEAK HOUR HEADWAYS WITHIN SELECTED CORRIDORS FOR VARIOUS TRANSIT SERVICES* (minutes)

(All Values for Bus Headways Rounded to Nearest Minute)

	II. All Bus**		III. Bus & Fixed Guideway		
Corridor	Local Bus	Express Bus	Local Bus	Express Bus	Fixed Guideway
Independence	8	4	7	6	
I-70	5	3	4	3	2.5
U.S. 50	15	3	15	3	
South Midtown	16	3	16	3	
Country Club	11	4	10	9	2.5
I-35 (Johnson County)	21	3	21	3	
I-29 (KCI)	30	3	30	3	
K. C., Kansas	13	6	13	6	
North K. C., Mo.	9	5	9	5	2.5
I-35 (Claycomo)	5	3	5	3	
Mo. 45	45	5	45	15	
System-wide Average	11	4	10	4	2.5

*Weighted by passenger volumes.

**Alternative I not shown as headways will be the same as Alternative II, however vehicle requirements will be slightly greater and were not considered in the cost estimate.

and a 28% reduction between alternatives I and III for the same measure. These savings in travel times for alternative comparisons give some indication of the relative order of magnitude between the cost of providing increased transit services and the effectiveness of the capital improvements in generating time savings. This is shown in Table 34.

Shown in Table 35 is a summary of the cost-effectiveness comparisons for each alternative comparison. For the three travel measures, differences in service attributes can be compared to the total cost increments to provide those travel benefits. Thus, for the alternatives I and II a savings of 21.75 million person-hours of travel time over the 25-

TABLE 33

IMPACT OF SPECIAL TRANSIT IMPROVEMENTS ON TOTAL CORRIDOR TRAVEL TIME

(Highway and Transit)

Alternative System	Corridor	Year 2000 Peak Hour Total Person-Hours of Travel Time	Year 2000 Annual Person-Hours of Travel Time (Millions)
I. All Bus-Mixed Traffic	North	2,700	2.80
	East	3,000	3.06
	South Midtown	1,530	1.59
	South	4,450	4.60
	System Total	11,680	12.05
II. All Bus-With Preferential Treatments	North	2,050	2.12
	East	2,590	2.68
	South Midtown	1,440	1.49
	South	3,760	3.89
	System Total	9,840	10.18
III. Bus & Fixed Guideway	North	1,670	1.73
	East	2,280	2.37
	South Midtown	1,400	1.45
	South	2,980	3.08
	System Total	8,330	8.63

TABLE 34

TOTAL TRAVEL TIME AND COST SAVINGS BETWEEN ALTERNATIVES

Alternatives Compared	Year 2000 Annual Total Travel Time Savings (millions of person-hours)	Total Travel Time Savings Over 26 Yr. Planning Period (millions of person-hours)	Difference In Capital and Operating Total Cost* ($millions)
I. All Bus-Mixed Traffic vs. II. All Bus-With Preferential Treatments	1.87	21.75	27.56
I. All Bus-Mixed Traffic vs. III. Bus & Fixed Guideway	3.42	41.01	207.15

*Discounted 1975 constant dollars (10% interest rate).

year planning period can be achieved by an 8.6% increment in costs attributed to the bus preferential treatments. For alternatives I and III a savings of 41.01 million person-hours will be realized during the planning period as a result of a 65% increase in costs due to a fixed guideway in place of bus preferential treatments.

Evaluations of cost-effectiveness measures are not the sole indicators of one alternative's worth in meeting regional transportation needs and objectives. These tangible measures must also be weighed within the context of local and regional policies which support development goals. The basic measures presented, constitute only one element of the total spectrum of transportation impacts. Thus, the ultimate plan selection is based upon an explicit judgmental determination, which reflects the interests of local governments, regional, state and federal agencies, and the public.

TABLE 35

SUMMARY OF COST-EFFECTIVENESS COMPARISONS

Cost-Effectiveness Measures*	Alternatives Compared: I. All Bus-Mixed Traffic versus II. All Bus-With Preferential Treatments	Alternatives Compared: I. All Bus-Mixed Traffic versus III. Bus & Fixed Guideway
Accessibility	No Difference	No Difference
Frequency of Service	No Difference	System-wide Average Headways: Local Bus - (III) 1 Minute less than (I) Express Bus - No Difference Fixed Guideway - Not Comparable
Travel Times and Speeds	21.75 million person-hours of travel time saved: II over I (accrued over 25 year planning period)	41.01 million person-hours of travel time saved: III over I. (accrued over 25 year planning period)
Total Capital and Operating Costs**	$27.56 Million more costly II over I.	$207.15 Million more costly III over I.

*Ultimate Long Range Plan unless otherwise noted.
**Discounted 1975 constant dollars (10% interest rate).

CHAPTER V

FINANCING, MANAGEMENT & LEGISLATION

Most of the Transit Study deals with the technical, planning, and operational aspects of developing a regional transit system to serve future needs. This Chapter addresses those aspects which are more issues of public policy and which require the attention of the elected officials and responsible agencies in order to move the selected program forward.

As part of the Transit Study, the Consultant prepared a number of background papers for MARC's Special Committee on Legislation and Finance. This Committee, comprised of members of the MARC Board, representatives of the KCATA, and other agencies, was designated to develop a legislative and financing program for the selected Long Range Transit Plan. This Chapter, supported by the background papers provide information on possible sources of funding, descriptions of financing programs, and legislation adopted in other metropolitan areas and identifies the issues that should be addressed in a program for the KCMR.

