

AN EVALUATION OF PARKING ON THE KANSAS STATE UNIVERSITY CAMPUS

by

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A THESIS

**submitted in partial fulfillment of the
requirements for the degree**

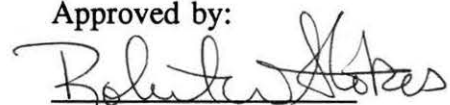
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A handwritten signature in dark ink, appearing to read "Robert W. Stokes", is written over a horizontal line.

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ABSTRACT



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The rapidly increasing student enrollments, early concentrated development on inner campuses, and the wide spread growth in the use of private automobile have all combined in recent years to magnify the problems of access, circulation, and parking on the K-State campus. Kansas State University has been experiencing the problem of parking on campus since 1977. Restrictions for freshman to park on campus has created on-street parking problems and traffic congestion in residential areas within six blocks of campus.

This study evaluated increasing the surface parking lots, constructing multi-level parking garages, and implementation of a shuttle system to solve the parking problem on campus. This study also considered the long range university planning goals in order to anticipate future potential sites for new buildings, possible additions to the existing buildings and/or parking structures. A feasibility analysis in terms of total costs, student share, application methodology, practical applicability to the K-State campus and impact on future campus developments are discussed.

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Chapter 1

INTRODUCTION

1.1 BACKGROUND

Modern University campuses are experiencing many of the same problems cities are facing. These educational institutions are experiencing problems such as over crowding of facilities, inadequate transportation systems and many others. University administrators must find the means to provide space and services for a heterogeneous population of students, faculty, staff, and a constant stream of visitors.

Rapidly increasing student enrollments, early concentrated development on inner campuses, limitations imposed by terrain, the widespread growth in the use of private automobile, and rapid growth in population and development of surrounding areas have all combined in recent years to magnify the problems of access, circulation, and parking on the Kansas State University (KSU) campus. The parking on the KSU campus can be characterized in terms of the existing parking supply, the distribution of parking spaces, and the effects of proposed developments on future parking supply.

1.1.1 Existing Parking Supply

At present the details of the parking spaces available on campus are shown in Table 1.1.

Table 1.1 Details of Parking Spaces on KSU Campus

Parking Stalls	Spaces	Parking Stalls	Spaces
Student Stalls	590	Reserve Stalls	450
Faculty Stalls	1314	Bramlage Stalls	5023
General Stalls	2660	Other Stalls	1001
Metered Stalls	317	Cycle Stalls	359
Residence Hall Stalls	3266	Total Stalls	14,980

Source: Parking Services, KSU

Excluding the Bramlage parking spaces, the total number of parking spaces available for campus activities is 9,957, of which only 5,014 parking spaces are available for Student and Faculty/Staff parking. The remaining spaces are allotted to student residence halls, metered stalls, and other necessary reserved stalls. The number of permits sold for the year 1992 - 93 are given in Table 1.2

Table 1.2 Permit Sales for the Year 1992-93

PERMITS	SEMESTER	FULL YEAR	SUMMER ONLY
Student	6162	4473	651
Faculty/Staff	1597	1689	31
TOTAL	7759	6162	682

Source: Parking Services, KSU

These include the Residence Hall permits also. The details of the Residence Hall permits sold are given in Table 1.3

Table 1.3 Residence Hall Permit Sales for the Year 1992-93

TYPE OF PERMITS	SEMESTER	FULL YEAR	SUMMER ONLY
B 2 permit	270	725	--
B 3 permit	117	346	--
Derby	80	294	--
Smurthwaite	02	40	--
Goodnow/Marlatt	184	428	--
Edwards	21	21	--
Edwards/General	46	43	--
Jardine	236	132	5
Jardine/General	306	157	10
TOTAL	1262	2186	15

Source: Parking services, KSU

Subtracting the Residence Hall permits from the total student permits, provides the number of permits sold for commuters to park on campus. These are shown in Table 1.4

Table 1.4 Commuter Permits Sold for the Year 1992-93

PERMITS	SEMESTER	FULL YEAR	SUMMER ONLY
Student	4900	2287	636
Faculty/Staff	1597	1689	31
TOTAL	6497	3976	667

Source: Parking Services, KSU

A full year permit is valid for two semesters. A semester permit is valid for one semester only. Therefore, to estimate the total number of permits sold for one year, two semester permits are taken as one full year permit. Hence the total number of permits sold for both Students and Faculty/Staff are $6497/2 + 3976 = 7225$. Comparing this to the 5,014 available spaces, indicates that 1.44 permits were sold for the year 1992 - 93 for each parking space. Jardine and Edwards Hall permit holders purchased 376 general permits, which allows them to park on campus also. Therefore, the total permit holders allowed to park on campus is 7601. But the available spaces remain the same at 5014. Hence the ratio of permits to the available spaces is 1.51. In addition, an average of 4400 visitor parking permits are issued every semester. This is equivalent to an average of 44 permits/day. The ratio of parking permits sold per stall is, therefore, somewhat greater than 1.51 figure reported above, because these visitors are allowed to park in Student or Faculty/Staff parking lots.

1.1.2 Distribution of Parking Spaces

University Parking services has divided the university into four zones for the purpose of recording violations of parking and traffic regulations (see figure 1.1). The number of parking violations observed in each zone for spring 1993 are shown in Table 1.5.

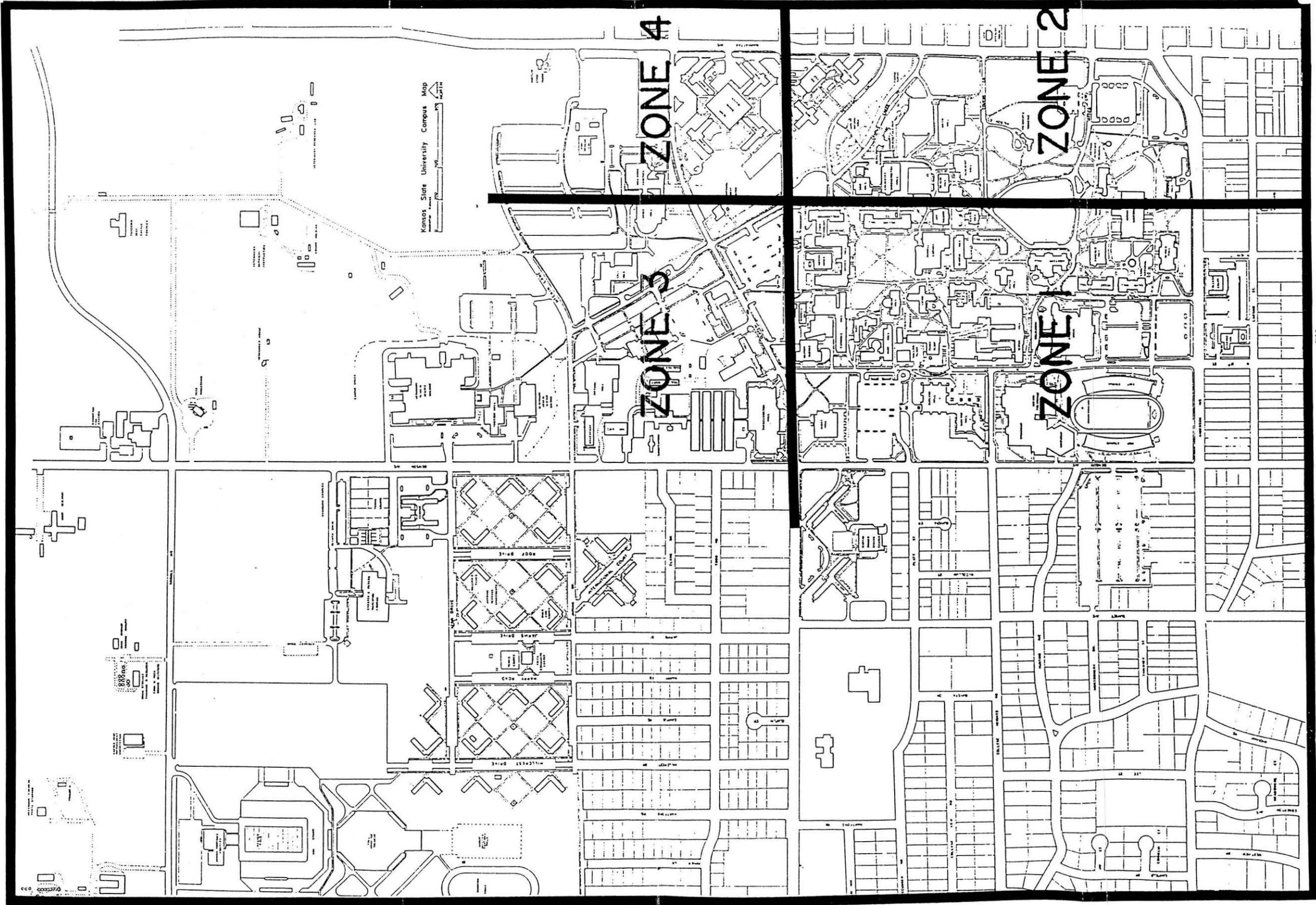


Figure 1.1 Campus Zones for Parking Violations

Table 1.5 Parking Violations for Spring 1993

Zone	Total Violations	Percentage
Zone 1	7821	39.44
Zone 2	4718	23.79
Zone 3	2905	14.65
Zone 4	4387	22.12
Total	19,431	100.00

Source: Parking Services, KSU

Approximately 70% of all violations occur in Zones 1 and 2 (south campus), where most classes and university activities take place. These figures clearly show that there is a shortage of parking spaces on the main campus. The smaller percentage of violations on the north campus suggests there is no shortage of parking spaces in Zones 3 and 4. This uneven distribution of parking spaces as compared to the location of academic activities on campus is a significant problem to be addressed.

1.1.3 Factors Affecting Future Parking Supply

Future construction projects on campus will increase the likelihood of parking problems. Future construction projects which will effect parking include the Farrell library expansion, closing of Mid Campus Drive, construction of art museum and future campus developments. Each are discussed in detail below.

1.1.3.1 Farrell Library Expansion

The Farrell Library expansion is projected to start construction in January 1994. Due to

the construction of the Farrell expansion, parking lot A 4, North of Holton Hall (metered lot of 20 spaces) and lot A 6, North of Dickens (Faculty/Staff lot of 76 spaces) will be used by the contractors during the construction period. This construction work is estimated to last for a period of 3 years. As a result, the campus will lose 100 parking spaces during the construction period.

1.1.3.2 Proposal for Closing Mid Campus Drive

Through traffic on Mid-Campus Drive will be rerouted to avoid the Farrell library construction area until the construction work is completed, and it may be permanently closed. This will create a circulation problem for traffic from the north campus to the south campus.

1.1.3.3 Proposal for the Construction of an Art Museum

The construction of an art museum on the southeast side of the campus is anticipated to start in early summer 1994. This construction will utilize a portion of parking lot A 1 (119 spaces) for 1 year. Once the construction is complete, these 119 parking spaces will be returned to service. However, the museum itself will attract a number of visitors which will tend to aggravate the present shortage of parking on the east side of the campus.