FRAMEWORK OF FINANCING THE FIRST FIVE YEAR PROGRAM

The preceding chapter has outlined the objectives of the Stage I Program to be implemented in the next five years under the Long Range Transit Plan. The financing for the proposed transit operation in the Region is derived from four sources of income as follows:

a. Farebox revenues.

b. Direct subisdy by Kansas City, Missouri from the 1/2% sales tax.

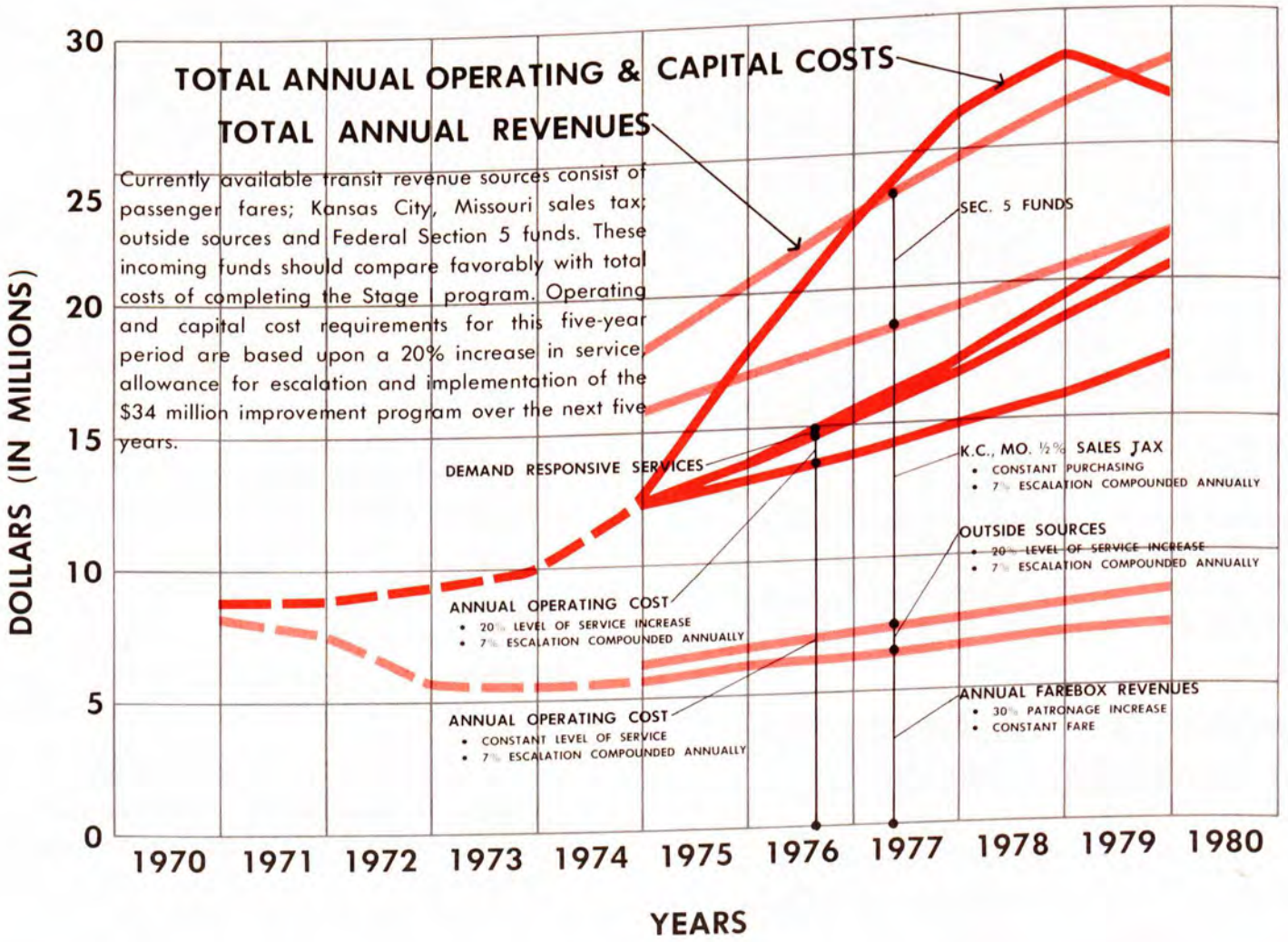
c. Income from contracts with outlying communities, and miscellaneous income from advertising and charter service.

d. The allocations under Section 5 of the National Mass Transportation Assistance Act of 1974.

Figure 38 shows graphically the sources of funding and the probable revenue and cost trends of the transit operation for the next five years. A 7% per year compounded escalation was assumed to reflect inflationary increases in costs over the projection period. Since revenue flows from fares which are set by policy, no increase in present fare levels was assumed in the projection. Consequently, the farebox revenues show a relative decrease in comparison to operating costs (see graphic) even though patronage is assumed to rise.

FIGURE 38

STAGE I
REVENUE, CAPITAL AND OPERATING COST COMPARISONS



In addition to the funding sources listed above, the Federal government under Section 3 of the 1974 National Mass Transportation Assistance Act may grant capital improvement funds over and beyond the fixed allocations under Section 5. While the fixed allocations for the Kansas City metropolitan area over a period of six years are approximately $28 million under Section 5, there is no direct limitation on the Section 3 funds except to the extent that Congress appropriates money for that purpose. The Administrator of the Urban Mass Transportation Administration is given discretionary powers to disburse Section 3 funds on the basis of need with a limitation of 12 1/2% of total funds to any one State. Consequently, any demonstrated required major capital investment which would substantially exceed the Section 5 formula grants would have to be requested under Section 3.