1.1.3.4 Future Expansion of the K-STATE Campus

As museum construction and the Farrell expansion take place within the main campus, continued expansion of the campus will create additional parking problems. The desire

to build within or adjacent to the main campus will consume land currently used for parking lots or dedicated to green spaces. Every new building or the expansion of an existing building will require more parking.

1.2 PROBLEM STATEMENT

As noted in the previous section, three problems were identified with campus parking. First, a shortage of parking spaces exists on the campus. The ratio of parking permits sold compared to the number of parking spaces available for campus activities was greater than 1.5. Secondly, the distribution of current spaces is uneven. Approximately 70% of all parking violations occur on the south campus indicating a clear shortage of parking spaces where most classes and university activities take place. The remaining 30% of violations occurring on the north campus would suggest that the shortage of parking spaces in this area is much less drastic. Finally, in the near future construction will reduce the number of available parking spaces and create a circulation problem resulting from the closing of Mid Campus Drive.

1.3 STUDY OBJECTIVES

Using past parking studies as a foundation, the objective of this study was to evaluate the feasibility of a campus shuttle system, a series of parking structures, and other parking alternatives for the KSU campus. This task included identifying financial implications, potential routes, site locations, and other pertinent information relating to these alternatives.

The specific objectives of this study were :

- To review past studies of the K-State parking problem;
- To evaluate the feasibility of a campus shuttle system, a series of parking structures, and other parking alternatives for the K-State campus;
- To identify potential costs, routes, site locations, and other pertinent information;
- To determine the impact of new parking structures on future campus development;
- To consider long range university planning goals in order to anticipate future potential sites for new buildings, possible additions to the existing buildings, and/or new parking structures;
- To identify financial implications of new parking structures, and for implementing a shuttle system (including construction costs, maintenance costs, revenue stream, etc.);

1.4 ORGANIZATION OF THE THESIS

In addition to this Introductory chapter, this Thesis consists of 3 chapters which correspond to the basic research objectives outlined above. Chapter 2 presents an overview of the past studies of parking on the KSU campus. Chapter 3 identifies and compares the alternatives considered to address university parking problems, and the fourth chapter of the thesis summarizes the primary findings and recommendations drawn from the study. Supporting documentation for various phases of the study is presented in 3 appendices.

Chapter 2

REVIEW OF PAST STUDIES

This chapter provides an overview of past studies concerning parking and internal circulation on the KSU campus. The material in this chapter is summarized under the titles of the individual studies conducted between 1978 and 1989.

2.1 THE 1978 KSU TRANSPORTATION PLAN

In 1978, Smith, et al., evaluated the transportation, circulation and parking related problems of the KSU campus. The report showed that of the 3,988 spaces available, 7,200 parking permits were issued. The ratio of total permits sold to the total spaces available was 1.805, which the authors considered very high. The 1978 study evaluated the following potential solutions for the campus parking problem: 1) increase the surface lots and 2) construct a multi - level parking garage. A financial analysis of the options, produced the following results. (Smith, et al., 1978)

- The total cost to the permit parker to park in the structure was \$255 per two semester school year, or \$ 1.7 per stall per day.
- The cost of building a parking structure was \$5,500 to \$7,500 per stall.

- The total cost of the permit to park in the surface lots was \$ 31.00 per year or \$ 0.21 per stall per class day, based on 1540 class days per year.

The basic conclusion of the study was that, "indeed, providing surface parking lots was the most preferred alternative in terms of financial feasibility. Only in cases of extreme shortage of land and urgent demand for more parking spaces should a parking garage be considered". KSU at that time did not meet the requirements.

2.2 THE 1981 KSU TRANSIT STUDY

A May, 1981 study titled "Kansas State University Transit Study", considered three levels of campus transit routes (Smith, et al., 1981). Level I was a campus circulation route that would encompass the Jardine housing area and the recreation complex, as well as the main campus. The Level II routes covered the area within a six or eight block radius of campus. The Level III routes included the city as well as major business districts. The Level II routes were designed to include the Level I routes. Likewise, the Level III routes would include Level II and Level I routes. The 1981 study considered the costs of each level of routes but did not identify a method to finance the system.

2.3 THE KANSAS STATE UNIVERSITY TRANSIT SYSTEM PROPOSALS AND POTENTIALS

In 1986, 4 marketing research students completed "The Kansas State University Transit System Proposals and Potentials", which sought to examine the need for a transit system,

and student, faculty, and staff willingness to financially support such a system. Although the results showed that the campus community was in favor of establishing a transit system, the university community was not in favor of financially supporting the cost of implementing such a system.

2.4 REPORT OF THE UNIVERSITY AD HOC COMMITTEE ON PARKING UTILIZATION

The Ad Hoc committee on parking (Bayouth, et al., 1987) conducted an inventory of the distribution of campus population and parking spaces for 6 sections of the campus. Table 2.1 gives the details of the inventory in terms of the distribution of campus population and parking spaces.

Table 2.1 Distribution of Campus Population and Parking Spaces (1987)

POPULATION			PARKING SPACES				
Section	Students	F/S/Dept	Student	S/F/S	F/S	Total	% Spaces
Southeast	3,098	1,031	-	285	396	681	16.50
Southwest	1,915	671	197	285	111	593	22.93
Central east	3,859	690	166	-	381	547	12.00
Central west	4,990	1,095	184	-	392	576	09.50
Northeast	696	137	-	296	23	319	38.30
Northwest	1,003	797	-	173	253	426	23.70
	15,561	4,421	547	1,039	1,556	3,142	15.70

F/S/Dept. = Faculty and staff per department

S/F/S = students, faculty and staff

F/S = faculty and staff

Source: Bayouth, et al., 1987

The Ad Hoc committee considered two options (i) constructing a multi-level parking garage, and (ii) campus transit to solve the parking problems on campus. The cost per space for the parking structure was estimated at \$ 5,500 to \$ 8,000 per space, and the maintenance and debt service was estimated at \$ 450 to \$ 850 per space. Constructing the parking garage, if the cost were shared among 10,000 parking permit holders, would add \$ 68.10 per permit.

Campus transit system is considered to solve the three primary circulation problems of 1) Access to the campus 2) Internal circulation and 3) Parking. They also considered 5 different routes, 3 of which were identical to those in the "KSU Transit Study" (Smith, et al.,). The assumptions made for the operating costs of the buses were:

Total Operating Costs	\$ 30 per bus hour
Operating Period	180 days/year
Capacity of the bus	45 passengers

The cost/year varied from \$ 113,400 to \$ 400,000 depending upon the number of buses used and the length of the route. The committee also studied and analyzed the existing parking system, delineating the following 3 categories of parking strategies. They were

- Segregated Parking Analysis
- Integrated Parking Analysis
- Status Quo Parking Analysis

The key features of these strategies are discussed below:

2.4.1 Segregated Parking Analysis

In the Segregated parking strategy, the parking lots were divided into Faculty/Staff and Student lots. The committee estimated that there were 2,800 students and 2,400 faculty/staff parkers during the peak period in 1987. The utilization of the 1,785 spaces in Faculty/Staff/Student lots is shown in Table 2.2. Two segregated options were considered by the committee. These options were outlined below.

Table 2.2 Occupancy of General Parking Lots in 1987

Type of Parker	Spaces occupied	Percentage
Students	1,413	79 %
Faculty/Staff	304	17 %
Visitors	8	0.5 %
Empty	24	1.5 %
Other	36	2 %
Total	1785	100 %

Source: Bayouth, et al., 1987

2.4.1.1 Segregated "Option A" would provide 2,434 spaces for Faculty/Staff on the basis that these groups have less flexibility of time and location and accordingly warrant additional consideration. Student permit holders would be assigned 1,673 spaces. In terms of Faculty/Staff convenience, the committee felt that satisfaction would increase as the available number of spaces approached the number of permits. Since the number of faculty and staff on campus at the peak period was estimated to be 2,420, the desired number of Faculty/Staff spaces should approach that number.

2.4.1.2 Segregated "Option B" would distribute shared spaces based on actual use, as determined by a survey. Faculty/Staff spaces would total 2,138, while 1,969 spaces would be assigned to student permit holders. Table 2.3 gives the number of segregated spaces as assigned to each group and the parking fee schedules for both the options.

Table 2.3 Comparison of Segregated Parking Options

Type of parking lot	Option A		Option B	
	Spaces	Cost	Spaces	Cost
Residence Halls and Jardine Terrace (no over-subscription)	2,873	\$ 96	2,873	\$ 96
Faculty/Staff (@3,000 permits)	2,434	\$ 78	2,138	\$ 68
Students (@4,000 permits)	1,673	\$ 40	1,969	\$ 47

Source: Bayouth, et al.,

2.4.2 Integrated Parking Analysis

In the integrated parking strategy, parking lots would be open to both students and Faculty/Staff. The committee considered two options for financing this strategy, (1) Uniform fee structure and (2) Sliding fee structure. The uniform fee structure provided a flat rate of \$ 67 per permit for students and faculty/staff. The sliding fee structure categorized the parking lots into 3 categories based on the ratio of the permits sold to the available spaces in each lot, with the cost of permits increasing as the ratio decreased. The committee evaluated two alternatives for the integrated sliding fee structure. Alternative A placed residence hall parkers in the highest cost bracket, due to the reserved aspect of the spaces. Alternative B placed residence hall parkers in the lowest cost

available. Assuming over subscription, for 9,893 permits sold to 6,980 available spaces, the costs are shown in Table 2.4

Table 2.4 Comparison of Integrated Sliding Fee Structure Alternatives

Category	Ratio	Alternative A	Alternative B
1	1.5	\$ 94	\$ 79
2	1.75	\$ 71	\$ 59
3	2	\$47	\$ 39

Source: Bayouth, et al.,

2.4.3 Status Quo Parking Plan

This strategy is a combination of both segregated and integrated parking options. The mixture of integrated and segregated parking areas available to permit holders made it impossible to evaluate the relative needs of the respective groups. Several windshield surveys indicated the almost complete utilization of segregated lots. Another consideration remained unevaluated. Staff permit holders generally have the longest and most consistent time frames for presence on campus. In contrast, turn-over for parking spaces occupied by faculty and students was much higher. Considering the ratio of spaces available to permits outstanding, student spaces probably had the highest turn over. The report concluded that by grouping faculty with staff, it may put faculty to a greater disadvantage than would any other alternative.

2.5 The 1989 Campus Parking and Circulation Study

This study (Barton-Aschman Associates, Inc., 1989) analyzed on-campus pedestrian and vehicular circulation, and existing campus parking. The study evaluated the following

options for addressing parking problems 1) increasing the surface parking lots, 2) constructing a parking garage and 3) implementing a shuttle system. Assumptions of this study were

- The predicted enrollment figure for the year 1997 was 18,682.
- A shortage of 284 parking spaces would occur for the year 1992- 1993.

The study recommended a set of changes in parking operations and concluded that the option of increasing surface parking was the best and most cost effective alternative. This conclusion assumed the acquisition of some property on the east side of the KSU campus in the City of Manhattan. It was determined that, the acquisition of such property was not feasible either financially or legally, hence this recommendation was not implemented.

This 1989 study suggested that lots A 29/ A 30, A 28, D 1, A 17/ A 18, and A 1/ A 2 be converted to parking garages in the near future and suggested building two garages at A 29/ A 30 and A 17/ A 18 in the long range recommendations. No consideration was given to the traffic effect of a parking garage at A 29/ A 30 on Anderson Avenue. This study also estimated the cost of providing a multi-level garage to be around \$ 7000 per space and maintenance around \$ 200 per space per year. The third alternative suggested was the implementation of a shuttle system which included 5 mini-buses on a proposed route with 6 minute headway in one direction. The study did not include financing options of the alternatives in detail. Also, the enrollment prediction of 18,682 students in 1997 has already been exceeded.

Chapter 3

IDENTIFICATION AND COMPARISON OF ALTERNATIVES

Using the past parking studies as a foundation, the objective of this study was to evaluate the feasibility of increasing the surface parking lots, construction of a multi-level parking structure and implementation of a shuttle system. This task included identifying financial implications, potential routes, site locations, and other pertinent information relating to these alternatives. Each of these are discussed in detail in this chapter.

3.1 SURFACE PARKING LOTS

As indicated in the previous chapter, parking problems are focused primarily in the main campus. Therefore the evaluation of potential new surface lot sites has been restricted to the main campus. The criteria used in this study to identify and evaluate parking lot sites are as follows:

- Size and location of the property;
- Density of development and use of adjacent land;
- Traffic Impact on adjacent streets;

- Sidewalk widths, curb cut locations and handicap curb cuts; and
- Set back lines, parking layout options and construction cost alternatives.

Based on these criteria, it was determined that expanding Parking Lot A 3 and constructing a new parking lot south of Memorial Stadium were two alternatives which should be evaluated. The advantages and disadvantages of these are discussed in the subsequent sections.

3.1.1. Expand Parking Lot A 3

By expanding Parking Lot A 3 north towards Lovers Lane, approximately 150 additional parking spaces could be obtained. In the short term, the temporary loss of 200 parking spaces on the east side of the campus due to the construction of the art museum and expansion of the Farrell library will be restored. However, once the construction of the Farrell library expansion and art museum is complete the expansion of Lot A 3 will help in compensating for the loss of 40 parking stalls due to the construction in the south east side of the campus. (see section 1.2.1)

3.1.2. Provide a Parking Lot South of Memorial Stadium

By constructing a new parking lot south of Memorial Stadium, approximately 200 additional parking spaces could be provided. By providing the new lot for general parking it would be possible to increase the metered parking in the Parking Lot A 29. The disadvantages of this site are the additional costs associated with storm drainage

improvements and future city street projects along Anderson and Denison. The Stadium lot would have vehicular access to both 17th Street and Denison Avenue and would displace recreation space. Table 3.1 summarizes advantages and disadvantages of the two sites considered for increasing surface parking lots.

Table 3.1 Pros and Cons of Alternate Surface Parking Lots

Parking Lot	Advantages	Disadvantages
Expand Lot A 3	• 150 spaces are obtained. • Compensates the loss of parking spaces due to the construction on the east side of the campus.	• Loss of green space. • Places a large parking lot in front of the President's residence.
South of Memorial Stadium	• 200 spaces are obtained. • More visitor parking can be provided at the Union.	• Loss of green space. • May have some traffic impact on the Anderson Avenue. • Have to spend more money on storm drainage. • Prevents expansion of Anderson Avenue.

3.1.3 Costs

The costs of two recent parking lot construction projects provide useful data for estimating the costs of such projects. These are:

1. A 14, residence hall parking lot of 95 spaces was reconstructed in the summer of 1993 for a total cost of \$200,000 (\$ 2105 per space).
2. Parking lot A 23 (88 spaces) was repaved for a total cost of approximately \$95,000 (\$ 1080 per space).

Hence the cost of constructing a new parking lot varies from \$1000 to \$2000 per space.

Thus the construction cost of expanding the Parking Lot A 3 would be \$150,000 to \$300,000 and the cost of a new parking lot south of Memorial Stadium would be

\$200,000 to \$400,000, which includes landscaping costs. It should also be noted that these figures do not include any other required infrastructure improvements, design fees, contingency amounts, site survey, geotechnical investigation or other improvements which would require funding. Even though there are advantages in increasing surface parking lots, this option does not solve the existing problems on campus, as these two lots merely replace the parking spaces that will be lost during construction on campus.

3.1.4 Changes Required in the Present Parking Fee Structure

If the surface parking lots are increased, then the present Parking fee structure could be continued. The present Parking fee structure (1993 - 1994) is shown in Table 3.2

Table 3.2 Parking Fee Schedule.

Type of permit	Annual	Semester	Summer
24 hour Reserved stalls (In addition to a permit)	\$ 265	-	-
10 hour Reserved stalls (In addition to a permit)	\$ 175	-	-
Organizational Unit Reserved Stall	\$ 100	\$ 50	-
Faculty/Staff permit	\$ 75	\$ 40	\$ 15
Jardine Terrace Combination	+\$10	+ \$ 5	-
Organizational Unit Permit in Faculty/Staff lots	\$ 50	-	-
Organizational Unit Permit in Designated Outlying lots	\$ 0	-	-
Student Permit	\$ 55	\$ 30	\$ 10
Residence Halls or Jardine Permit	\$ 55	\$ 30	-
Jardine Terrace Combination	+\$ 10	+ \$ 5	-
Edwards Hall Combination	+ \$ 10	+ \$ 5	-
Motor Cycle Permit	\$ 25	\$ 15	\$ 10
Vendor Permit (Commercial)	\$ 65	\$ 35	-

Source: Parking Services, KSU

3.2 MULTI-LEVEL PARKING GARAGE

A multi-level parking garage would provide more parking spaces where there is greatest parking demand. The site selection criteria for a parking structure includes the items indicated for surface parking lot design (see section 3.1) plus the following:

- Parking demand study based on the following
 - Zoning and density
 - Parking based upon square foot areas of different building types
 - Existing parking availability and demand
 - New parking demand
 - Total parking deficit
 - Total parking requirement
- Type of parking structure based upon the location on the property
- Traffic impact on adjacent existing streets and intersections
- Type of Intersection control system
 - Yield signs
 - Stop signs
 - Traffic signals

The potential sites considered for multi-level parking garages are given below. Figure 3.1 shows the location of the potential sites. At each location, a parking garage with 1000 spaces was considered. The potential sites considered are:

1. Parking lot A 30 (South of Union)
2. Parking lot D 1 (West of Memorial stadium)
3. Parking lot A 28 (South of Ackert)
4. Parking lot A 5 (North of Justin Hall)
5. Parking lot A 17 (North of Waters Hall)

3.2.1 Parking Garage on Lot A 30

The construction of a multi-level parking garage on lot A 30 (south of K-State Union) provides an adequate number of parking spaces on the main campus where the demand for parking is highest.

3.2.2 Parking Garage on Lot D 1

The construction of a garage on lot D 1 increases parking supply on the periphery of the campus. Even though this site is not in the core of the campus, its close proximity to the main campus should make it a desirable parking site.

3.2.3 Parking Garage on Lot A 28

This site would be ideal for the construction of a parking garage, as it is centrally located.

3.2.4 Parking Garage on Either Lot A 17 or A 5

As these two sites are close to each other, the construction of a garage at either location would reduce the parking shortage on the main campus.

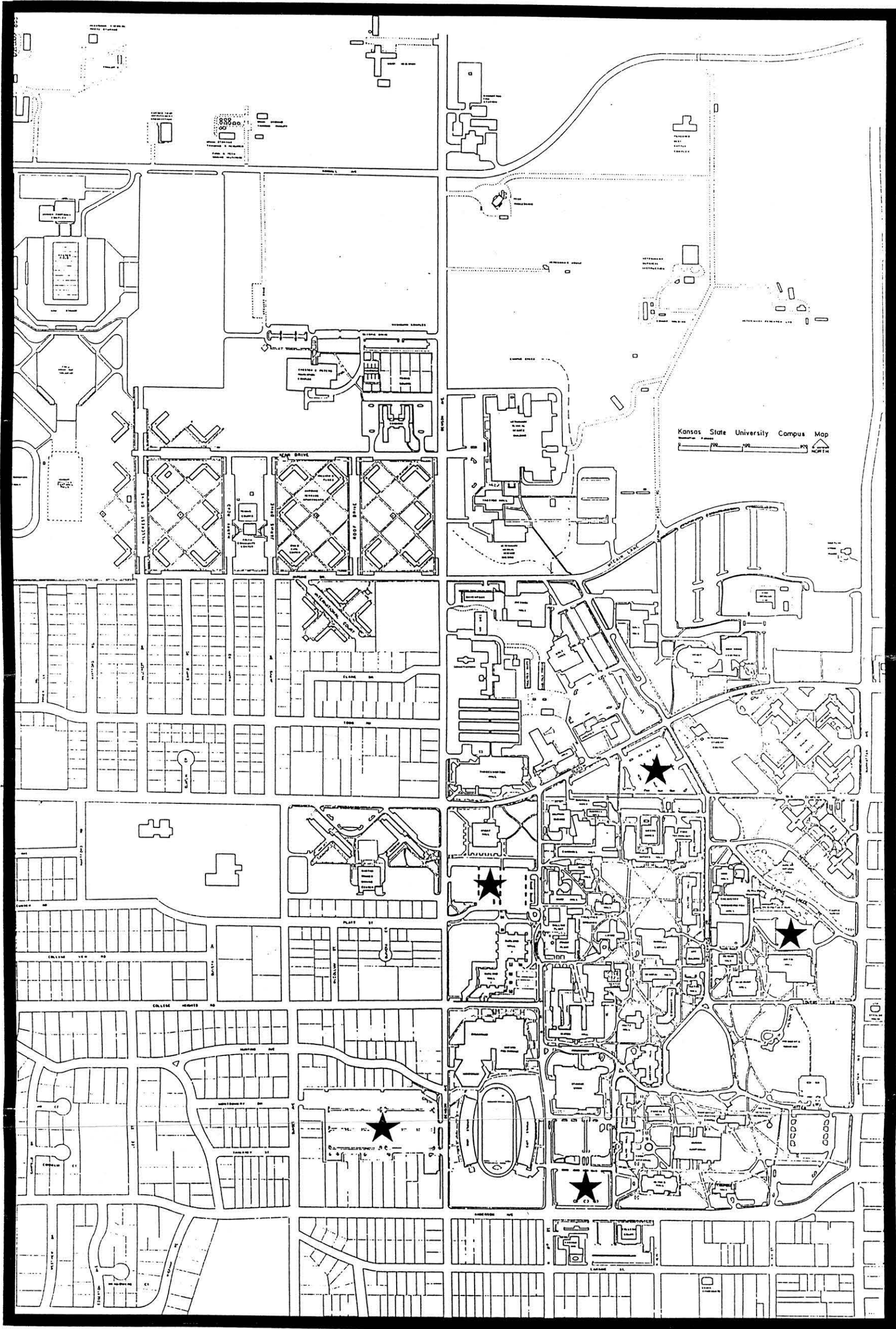


Figure 3.1 Potential Site Locations for Multi-Level Garage

3.2.5 Feasibility of Parking Garages

The basic items that have been considered for a parking garage on campus are

- Cost of the parking garage.
- Traffic impact on adjacent streets and intersections

3.2.5.1 Costs

Table 3.3 summarizes the construction costs of the recent multi-level parking garage projects.