At the present time, the KCATA's operating costs are between $12 and $13 million annually. The collection from the 1/2% sales tax is approximately $10 million. Farebox revenues have declined to under $6 million and the income from other communities served by the ATA but not covered by the Kansas City sales tax is approximately $720,000. To this, must be added miscellaneous income from charter services and advertising of approximately $450,000. While it is not the purpose of this report to analyze the particulars of current and ongoing financing, these figures indicate the approximate relationship of cost to direct revenues obtained by the Authority.

Historically, the required subsidies have increased and are likely to continue to do so during the first stage to perhaps as much as 60-70% of the total operating budget. This is so because an extended system does not per se improve the financial position of the transit operator, even though it must be assumed that ridership increases in some proportion to the increased level of service. With the available Federal allocation for the metropolitan area of over $28 million for six years, the Area Transportation Authority's demand for municipal funds will ease somewhat. Specific formulas are applied to the utilization of these funds which, however, as a practical matter, impose no restrictions here as long as the sales tax subsidy continues. If it were stopped and no other funding is provided locally, Federal operating subsidies would become unavailable in the Kansas City region.

In the Kansas City situation, the key limitation in this regard is the Federal requirement that the level of financial effort by the local communities can never be reduced. This means that the local communities must continue to maintain their past level of effort. Another requirement is that Federal operating subsidies are matched on a 50/50 basis, while Federal capital investment assistance is based on an 80% Federal share and a 20% local effort. However, the financial pattern which has evolved during the last several months suggests that the KCATA will be able to utilize the Federal funds to the best advantage primarily for operating subsidy and to a lesser extent, for the capital investments suggested. It can, therefore, be concluded that the Stage I Program as outlined in Chapter IV is indeed feasible and practical from a funding point of view. While theoretically possible, it does not appear necessary to use Federal highway funds for capital improvements so that much needed road projects need not be postponed in favor of transit. Certain facilities in the Stage I Program and the Long Range Plan might be eligible for financing using Federal highway funds. These include exclusive bus lanes when part of a freeway, park & ride facilities, special ramps, and signalization equipment.

The practical weakness of the funding pattern is the two-year limitation of the transportation sales tax levy in Missouri. Under present law, the State Legislature must extend the sales tax authorization every other year. It will be readily apparent that this makes it impossible for the KCATA to enter into any long range financial commitments without specific backing by the City of Kansas City or any other municipal corporation or county in the district. Such pledging of credit is highly unlikely because of legal constraints which would be applicable and for the very practical reason that the other jurisdictions, as well as the transit operator, are short of funds.

Metropolitan areas throughout the United States have been granted taxing powers for public transportation by their legislatures. Atlanta and Denver, for example, use the sales tax; San Francisco and Omaha levy a real estate tax; Cincinnati applies a portion of its earnings tax to transit; and Massachusetts imposes a cigarette tax. Regardless of the manner of taxation, it is typically a permanent source on the strength of which sound financial plans can be made.

KCATA JURISDICTION

It will be recalled that the KCATA is responsible for the management of public transportation in the Kansas City Transit District which is composed of four Missouri and three Kansas counties. The Authority derives its legal power from a 1966 bi-state compact which is administered by a 10-member board, 8 of whom are appointed by the Governors on the basis of a prescribed formula within each State and 2 by the Mayor of Kansas City, Kansas. The Authority has no taxing powers and depends on the participating jurisdictions for any required government subsidies.

To date, Kansas City, Missouri, is the only municipality which has enacted a special one-half percent transportation sales tax levy on the basis of a statutory authorization in Missouri, which was first provided by the legislature in 1971 and subsequently amended in 1973. In addition, Independence, Missouri, has levied a one-half percent sales tax, approved by the voters, which pledges a specific amount to be used for transit subsidy. All other participating jurisdictions must provide required subsidies out of general revenues and pay these subsidies to the KCATA on the basis of specific annual contracts. Under the present law, other cities with a population over 500 can impose this tax if approved in a referendum.

The fundamental question which can be raised is why the Authority was based on such a large geographic area rather than on the jurisdictions which actually use the transit facilities. A cursory examination of ridership shows that the two principal transit users in the transit district are Jackson and Wyandotte Counties. Based on KCATA ridership figures for January 1975, Kansas City, Missouri, in Jackson, Clay and Platte Counties, account for 88.5 percent of all transit riders; Wyandotte County accounts for 6.8 percent; Johnson County for 1.9 percent; Independence for 1.5 percent; and the remainder of the district generates 1.3 percent of the ridership. Cass and Leavenworth Counties are the most marginal transit users. Consequently, if patronage by itself were the overriding consideration, a transit boundary could be drawn which would include essentially the present urbanized section of Jackson County; southern Clay and Platte Counties, perhaps to Barry Road on the North, and Kansas City International Airport on the West; Wyandotte County; and the communities which make up the northeast Johnson County urban area plus Olathe.

The administrative and political ramifications of any such modification are, as a practical matter, very difficult. However, if any consideration is to be given to reducing the district in geographic expanse, this would not disqualify jurisdictions outside the district from contracting with KCATA for service. Such a reduction in size would have the advantage of bringing the district more in harmony with the actual generation of patronage and consequently, any direct levy taxes would be more equitable and, perhaps, more palatable to the constituencies of the remaining three counties of Cass, Ray and Leavenworth.