Table 3.3 Cost Details of Multi-Level Parking Garages

PROJECT	CAPACITY	NO.OF LEVELS	TOTAL COST	COST/ SPACE
Univ. of Kansas Parking Structure	766 cars	5	\$ 3,967,750	\$ 5,113
Stormont-Vail Regional Medical Center, Topeka KS.	715 cars	5	\$ 4,029,000	\$ 5,635
The Univ. of Arizona Parking Facilities # 1 #2 #3	720 cars 1033 cars 1416 cars	-	\$ 11,390,000	\$ 3,600
Heritage Place Parking Facility, City of Molione, Illinois	505 cars	3	\$ 2,000,000	\$ 3,960
City of Dubuque Parking Facility No. 3 Iowa	617 cars	5	\$ 2,766,219	\$ 4,483
West side Parking Facility St. Cloud, Minnesota	400 cars	6	\$ 2,011,649	\$ 5,029
City of Columbia Heights Parking Facility columbia Heights, Minnesota	310 cars	3	\$ 1,288,121	\$ 4,155

As shown in Table 3.3, costs range from \$ 3,500 to nearly \$ 6,000/space. The difference in the cost/space is due to the location, type of construction and the year of construction.

The construction cost of the University of Kansas parking structure and the Stormont-Vail Regional Medical center garage in Topeka are perhaps typical for our region. The data in Table 3.3 was updated by conducting a preliminary telephone survey of firms which specialize in the design and construction of parking garages. Based on these considerations it was determined that a reasonable value for estimating the cost of multi-level parking garages is in the range of \$7000/space to \$9000/ space.

In addition to the construction costs of parking garages, it was necessary to develop an estimate of the maintenance costs of such facilities. The results of a survey published in Parking Magazine (Arons, 1985) were used to arrive at an estimate of the maintenance cost of multi-level parking garages. As shown in Table 3.4, a maintenance cost of \$250/space/year appears to be a reasonable value.

Table 3.4 Parking Facility Operational Expenses - 1984 Survey Data

Facility Car Capacity	No.of Responses	Operational Expenses per space
250 - 399	12	\$ 208
400 - 499	19	\$ 220
500 - 599	15	\$ 190
600 - 699	12	\$ 265
700 - 799	12	\$ 197
800 - 910	7	\$ 237
1000 - 1400	10	\$ 239
1450 - 1690	6	\$ 147

Source: Arons, 1985.

3.2.5.2 Traffic Impact Analysis

The Quick Response System II (QRS II) software (source) was used to assess the traffic impacts of the proposed parking garages. The Manhattan street network used in the analyses was obtained from the Kansas Department of Transportation (KDOT). The KDOT network was developed and calibrated using traffic and socio-economic data for 1985. Figure 3.2 shows the portion of the Manhattan street network used in the traffic impact analyses. The existing street capacities (vehicles/hour) used in the analyses are also shown in Figure 3.2.

For the purpose of conducting the traffic impact analysis it was assumed that each garage parking space would generate 5 trips/day. Therefore the addition of a 1000 space parking garage would generate 5000 trips/day. The QRS II software was used to assign these trips to the adjacent street system.

Tables 3.5 to 3.11 presents the results of the preliminary traffic impact analysis. As shown in Tables 3.5 and 3.6, the traffic from the parking garages could result in volume to capacity ratios of 0.95 and higher. Existing traffic volumes, street geometry, and signal timings are such that parking garages at A 30 and D 1 could cause substantial congestion on those sections of Anderson Avenue between Denison and 16th Street. Therefore, these two sites should not be considered as suitable sites for the construction of multi-level garages.

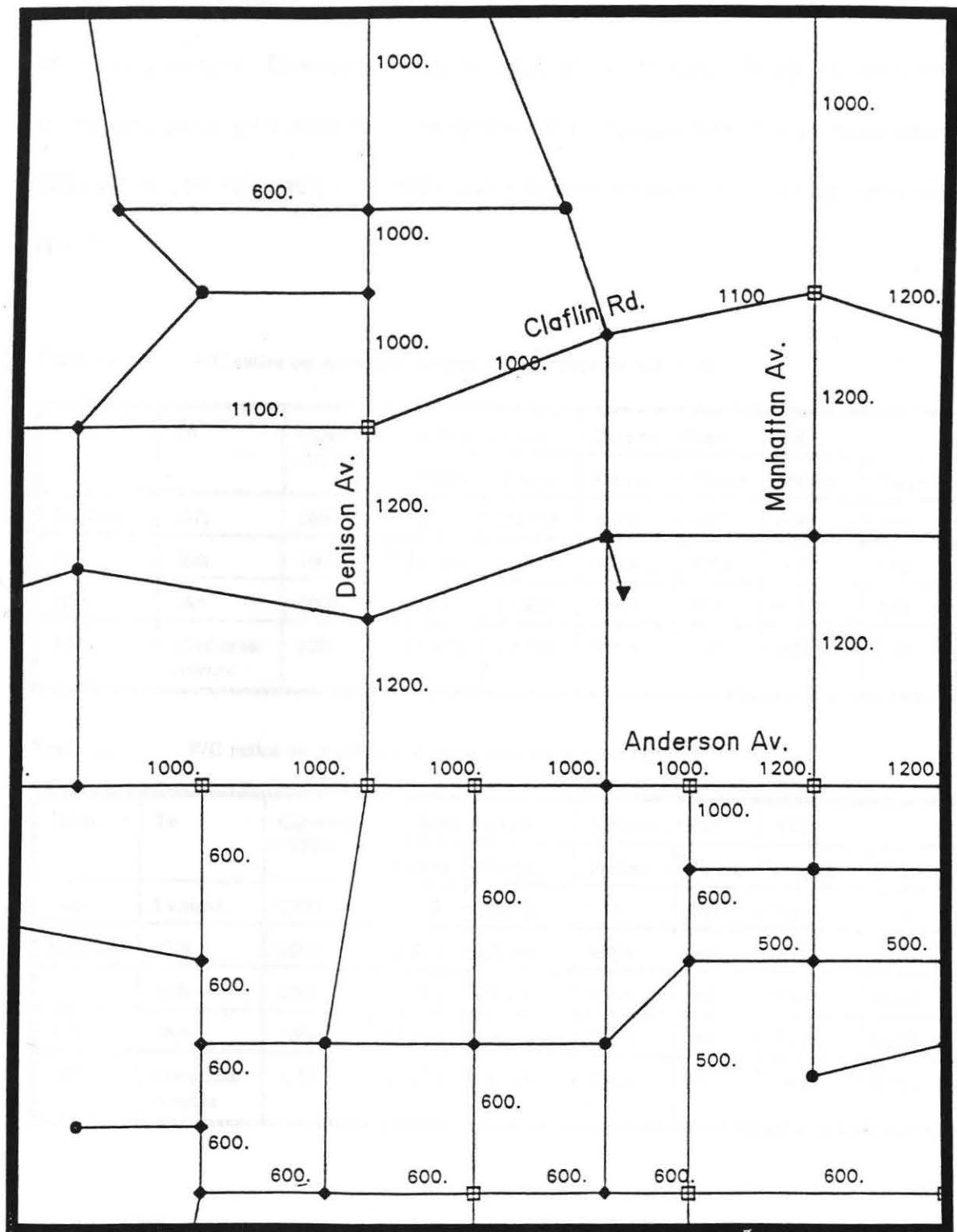


Figure 3.2 Capacities of Manhattan Road Network

The relatively low V/C ratios resulting from the traffic from the remaining three sites suggest that these sites (i.e., A 28, A 17, and A 5) may be suitable for the construction of parking garages. However, it must be noted that if parking garages are constructed on existing parking lot sites, the construction of the garages will remove those surface spaces from use and would very likely result in a severe short term shortage of parking spaces.

Table 3.5 V/C ratios on Anderson Avenue with Garage on Lot A 30

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
Denison	17th	1000	21,741	22,976	905.8	957	0.905	0.95
17th	16th	1000	21,741	22,674	905.8	1028	0.905	1.03
16th	14th	1000	17,983	19,481	749.3	811	0.749	0.81
14th	Manhattan Avenue	1200	17,678	19,184	736.6	799	0.613	0.79

Table 3.6 V/C ratios on Anderson Avenue with Garage on Lot D 1

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
18th	Denison	1000	17,928	18,416	747	767	0.747	0.767
Denison	17th	1000	21,741	23,986	905.8	999	0.905	0.999
17th	16th	1000	21,741	23,170	905.8	965	0.905	0.965
16th	14th	1000	17,983	19,235	749.3	801	0.75	0.801
14th	Manhattan Avenue	1200	17,678	18,938	736.6	789	0.613	0.789

Table 3.7 V/C ratios on Denison Avenue with Garage on Lot D 1

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
Anderson	College Heights	1200	3,988	8,230	166	343	0.138	0.285
College Heights	Claflin	1200	4,288	6,458	179	269	0.15	0.224

Table 3.8 V/C ratios on Denison Avenue with Garage on Lot A 28

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
Anderson	College Heights	1200	3,988	6,716	166	280	0.138	0.233
College Heights	Claflin	1200	4,288	5,052	179	210	0.15	0.175

Table 3.9 V/C ratios on Claflin Road with Garage on Lot A 28

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
Denison	Mid Campus Dr.	1000	5,117	5,383	213	224	0.213	0.224
Mid Campus Dr.	Manhattan Avenue	1100	4,492	6,698	187	279	0.17	0.254

Table 3.10 V/C ratios on Manhattan Avenue with Garage on Lot A 5 or A 17

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
Claflin	Ratone	1200	5,596	6,766	233	282	0.19	0.23
Ratone	Anderson	1200	7,690	10,102	320	421	0.26	0.35

Table 3.11 V/C ratios on Claflin Road with Garage on Lot A 5 or A 17

From	To	Capacity (VPH)	24 Hour Volume		Volume / Hour		V/C	
			Present	Future	Present	Future	Present	Future
Denison	Mid Campus Dr.	1000	5,117	7,359	213	306	0.213	0.306
Mid Campus Dr.	Manhattan Avenue	1100	4,492	4,366	187	182	0.17	0.165

3.2.6 Changes Required in the Present Parking Fee Structure

If a multi-level parking garage is built, it will be necessary to modify the university's parking fee structure to finance the construction and maintenance of the garages. Based on the following development and maintenance costs:

- Development costs \$8,000,000
- Annual Costs:
 - Operational Costs \$250,000
 - Debt Retirement Costs \$808,000
 - Total Annual Costs \$1,058,000

It would be necessary to increase the annual cost per permit by \$100. The University parking fee structure would then have to be modified as outlined below:

- Suggested Annual Parking Fee Rates:
 - Reserved 10 hour \$345

- Reserved 24 hour	\$435
- Faculty/Staff	\$170
- Students	\$150

3.3 IMPLEMENTATION OF A SHUTTLE SYSTEM

A May 1981 study entitled "Kansas State University Transit Study" (Smith, et al., 1981), considered three different levels of campus transit routes . The Level I route structure was a campus circulation route that would encompass the Jardine housing area and the recreation complex, as well as the main campus. The Level II routes covered the area within a six or eight block radius of campus. The Level III routes included the city of Manhattan as well as major commercial areas. The Level II routes were designed to include the Level I route. Likewise, the Level III routes would include Level II and Level I routes.