TAXING POLICY

The levying of taxes, generally, is a complex political issue. Many political observers feel that taxes must only be levied directly by entities which are governed by elected public officials and appointed boards should not be given the power of taxation. It is for this reason, among others, that the Missouri Legislature delegated the power of levying a special transportation tax to the cities in the area, rather than to the Area Transportation Authority itself. Consequently, if any modification of the method were considered desirable, it would undoubtedly be necessary to amend the bi-state compact to provide for the direct election of the Area Transportation Authority Commissioners as, for instance, in the California transit districts, or to provide for an appointment procedure more directly representative of local jurisdictions.

The disadvantage of direct election is, of course, that any candidate for such public elected office must arrange for the necessary political support to win an election which may well be considered a distraction from his administrative transportation functions. The authors of the 1966 compact apparently felt strongly about this and provided for a method of appointment rather than direct election.

In fact, it may be said that the Area Transportation Authority is functioning reasonably well under the criteria and constraints which the agency has assumed since its establishment. If only the last five-year period is held in view, it becomes readily apparent that the KCATA has learned to operate more responsively to demand as expressed by the entities which support it. Prior to the enactment of the 1971 sales tax, the Authority was entirely dependent upon farebox revenues and other minor earnings. Obviously, that was an untenable condition, which was remedied by the legislative action. Today, along with other American metropolitan transportation systems, KCATA's ability to operate is contingent upon subsidies of 50 to 60 percent which are likely to increase proportionately during the next three to four years.

BUDGETARY CONSTRAINTS

The public agencies, particularly Kansas City, Missouri; Kansas City, Kansas; and Independence have learned that money is the principal constraint of service. The temptation to yield to the slightest public pressure for providing transit service is more and more rejected by the elected officials as an inappropriate policy. Marginal services must be eliminated anyway and it is usually easier to say "No" at the outset than to explain later on why a service had to be discontinued. In this connection, it is highly desirable to establish specific standards of service performance so that the discontinuation of a transit service can be readily

understood by the public. If, for instance, it is the policy that there must be, during the peak hours, at least a passengers to seats provided ratio of 0.60 of all buses serving a certain new line, and if this 0.60 is not achieved within 3 months or so, the service will be discontinued, maintenance or discontinuance of the line becomes merely a matter of elementary arithmetic requiring little explanation to the public.

As a result of five years' experience under subsidized transit operation, the Authority and the cities have learned to recognize the overriding requirement of making ends meet and staying within the available funding. There is no such thing as deficit spending at the local transportation level. In acting accordingly, the Authority and the sponsoring municipalities and counties become more and more business-like in their official actions. It may, therefore, be said that the basic formula which the authors of the 1966 compact elected to use is working reasonably well. Given a fair chance to continue, KCATA will improve as time goes on and create a reasonable balance between desirable transportation objectives and budgetary limitations. In a very direct sense, the public has a voice in the matter through the elected officials of the city councils and the county boards which provide KCATA operating subisides.

SUB-DISTRICT FUNDING

A major issue which arises from time to time and will be more in the foreground in the future is the fair and reasonable distribution of Federal funds to the transportation district. The Federal government recognizes the existing Kansas City urbanized area as defined by the 1970 census and allocates funds under the 1974 act for either capital or operating subsidies to this area. Within this area, however, the question may well be raised whether or not any one community of the ATA constituency receives a greater share of the Federal funds than others. Since the Federal appropriations are based on considerations other than patronage, the issue becomes more complex.

Analysis of the transportation program under the Long Range Plan will give a good indication of the constraints flowing from cost versus available funding. If, for instance, the responsible officials implement at some future time the fixed guideway system, funds for construction would have to be secured from UMTA. Under present legislation, this is theoretically possible under Section 3 of the 1975 Act. If such funds were granted, the question would arise, "How would the local 20 percent share be financed?"

Obviously, this amount could be levied against the entire transit district in some form. In part, it could be taken from the sales tax revenue, however, at the expense of other needed improvements, and as the figures show, there is very little money available at that - unless the tax is raised to one percent. It is at this point where the issue of the validity of holding the total district responsible for such a proposition will arise.

In order to achieve a greater degree of financial flexibility, some consideration can be given to the creating of sub-districts within the larger transit district. In a series of background papers prepared as part of the Transit Study, the particulars of that and related concepts were detailed together with the necessary information on tax resources.

It can obviously be said that the principal beneficiary from construction of fixed guideways would be initially Kansas City, Missouri and, at some future date, perhaps Kansas City, Kansas, Independence or Johnson County. In Kansas City, to use that example, it may be said that the entire 320 square-mile municipal area does not benefit from this improvement. In this situation it may be wise to consider the well established method of the "benefit assessment district" as a sub-district for financial purposes which would produce a two-tier type financial arrangement. Conceivably, within the larger transit district a smaller transit district could be established, which by standards acceptable to the public would create a benefit assessment to raise some of the funds needed to provide the local matching investment. Thus, the Federal government would have to consent to an 80 percent underwriting of the construction costs of such a fixed guideway transit element. As the system is expanded, similar arrangements are possible in every jurisdiction where appropriate. For instance, only the northeast portion of Johnson County would be concerned for years to come and would provide their own funding.

Any assessment, if it were against real estate, would be fairly substantial. At the present time, the assessed valuation of all real estate in Kansas City is approximately $900 million. If the special assessment district for rapid transit were to include one-third of the assessed valuation, or about $300 million, a $20. per $1,000. valuation tax levy would produce approximately $6 million of tax revenue per year. On this basis, the collection of about 17 years would be required to raise enough funds for $100 million of matching funds. An alternative to this method, of course, is a smaller millage levied against the total property of the City for the purpose of issuing general obligation bonds, or to amortize bonds issued on that basis. This would have to be approved by a two-thirds majority of the voters in a bond election. Based on past experience in recent years, this is presently a critical problem in Missouri. Yet another option would be the use of increased sales taxes for capital funding, but provide for ad valorem backing on sub-district basis to obtain marketable bonds. Regardless of the method, the demand must be strong, for the cost to the taxpayer will always be substantial.

KCATA MANAGEMENT

It would appear at this time that the most logical policy to be followed by the participating governments in the Kansas City Transit District would be the continued cooperation with the Kansas City Area Transportation Authority and the strengthening of its capabilities. New organizations will not necessarily produce meaningful improvements over the present arrangement. On the contrary, any new model would require a number of years of trial and error which would be a considerable set back for the public. The KCATA has undergone severe criticism and has its difficulties, but at the same time it has also gone through an extensive shakedown process which has produced a workable agency. As an interim measure, KCATA secured the services of a private management firm which has helped overcome the initial internal administrative problems which the new entity faced at a point in its development when both funds and capable personnel were simply not available.

Since the Missouri Legislature resolved in 1971 the funding problem and the other communities who desired to participate have effectively seen fit to pay their share of the total bill, the entire entity has become more responsive to public demands and should, move in the direction of its own in-house permanent management staff. That, too, will contribute to greater acceptance by the public for the obvious reason that the constituent governments will feel that the personnel they are supporting are oriented towards the sponsors in much the same manner as the civil service employees of the jurisdictions concerned.

LEGISLATIVE PROGRAM

A review of the issues at hand might suggest that one could conceive of a wide range of legislative measures which would perhaps create more opportunities for management alternatives and operational options. It has to be recognized, however, that little is to be gained by ideal, highly theoretical legal models for the reason that they tend to confuse the legislators and detract from the key issue.

Legislators are typically overloaded with numerous demands for consideration and have little time to address themselves to the intricacies of any one of the many highly technical propositions before them. Moreover, with respect to Missouri, anything advantageous to Kansas City, as a practical matter, must be acceptable to St. Louis as well and vice versa. Therefore, it would seem prudent to simplify any practical legal program as much as possible and to concentrate on the real issue. In Missouri the primary issue is the elimination of the two-year renewal clause in the act which authorizes the levying of a 1/2% sales tax so that the revenues produced under this law can become a permanent source of income available to the transit operators.

Ideally, the most desirable public support for transit would be through the establishment of a multi-jurisdictional tax which should also be given high priority in legislative efforts. It would be desirable to have a statute which would give the option of levying such a tax to all jurisdictions but at the very least to Wyandotte County which is second in ridership in the Transit District.

The Special Committee on Legislation and Finance of MARC has been provided with the required background information to deal effectively with these management and legislative issues. It should move swiftly if the momentum gained through the MARC planning process is to yield meaningful results.

Once this fundamental goal is achieved, the Committee can then deal with other more sophisticated matters. Some of these longer range concerns are as follows:

1. What powers should the regional transit authority have for the KCMR?

2. Should it have direct or derived powers of taxation, or should these powers remain with the constituent governments?

3. What tax alternatives would be acceptable to finance operating deficits and capital investments in both states?

4. Should the board members of the regional transit authority be appointed by local or state governments, or elected and if elected, in what manner?

5. Should the transit district's jurisdiction be limited to the area it primarily serves?

6. Should an effort be made to secure statewide financial support for transit in both Kansas and Missouri? What role generally should the states play in financing regional transit systems?

7. How should the fare be established and who should determine policy with respect to the level of service offered?

8. Should the transit authority have powers other than those related to transportation, for instance, joint land development powers?

9. What formula should be used for capital improvement financing of local shares with respect to local projects and should the present formula for determining operating subsidies be modified?

Obviously, these are all matters of public policy and their resolution will determine how effectively a high quality public transportation system for the KCMR will be developed.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

MAJOR FINDINGS

The objective of developing a Long Range Transportation Plan for the KCMR is to provide a framework for policy decisions, financial commitments and development goals which will complement each other in providing improved mobility for the citizens of the Region. This Report has summarized the public transportation alternatives which were considered as part of the Study and summarized their costs, benefits, and impacts on the Region.

The refinement of the Provisional Plan included the evaluation of a regional transit system with two options in the major corridors. From this evaluation, the following findings are summarized:

- Service - The Regional Transit Plan with either option would provide transit service within walking distance of 75% of the forecast population and 78% of the forecast job locations.

- Costs - Based on 1975 cost levels, the facilities included in the All Bus option would cost approximately $237 million while the current cost of the Bus & Fixed Guideway option would fall between $680 and $745 million depending upon the alternative alignments in certain locations.

- Ridership - Based on the projected population and employment distribution and demonstrated travel behavior, it would be expected that approximately 296,000 revenue passengers a day would be attracted to the All Bus Plan while 322,000 would utilize the Bus & Fixed Guideway Plan. These represent five times the present level of ridership.

- Revenues and Operating Costs - Based on current fare and operating cost levels, service with either option would require a substantial annual subsidy. This would vary from $23 to $28 million per year, depending upon the option.