As the present study is confined to the campus shuttle service, only five Level I routes were considered for detailed analysis. The alternatives are discussed below in terms of service area, traffic control devices encountered along the routes and general scheduling information. In the following alternatives, it is assumed that the Mid Campus Drive is made a two way street from Calvin Hall to Fairchild Hall.

3.3.1 Alternative A

This route (see Figure 3.3) starts in the commuter parking lot at the east side of the

football stadium, runs through the Jardine complex, turns south on Denison Avenue, east on College Heights, and turns south on 17th street to the Union. From the Union parking lot it proceeds north to Mid Campus drive which serves the buildings on the south east portion of the campus. The route then continues in the northern direction past Anderson Hall and up Mid Campus drive, serving the majority of the buildings on the East campus. The route then continues across Claflin past the Call Hall area to the STOP sign at Denison. Proceeding north on Denison, the route passes the Veterinary Medicine Complex, turns in to the recreation complex area and returns to the commuter parking lot at the football stadium.

1. Service Area: Potential riders would include students parking in the commuter lot, Jardine complex residents, and those who use the Veterinary Medicine complex, or live in Edwards Hall. The route also provides transit from South Campus to North Campus, as well as circulation around campus.

2. Traffic Control : The route includes seven STOP signs and two traffic signals. It also involves two left turns from busy Denison Avenue.

3. Scheduling: This route is 16,150 feet in length. With an average travel speed of 12 miles/hour, the total trip time is 20 minutes. Assuming a headway of 10 minutes, 4 buses will be sufficient to operate this route in both directions.

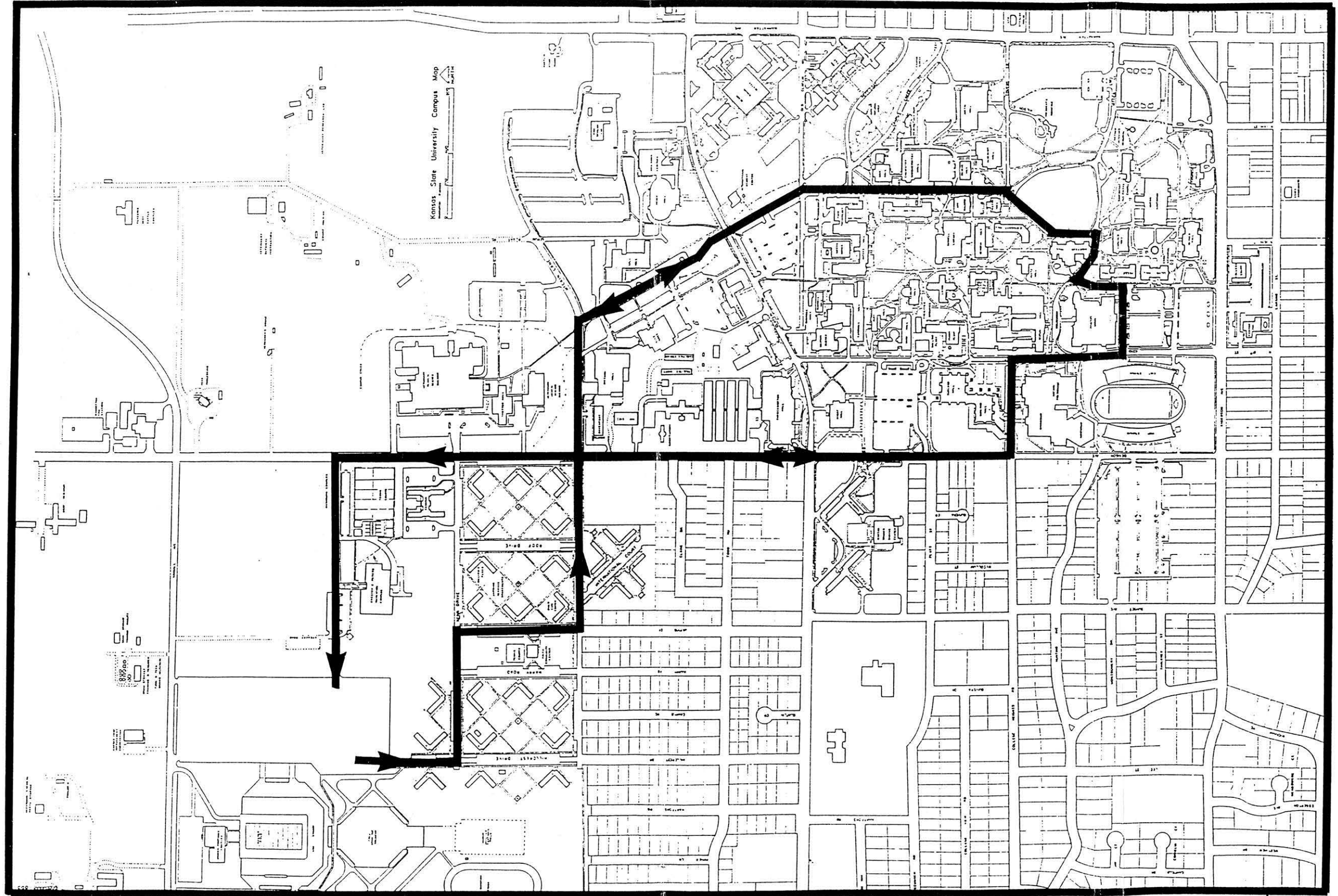


Figure 3.3 Shuttle Bus Route Alternative A

3.3.1 Alternative B

This route (see Figure 3.4) starts in the commuter parking lot at the east side of the football stadium, runs through the Jardine complex, turns south on Denison Avenue, turns east at College Heights, at 17th street it turns south to the Union. From the Union parking lot, the route loops round the campus via Mid Campus Drive and Vattier past the Chapel. It also includes Oak Drive (north-bound) and Mid Campus Drive. The route then moves along the one way street past the Strong Complex, West Hall and Ford Hall. Traveling northbound on Manhattan Avenue, then West on Claflin to Denison Avenue, the route provides access to most of the residence halls. Upon reaching Denison Avenue, the route proceeds north to serve the recreational areas (via Veterinary Medicine complex) and back to the commuter parking lot.

1. Service Area: Those served would include users of the Veterinary complex, residents of Jardine, most residence halls, the users of the commuter lot, as well as the students needing Campus circulator services.

2. Traffic Controls: This route includes eight STOP signs, four traffic signals, and four left turns. It includes two left turns from busy Denison, one left turn on to Manhattan Avenue and one left turn from Manhattan Avenue.

3. Scheduling: The route is 19,950 feet long and would require headway up to 25 minutes (including loading). By employing the use of four buses, headway of ten minutes would

be feasible in both the directions. The extensive ridership potential for this route would justify the use of two buses in each direction.

3.3.3 Alternative C

This route (see Figure 3.5) originates in the football stadium east parking lot and proceeds through the Jardine complex on the north road, then proceeds south on Denison to College Heights. Heading east on College Heights, this route follows the Alternative A route until it reaches Claflin Road. On Claflin it heads west to Denison Avenue and returns to its starting point (via the Veterinary Medicine Complex).

1. Service Area: This route would serve a commuter lot which could be used for long term storage of cars, as well as for everyday commuter traffic. The route also provides inner campus access, which would appeal to those who live in university housing.
2. Traffic Control: This route includes six STOP signs, three traffic signals and includes two left turns from Denison Avenue.
3. Scheduling: The length of the route is approximately 17,250 feet and would require 15 minute headway at an operating speed of 13 mph. Including time for loading and delays due to traffic congestion, a 20 minute headway could be obtained. Using four buses (two buses in each direction), a 10 minute headway could be achieved.

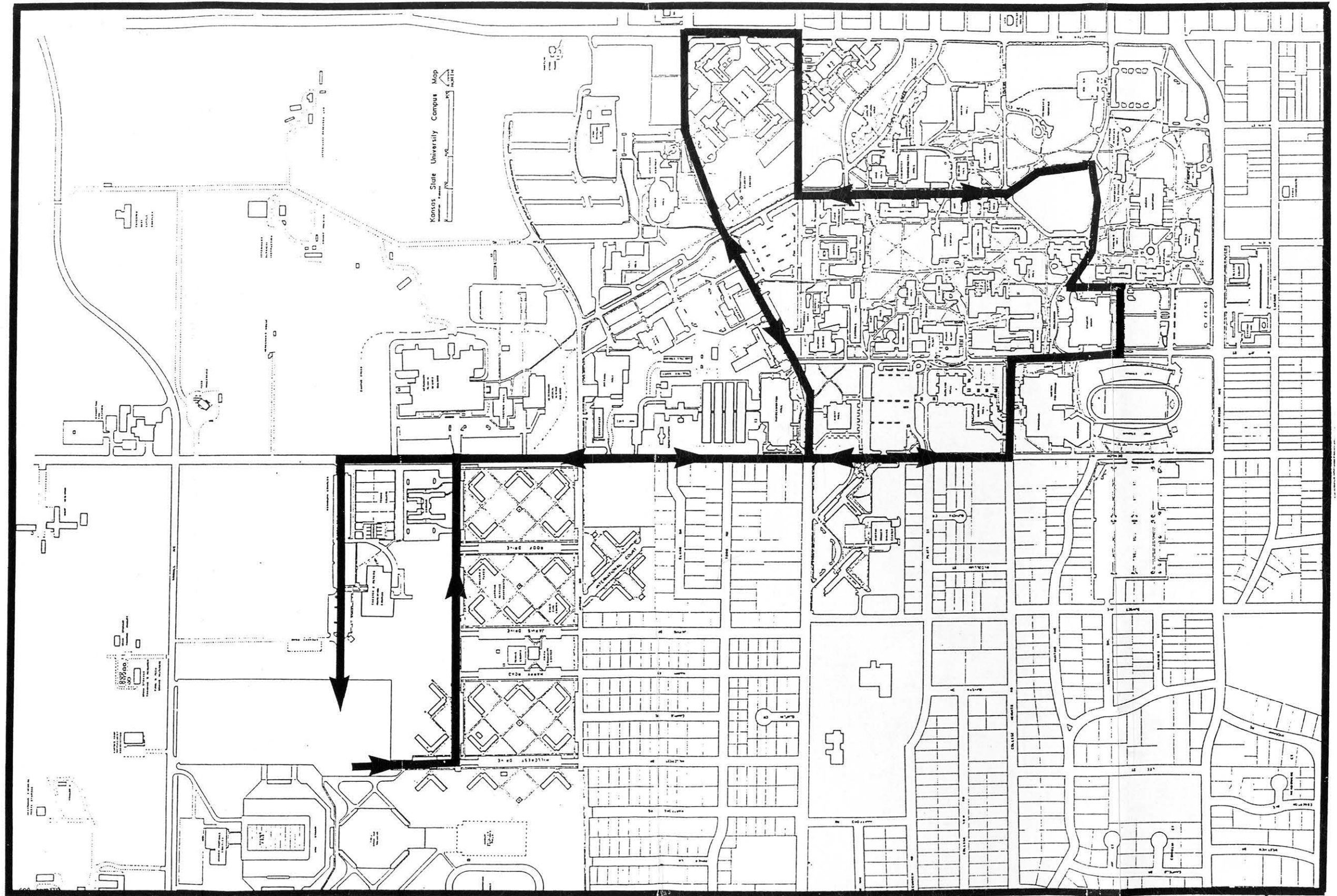


Figure 3.4 Shuttle Bus Route Alternative B

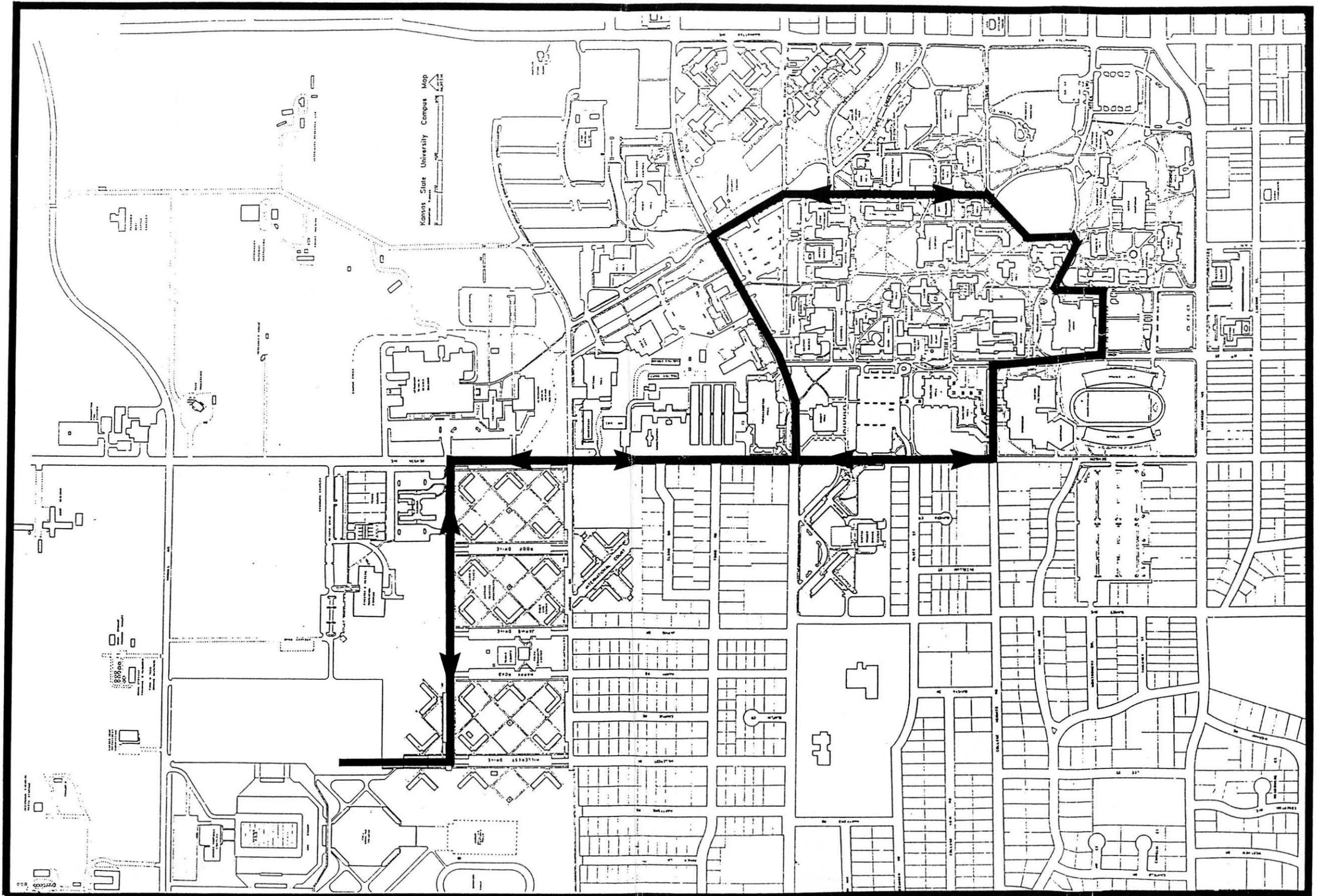


Figure 3.5 Shuttle Bus Route Alternative C

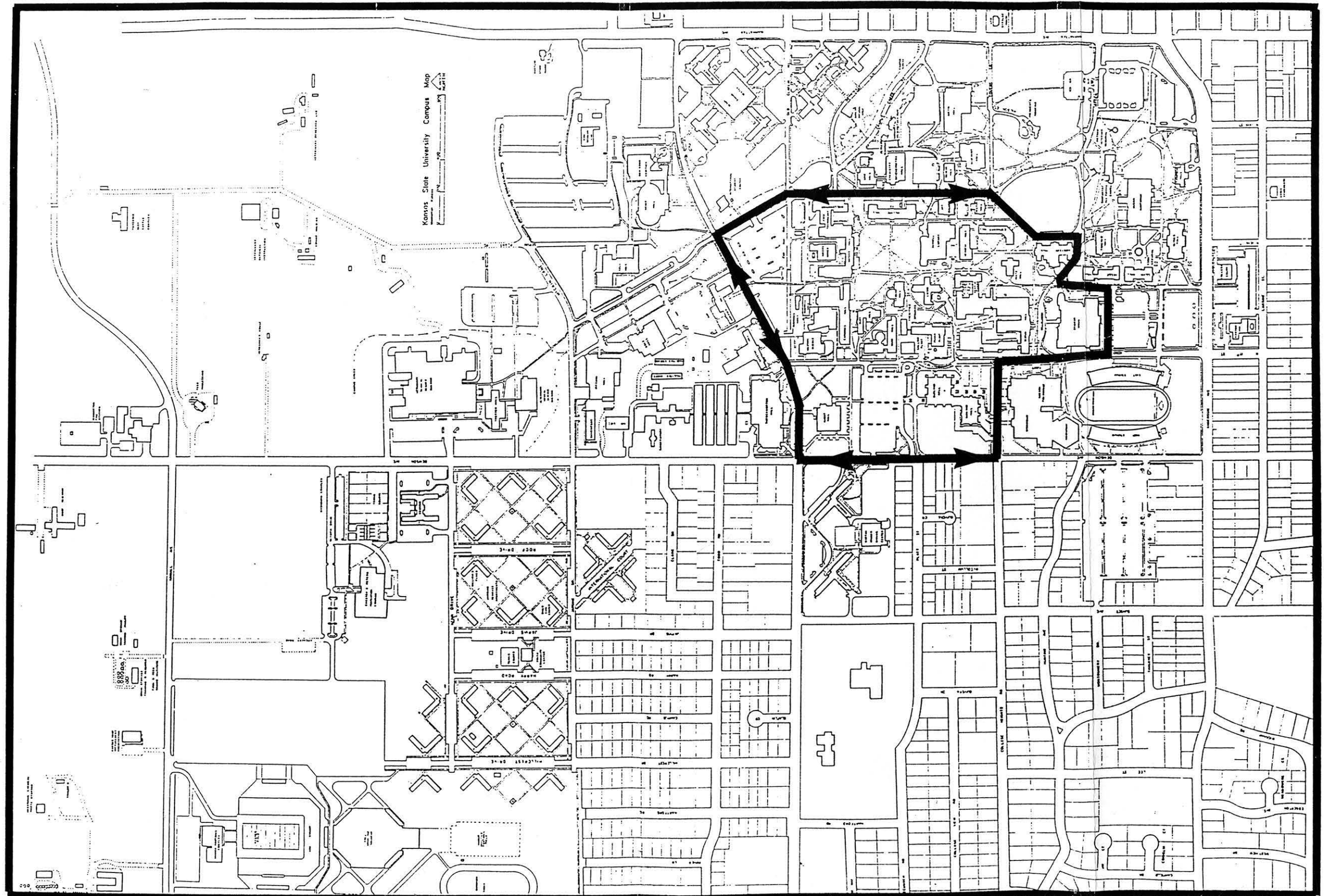


Figure 3.6 Shuttle Bus Route Alternative D

3.3.4 Alternative D

This route (see Figure 3.6) circles the core of the campus starting at the Union, proceeding east on Vattier and north on Mid Campus drive to Claflin, West on Claflin to Denison Avenue, then south on Denison Avenue to College Heights, east on College Heights to 17th street and back to the Union.

1. Service Area: This route provides service to those who typically choose to drive rather than walk to destinations on the main campus. Therefore, this route could decrease traffic on the main campus.

2. Traffic Control: This route includes two STOP signs, two traffic signals and two left turns to and from Denison Avenue.

3. Scheduling: The length of the route is approximately 6,000 feet, which indicates headway of 6 to 8 minutes. Keeping the headway at 8 minutes, the shuttle could be run efficiently and effectively. This route requires two buses, one in each direction.

3.3.5 Alternative E

This route (see Figure 3.7) originates in the football stadium east parking lot and proceeds through the Jardine Complex, south on Jarvis drive, turns left at Memorial Hospital behind Marlatt Residence hall and south on Denison Avenue to College Heights. The route then travels east on College Heights to 17th street and then to the Union Parking

lot. From the Union the route travels north on Mid Campus drive serving the south east and east portions of the campus along Petticoat lane. The route turns east on Manhattan Avenue and proceeds north to Claflin, then west on Claflin and north west on Mid Campus drive to Denison Avenue where it returns to its origin via Veterinary Medicine and Recreation complexes.