- Benefits - If no improvements were made to the existing transit system, future total auto vehicle miles would increase on the order of 130% over present vehicular travel. Implementation of either transit option would reduce petroleum comsumption in the KCMR by about 8% or approximately 40 million gallons annually. Additionally, highway accident costs would be reduced by $12 million and fatalities by 7%, for both options.

- Transportation Costs - The total annual cost of transportation to the citizens of the Region would be reduced by $64 to $69 million, depending upon the option selected in the design year by providing a comprehensive regional transit system.

- Generated Employment - Construction of the Bus & Fixed Guideway system would generate 98,000 man years of employment including 1,600 to 1,700 on-site construction jobs over a 10-year period. In addition, 2,000 more jobs would be needed to operate the system than are required for the present system.

- Air Quality - The Long Range Transit system with either option would reduce air pollutants in the range of 5 to 7% when compared to not improving the present system.

- Traffic Congestion - In spite of the modest forecast of 5½ to 6% of total person trips on transit, traffic congestion would be reduced in all major corridors and high activity areas. In the Kansas City, Missouri CBD alone the number of vehicles could be reduced by 20% if the Bus & Fixed Guideway system were implemented and 12% under the All Bus option.

FULFILLING REGIONAL GOALS

MARC's regional goals for transit in the KCMR were summarized at the beginning of this report and each of the specific goals have been addressed in the foregoing Chapters. It must be recognized that many of these goals require continuing action in regard to legislation, funding, and the gradual improvement to public transportation services throughout the Region.

While the transit component of the regional transportation system has been presented, it is but one essential element in the task to provide mobility to the citizens of the area. With the adoption of a Long Range Transit Plan, MARC and the other agencies will develop a long range highway plan and a long range land use plan, each of which will be consistent with the others. The effort to seek an appropriate balance between public and private transportation is one that will require continuing attention in the years to come. As most of the planned transit services would be provided along existing or proposed streets and highways both the highway network and transit system interact to a great extent.

Highways have played a very significant role in the development patterns of the region, particularly since World War II. Transit's gradual decline has perhaps reached the point where a change in direction is both desirable and possible. With the uncertainties of the future, it can be stated that transit can be expected to play a gradually increasing role only if the elected officials and decision makers in the region establish this as an objective and make public and private policy consistent with it.

The need for a plan is obvious for it will provide a framework within which short-term objectives, financial commitments, and other decisions can be made; and yet, while it is so important to adopt a Long Range Plan, it has been emphasized that there is need for flexibility within this plan so that the region can respond to changing conditions which are difficult to predict at this point in time. The suggested staging program provides for this flexibility through an on going Monitoring Program.

An example of this needed flexibility is the South Midtown Freeway which is now being contested in the courts. It was assumed that the Freeway would be constructed and transit ways have been proposed in the median. In the

event that this project is delayed or deferred alternate planning options will have to be examined.

The realities of the various political subdivisions must be recognized and dealt with accordingly. One very important aspect of the multi-jurisdictional composition of the KCMR relates to the bi-state nature of the metropolitan area. Consequently, many of the legislative changes and financial programs that will be required must result in closely coordinated efforts towards developing unified and cooperative programs, sensitive to the unique problems of each state. While in the past the state line has increased the complexity of solving regional problems, it can also provide the catalyst in approaching a program that is by its nature a regional one. Public transportation is certainly in this category.

Regional goals are what the people and elected officials make them. Progress toward achieving them must be made within the list of priorities that the region sets for itself. The recommended Long Range Transit Plan outlined below should be given the appropriate priority because of the significance of its impact on the future growth of the KCMR.

CONCLUSIONS

Various plans have been reviewed in some depth throughout the life of the Study and summarized in this and previous reports. The Provisional Plan, developed last fall, is basically a regional bus system with two options for rapid transit in two major central corridors. The All Bus option envisioned a greatly expanded bus system including special lanes for buses — a system which responds to those estimated demands which can be reasonably predicted from past and current experience. A second option, incorporating a nucleus of 24 miles of fixed guideway (with further expansion possible) provides, at greater cost, a more sophisticated public transportation system capable of moving a much greater number of people and also capable of exerting a more significant long-range effect on urban development.

The studies conducted have consisted of two major efforts - 1) rigorous technical analysis, and 2) public input from all facets of the community. The technical analysis indicates that the All Bus system will provide a practical, cost-effective answer to the predictable area transit needs in the foreseeable future. Much of the public input has been insistent that the fixed guideway system is desirable and warranted. This conclusion seems to have resulted from very real concerns or fears of an energy shortage and rising fuel costs; of severe air pollution problems if automotive growth is unchecked and of further urban deterioration, all coupled with a disenchantment with the present transit service as a means of travel. Many also expressed a concern that desirable urban development goals could only be implemented by a system which includes a fixed guideway element. The validity of such concerns is recognized.

It is well accepted that transportation is interdependent with regional development. A commitment to incorporate the fixed guideway as part of the Long Range Plan, even without a specific time schedule, will provide a framework for policy decisions to link major activity centers and to shape metropolitan development. These decisions imply many further development and planning actions and

require the deliberate commitment of resources to encourage more intensive development along the transportation corridors.

Currently the Kansas City Region has low population densities and an excellent highway system. These conditions make for a very low diversion to mass transit and the theoretical analysis indicates that only some 5 or 6% of daily person trips will be attracted to any proposed mass transit system. Barring some uncertain and highly significant event, or series of events, changes may occur in travel behavior to such an extent that perhaps 2 or 3 times this percentage of riders would be attracted to mass transit. It is recognized that in today's circumstances it is reasonable to consider such events.

After thorough consideration, it is concluded that the two systems studied should be merged into a single long range public transportation plan. This plan would call for a nucleus of rapid transit routes, initially for bus service but designed for ultimate conversion, as required, to a light rail or equivalent intermediate capacity system. The commonality of much of the busway and fixed guideway alignments provides an opportunity to proceed with bus facilities, reserving the opportunity to change to a fixed guideway technology at a later date. This will permit early acquisition of (or protection of existing) rights-of-way for certain major routes.

The Recommended Long Range Transit Plan is shown on the fold-out map in Figure 39. It represents a composite of the two options developed from the Provisional Plan. The concept has the following characteristics:

- It is a dynamic plan which responds to the public transportation needs of the region in incremental steps.
- It is a practical plan which can be initiated immediately within present financing resources by following the suggested first stage program.
- It is a plan which once adopted can be used to develop a long range highway plan and land use plan for the KCMR, each of which will be interdependent upon each other.
- It is a flexible plan which through the Monitoring Program can anticipate and respond to changes in forecast trends; levels of transit usage; highway congestion; and Federal, State and local policy.
- It is a comprehensive plan which consists of a basic network of line-haul services, local area services, and various forms of special services including some demand responsive service. It will serve all parts of the metropolitan region as they develop.

RECOMMENDATIONS

In order to make the Long Range Transit Plan a reality, it will be necessary to take a number of actions in the immediate future and to set up the machinery to insure the coordinated development of a comprehensive, high standard public transit system for the KCMR. From the Conclusions stated above, the following recommendations are presented:

1. That after review by the appropriate agencies, civic organizations and the public, the MARC Board adopt a Long Range Transit Plan for the KCMR.

2. That this Plan be used as the basis of developing a Long Range Highway Plan and Land Use Plan which when combined with the Transit Plan would be adopted as the Regional Transportation and Land Use Plan.

3. That the $34 million, Stage I Program outlined in this Report be adopted by the MARC Board and that the necessary steps be taken towards implementation.

4. That, with approval of the Stage I Program an aggressive marketing program be undertaken to publicize the planned improvements and make the public more aware of the transit services offered.

5. That concurrent with the Stage I Program the planning and engineering studies listed below be initiated to identify specific project locations and feasibility to the point where right-of-way can be acquired for future facilities.

6. That MARC's Special Committee on Legislation and Finance be authorized to develop a suggested Legislative & Financing Program consistent with the adopted Long Range Transit Plan. These are considered matters of public policy and are thus beyond the scope of this Study.

7. That the Monitoring Program described in Chapter IV be established under the Total Transportation Policy Committee, by joint cooperation between MARC, KCATA, other agencies, and the major municipalities to review the transit program periodically as a basis of developing incremental transit improvements in the KCMR.

8. That the KCATA be requested to develop service criteria for the present system which would be used as the basis of continuing or extending services and that these criteria be incorporated into the Monitoring Program.

9. That a concerted effort be made to explore the feasibility of initiating demand responsive or Dial-A-Ride services for areas which need it and that such services be inaugurated where found feasible.

PROJECT IMPLEMENTATION PLANNING

In addition to the capital items summarized in Chapter IV for improvements to transit service during Stage I, it will be necessary to undertake certain investigations and studies to resolve questions of physical feasibility, route location and right-of-way acquisition for transit facilities included in the Long Range Plan. These should be considered part of the continuing planning process and are required as a basis of making policy decisions and eventually financial commitments.

As stated in the foregoing section, which summarizes the conclusions and recommendations, the proposed Long Range Plan is a flexible one, designed to respond to changing conditions and rates of development throughout the metropolitan area. The Monitoring Program will provide a useful mechanism to carry out incremental planning but must have input that would be developed as a result of those efforts listed below:

1. **Country Club Busway** - An at-grade busway is proposed as part of the first stage program from Volker

to Waldo. If there are any legal restrictions on such use they should first be resolved. Preliminary engineering and urban design investigations should be initiated regarding station locations, access, and parking. Consideration should also be given to developing a demonstration program of increased transit service on the busway and north to the downtown area along Broadway.

2. **Missouri River Crossing** - In view of the obvious need for increased vehicular and transit capacity across the Missouri River, it will be necessary to determine the optimum solution for providing for this capacity so that both highway and transit planning can be coordinated. These investigations would include location, type of structure, methods of financing the river crossing, the future use of the upper level of the ASB Bridge and the location of separate transit facilities both north and south of the River.

3. **South Midtown Freeway** - Preliminary discussions with the Missouri Highway Department indicate that providing for transit — either exclusive bus lanes or fixed guideway — in the median of the South Midtown Freeway will require design modifications to that facility. Engineering and urban design studies should, therefore, be undertaken to fully explore the physical and operational feasibility as well as the cost of making provision for transit from Truman Road to 75th Street with a connection to the 31st Street corridor.

   This Freeway was a part of the assumed Existing and Committed Highway Network and the transit planning was based on this assumption. If the South Midtown were deleted from the Highway Network alternate planning options will have to be examined.

4. **31st Street Corridor** - Because the proposed busway and fixed guideway are on common alignments along the 31st Street corridor between the South Midtown Freeway and Van Brunt, investigations should be undertaken to explore the physical feasibility of a combined transit and highway corridor, the right of way required for these facilities, and the redevelopment potential in the surrounding area.