1. Service Area: This route serves students living on the west fringes of the campus as well as students in the northeast corner of the campus. It also serves most of the residence halls. Indirect access is provided to the Recreation and Veterinary Medicine complexes, the commuter parking lot, as well as the core of the campus.

2. Traffic Control: This route includes eight STOP signs, three traffic signals, and six left turns. This is the longest route with eight pedestrian crossings.

3. Scheduling: This route is 18,000 feet and would require 25 minutes for one round trip. Using 4 buses (2 buses in each direction), a 12 minute headway could be obtained.

3.3.6 Alternative F

Alternative F is a hybrid configuration which incorporates the basic advantages of Alternatives A-E. Moreover, Alternative F accounts for the effects of the Farrell library expansion and the temporary closing of a portion of Mid Campus Drive, which is a key link in Alternatives A-E.

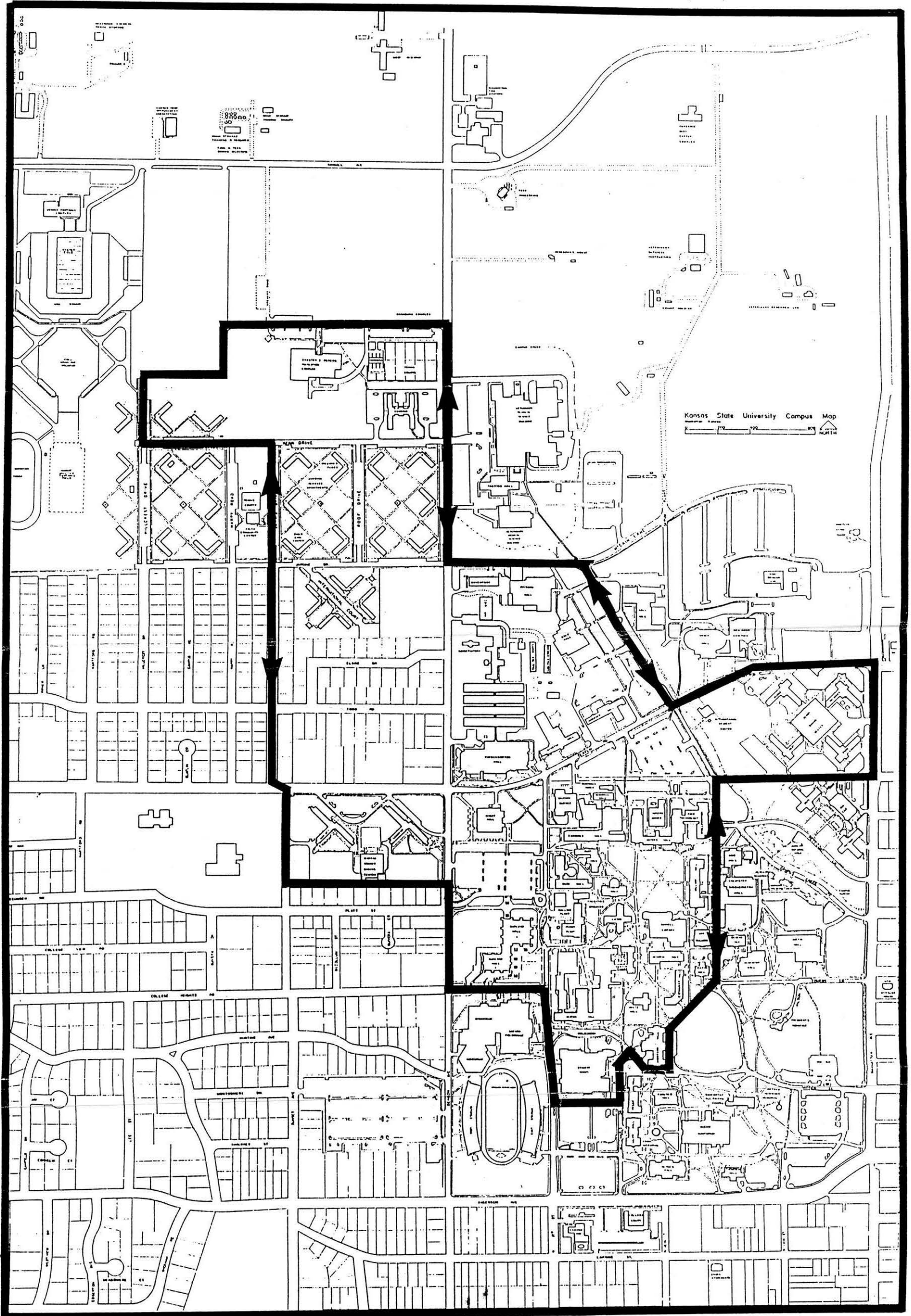


Figure 3.7 Shuttle Bus Route Alternative E

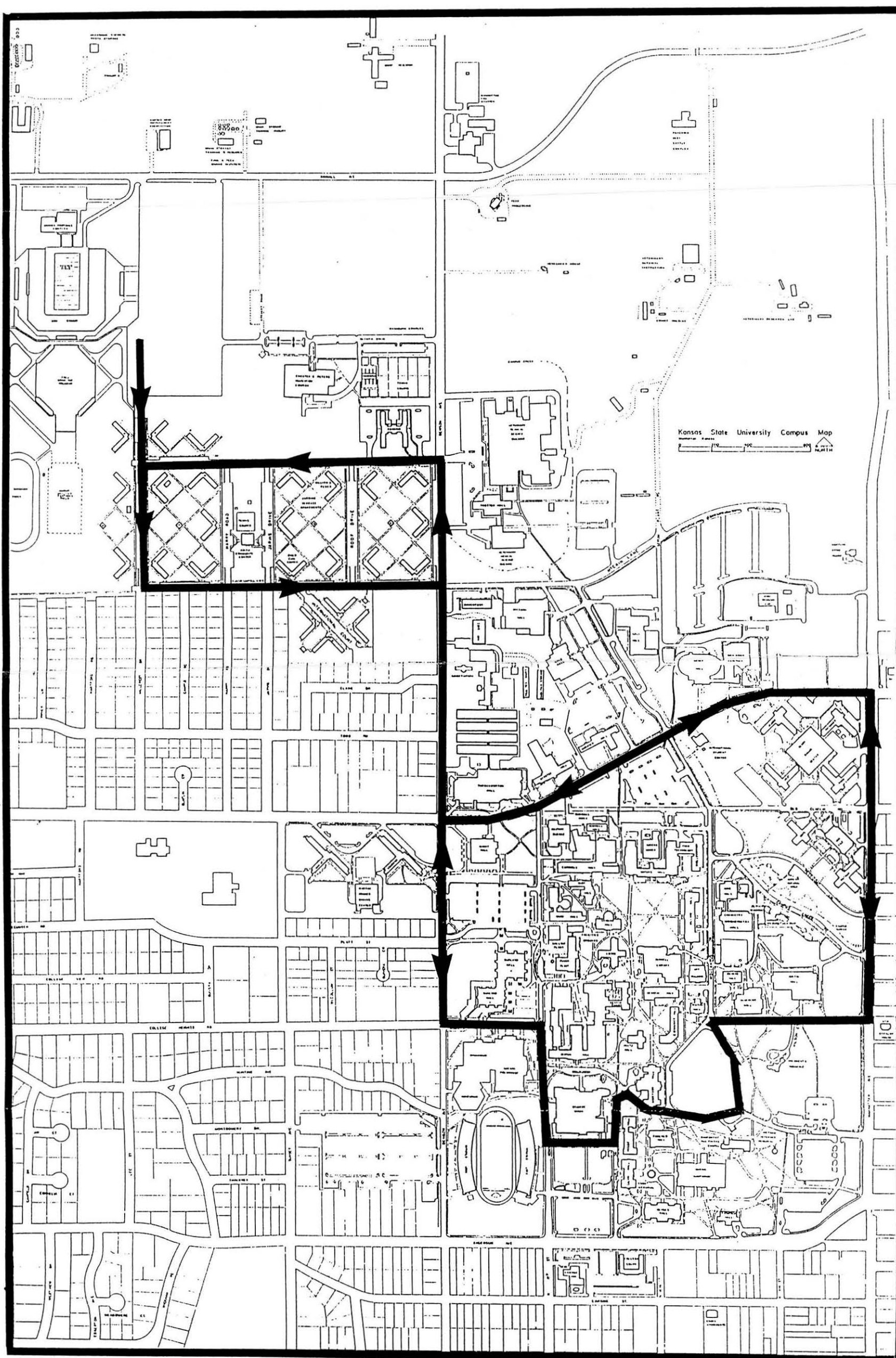


Figure 3.8 Alternative F - Clockwise Route

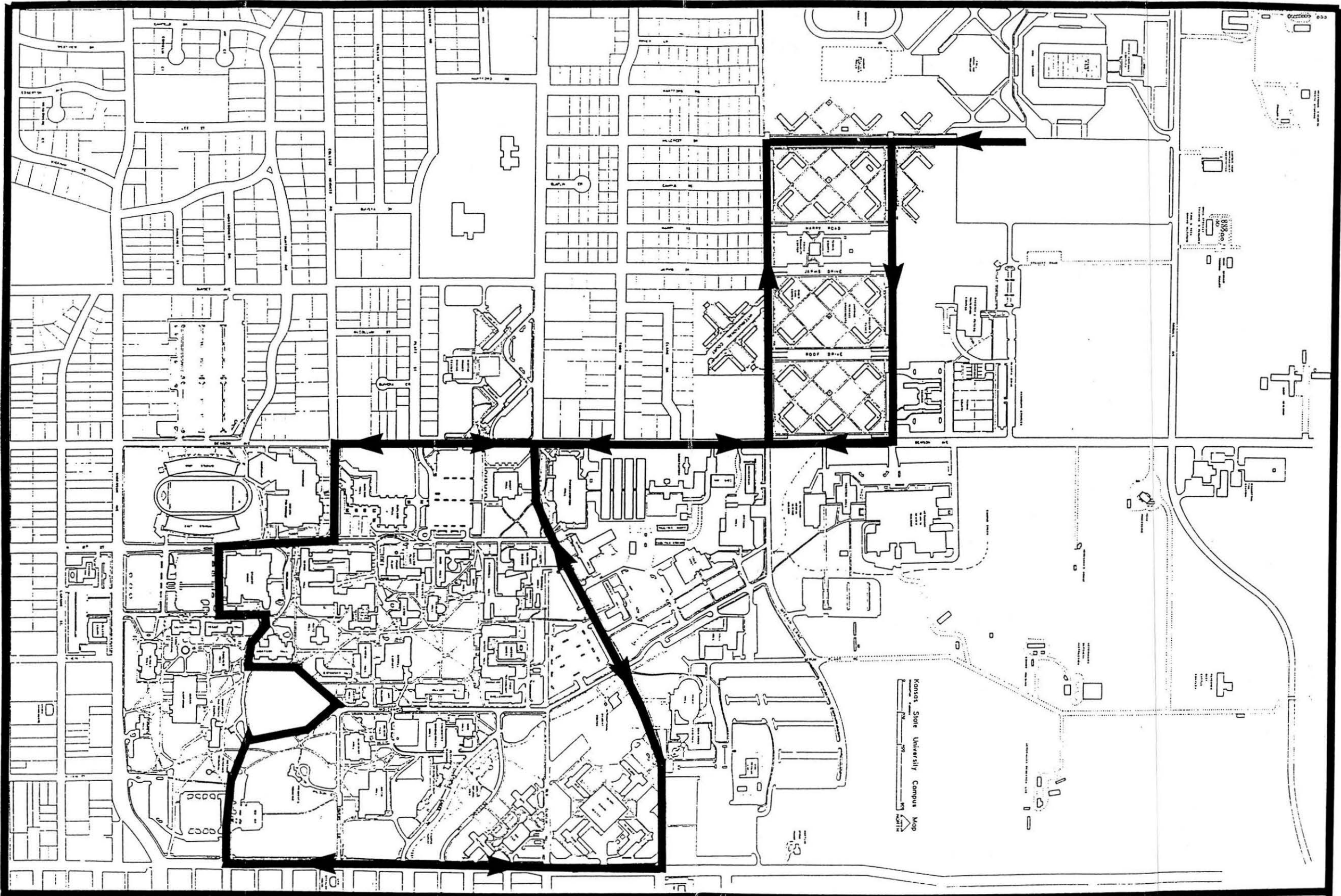


Figure 3.9 Alternative F - Counter Clockwise Route

This route starts in the commuter parking lot at the east side of the football stadium, goes through the Jardine complex, turns south on Denison Avenue and then turns east on to College Heights. The route turns south on 17th street to the Union, and then proceeds north on the Mid Campus Drive along the south east portion of campus. The route then turns south on to Oak Drive near Bluemont Hall, joins Vattier and turns north on Manhattan Avenue. The route proceeds along Manhattan Avenue serving the residential area on the east side of the campus. The route then turns west on Claflin Road past the residence halls to Denison Avenue, turns North on Denison Avenue and returns to the commuter lot through the Jardine Complex. On this route buses run in both directions (i.e., clockwise and counter clockwise directions). Figures 3.8 and 3.9 show the clockwise and counter clockwise routes, respectively.

1. Service Area

Clockwise Route

- This route provides service from Jardine, and commuter lot to Throckmorton, Dykstra Hall, Umberger Hall, Weber Hall.
- The route also provides access from Moore, Ford and Haymaker Halls to the Union
- This route provides transit from the Union to Veterinary Medicine complex and the commuter parking lot.

Counter Clockwise Route

- This route provides service from commuter lot, Jardine, Edwards hall, the Veterinary Medicine complex, and Goodnow/Marlatt halls to the Union.

- This route provides ridership from the Union to the Moore, Ford and Haymaker residence halls.
- This route provides transit from the Moore and Haymaker residence halls to Throckmorton, Veterinary Medicine complex and Bramlage Coliseum.

2. Traffic Control

This route includes four traffic signals with two left turns at signalized intersections and two left turns at unsignalized intersections. These routes cover the majority of the campus pedestrian crossings, thus providing pedestrian access to the shuttle.

3. Scheduling

This route is 4.0 miles long and takes 30 minutes for a round trip including loading and unloading. Therefore, 3 buses in each direction would provide a headway of 10 minutes in each direction. The total number of buses in both directions would be 6.

3.3.7 Summary of Route Alternatives

Table 3.12 provides a summary of the six shuttle alternatives discussed in the preceding Sections of this Thesis. In the alternatives A to E the proposal for the shutoff of Mid Campus Drive is not considered. After considering the advantages of all these alternatives, alternative F is considered with the proposed changes on campus routes due to the construction works. Alternative F is found to be the recommended route at the present situation. Table 3.13 compares the advantages and disadvantages of the route alternatives.

Table 3.12 Summary of Route Alternatives

ALTERNATIVE	LENGTH	TIME	SPEED	NO.OF BUSES
A	16,150 ft (3.05 miles)	20 min.s	12 mph	2+2
B	19,950 ft. (3.77 miles)	25 min.s	12 mph	2+2
C	17,250 ft (3.26 miles)	20 min.s	13 mph	2+2
D	6,000 ft (1.13 miles)	8 min.s	12 mph	1+1
E	18,000 ft (3.4 miles)	25 min.s	12 mph	2+2
F	(4 miles)	30 min.s	12 mph	3+3

Table 3.13 Pros and Cons of Route Alternatives

Alternative	Advantages	Disadvantages
A	• Better access to Jardine apartments • Serves area near Call Hall. • Serves area near Union.	• Indirect service for fraternities, sororities to Recreation complex. • Indirect service for Veterinary complex and Edwards Hall.
B	• Serves largest group of any route. • Direct access both coming from and going to North campus. • Provides service to parking lots on campus.	• The longest route. • Includes left turns on to busy streets. • May be congestion problems. • Does not serve effectively the Jardine residents.
C	• Direct access to Veterinary and recreation complexes from and to main campus. • Short and effective route.	• Does not serve Call Hall. • Does not serve effectively the Jardine residents.
D	• Short route and quick service is provided for main campus. • May be popular during inclement weather.	• Very limited service area. • Does not address the parking problems.
E	• Fairly short route with a great deal of coverage. • Service provided to most of the parking lots.	• Left turns on to busy streets. • Excessive indirect access. • Ineffective double coverage for most users.
F	• Excellent coverage of Jardine and Residence halls. • Service provided to most of the parking lots	• Left turns on to busy streets. • The Longest route discussed.

3.3.8 Legal Issues