5. **Right-of-Way Requirements - Rapid Transit Corridors** - In addition to determining right-of-way for the segments listed above, steps should be taken to reserve or dedicate other segments of right-of-way required to implement the rapid transit ways. These include parts of State highways, major streets, other publicly owned lands and railroads rights of way where dedication or easements will be necessary to provide for the transit facilities.

6. **Right-of-Way Requirements - Other** - Location studies should be undertaken to determine specific location for park & ride facilities, major transfer stations, and maintenance facilities so that property can be acquired or reserved.

7. **Transit Technology Review** - As part of the Monitoring Program, a periodic review should be made of developments in transit technology regarding light rail and other intermediate capacity systems to determine what application these developments might have on the fixed guideway plans. In addition con-

sideration should be given to the feasibility of providing light rail service at grade with the idea of later constructing it on its own right of way.

8. **Union Station/Pershing Square Development** - Close coordination should be established for the transit facilities to be provided within the Pershing Square Development area and necessary studies made to provide for future reservation for fixed guideway.

9. **Downtown Passenger Terminal** - As part of improving KCI Express service between the airport and the Kansas City, Missouri CBD, the feasibility of developing a single downtown passenger terminal should be explored.

10. **Environmental Impact** - Prior to receiving capital grants from the U.S. DOT, it will be necessary to make an environmental assessment, and in some cases, prepare an Environmental Impact Statement for specific projects. The extent of these investigations can only be determined when the projects are identified.

THE DECISIONS AHEAD

The decisions to be made in the near future in regard to public transportation for the KCMR can have a profound effect on the type of metropolitan area it becomes. Since transportation is a regional problem, it must be solved on a regional basis and this has been the underlying philosophy of the transit study.

What is needed now is responsible leadership by all the elected officials and agencies who have a role to play in making superior public transit a reality. The development of the Long Range Plan, as presented in this Report, is but a necessary first step to providing a viable alternative to the automobile for the citizens of the Region. Once the Plan is adopted many other decisions will be necessary: providing funding sources, getting public support and setting up the machinery to keep the improvement program moving. Indeed, it is apparent, of these decisions the most critical one is to develop a permanent tax support program for the funding of transit improvements and operations. Attempts should be made to establish the tax on a bi-state, multi-jurisdictional basis.

It is hoped that the Plan presented offers the opportunity to develop one significant component of the Region's transportation system which serves the community, conserves energy, preserves the environment, and is flexible enough to respond to future change.

APPENDIX A

TECHNICAL MEMORANDA

VOLUME I

PHASE I

1. Regional Control Estimates — Population 1970-1980-2000
2. Regional Control Estimates — Employment 1970-1980-2000
3. Small Area Population Projections — 1970-1980-2000 (Plan A)
4. Small Area Employment Projections — 1970-1980-2000 (Plan A)
5. Comparison Population and Employment Projections — 1970-1980-2000 (Plan A and B)*
6. Summary of Comparisons of the Socioeconomic Distribution — Land Use Plans A & B
7. Special Study — Freeway Accidents and Delay Costs
8. Special Study — Utilization of Existing Railroad Rights of Way
9. Special Study — Analysis of Transit Attitude Survey*
10. Existing Regional Physiographical Characteristics
11. Data Base and 1970 Transit Network
12. Potential Transit Corridors
13. Citizen Meetings
14. Review of Socioeconomic and Environmental Impacts
15. Transit Technology Review and Evaluation

VOLUME II

PHASE II

16. TMII-1 Modal Split Model — Parts 1 & 2
17. TMII-2 Mode Preference Model — Preliminary
18. TMII-3 Mode Preference Model — Final
    Part 1 — Airport Survey
    Part 2 — Employment Survey
    Part 3 — Impact of Pricing and Rationing on Auto Trip Production
19. TMII-4 Evaluation of Commuter Railroad System
20. TMII-5 Travel Impacts, No Build — Plan A
21. TMII-6 Community Involvement Program
22. TMII-7 Test System Facility and Cost Estimate, Plan A
23. TMII-8 Test System Patronage and Operations, Plan A
24. TMII-9 Test System Impact Analysis, Plan A

PHASE III

25. TMIII-1 Travel Impacts, No Build — Plan B
26. TMIII-2 Patronage Adjustment Factors for Regional Transit Systems
27. TMIII-3 Test System Facility and Cost Estimate, Plan B
28. TMIII-4 Test System Patronage and Operations, Plan B
29. TMIII-5 Test System Impact Analysis, Plan B

VOLUME III

30. TMIII-6 Alternative System Characteristics
31. TMIII-7 Test System 109 Analysis (South Midtown)
32. TMIII-8 Plan Implementation Background Paper
33. TMIII-9 Impacts of Transit Stations in Other Cities
34. TMIII-10 Staging the Long Range Transit Plan
35. TMIII-11 Cost Estimates — Recommended Alternative Systems 110 & 111
36. TMIII-12 Patronage and Operations — Recommended Alternative Systems 110 & 111
37. TMIII-13 Financing Alternatives for the KCMR
38. TMIII-14 Economic Evaluation of Alternative Transit Plans — Midwest Research Institute

*Report published separately from Technical Memoranda Binder

Note: The above listed Technical Memoranda have been published and distributed as support information for the Rapid Transit Planning Study.

COMMITTEE MEMBERS

Note: A regional transportation study covering two states and 110 municipalities requires close coordination on many different aspects of the problem. The committees listed (below) have had the responsibility of providing technical guidance, citizen input and liaison to the Transit Team and MARC Board.

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