In developing the alternatives for a Shuttle system to serve the KSU, research was done to determine what major legal issues may arise, if such a system were to be implemented. Though the legal constraints posed on a system serving an institution such as KSU are surprisingly minimal, much time can be spent in litigation as a result of legal problems. A source from the Metropolitan Transit Authority in Topeka, Kansas confirmed that its management spends seventy percent of its time working at solving legal conflicts. (Smith, et al., 1981). Probably the most complicated legal problem is liability for pedestrians, system users, and system employees. Should the University own and operate the system, the state provides full coverage policies called the "Fleet Policy" and the "Tort Claims Act", which include third party liability claims. But if the University is not funding the system, the State requires that the firm or company carry its own policies to provide the coverage.

3.3.8.1 Facilities for the Disabled

Another important legal issue that is given consideration is meeting the requirements of the Americans with Disabilities Act (ADA). ADA rules for transportation services operated by, under contract to, or on behalf of Public Universities are covered by Title II of ADA. The specific regulations would depend upon whether the service was fixed route or demand responsive. Fixed route services operated by public universities would be subject to the Department of Transportation (DOT) rules for commuter bus service, which means that the University would not have to provide complementary paratransit

services. If a University operates a demand responsive system for the general public, it would be subject to the rules for demand responsive systems for the general public.

Public university fixed route systems are subject to public entity requirements. However, the systems are viewed as commuter bus services. This has the effect of requiring the acquisition of accessible vehicles, but there is no requirement for the provision of complementary paratransit or submitting a paratransit plan. Like the commuter bus systems, university fixed route systems generally have limited, rather than comprehensive, route structures. They serve a limited number of origins and destinations, and have limited functions. One of their primary functions is to interface with fringe parking lots and/or city transit systems that carry people to the vicinity of, but not directly to, major campus destinations. Moreover, like commuter bus systems, campus shuttles are a kind of service which do not fit the urban transportation model of complementary paratransit comfortably. Given the composition of university communities, the likelihood of significant numbers of individuals meeting the para-transit eligibility standards is low. Costs of planning and implementing a complementary paratransit system at a university are less likely to be balanced by providing significant amounts of needed service than in a more typical urban mass transit context.

The following ADA related items should be given consideration in the implementation of a shuttle system on the KSU campus.

- Vehicles: All vehicles should be lift chair equipped.
- Bus Stops: Bus stop is a general term which encompasses all of the elements associated with the access to the loading area or bus stop pad, the interface area between the bus lift or ramp and the bus stop pad, the shelter, *if provided*, and the bus route signage (KRW Inc).

The term *if provided* emphasizes that it is not necessary to build a bus shelter, but if provided, it should satisfy the ADA requirements.

3.3.9 Economic Considerations in Implementing Shuttle System

Two basic operating alternatives available for implementing a campus shuttle system.

They are:

1. University ownership of the Shuttle System; or
2. Contracting with a private vendor.

The advantages and disadvantages of these options are discussed below

3.3.9.1 University Ownership of the System

Factors that should be considered in evaluating the feasibility of University ownership of the system are

- Initial investment to buy the buses
- Operational Costs
 - Hiring Personnel to manage the system efficiently and effectively
 - Hiring the drivers and mechanics to maintain the buses.

- Fuel costs, insurance costs and legal issues.

- Providing maintenance, facilities for the buses

3.3.9.1.1 Initial Investment to Buy the Buses

The cost of new buses ranges from \$60,000 to \$200,000, depending upon the size of the bus, and features such as air conditioning, cushion seats, etc. The different sizes of the buses available in the market are given in Table 3.14.

Table 3.14 Standard Bus Sizes

Type of Vehicle	Length	Width	Seats	Standees	Total
Mini Bus	18 to 25	6.5 to 8	15 to 25	0 to 15	15 to 40
	30.0	8.0	36	19	55
	35.0	8.0	45	25	80
	40.0	8.5	53	32	85
Articulated Transit Bus	55.0	8.5	66	34	100
	59.7	8.5	73	37	110

Source: Levinson (1992)

3.3.9.1.2 Operating Costs

Typical operating costs include maintenance costs, driver's wages, and cost of spare parts. Appendix A summarizes operating costs for transit services for small cities in the midwest. As shown in Appendix A, operating costs for small systems typically are on the order of \$36.94 / bus hour.

3.3.9.1.3 Maintenance Garage

A maintenance facility will need to be built for the maintenance of the Shuttle buses, if the system is owned by the University. The existing university motor pool is probably not sufficient for these maintenance services.

3.3.9.2 Contracting with a Private Vendor

Most universities have provided transit services by contracting with private vendors or paid City Transit systems to extend service to the University students. Very few universities own their system. Representative rates paid by Universities for the shuttle service are summarized below based on a telephone survey.

1. Rensselaer Polytechnic Institute, New York	\$23.17 per bus hour
2. University of Kansas, Lawrence	\$26.00 per bus hour
3. University of Georgia, Athens	\$30.00 per bus hour
4. University of North Carolina, Charlotte	\$31.00 per bus hour

The variation in the cost/bus hour is due to the number of bus hours of operation and the age of the system.

3.3.9.3 Comparison of Ownership of the System

The advantages and disadvantages of the contracting out the Shuttle system is summarized in Table 3.15.

Table 3.15 Advantages and Disadvantages of the Ownership of the Shuttle System

System	Advantages	Disadvantages
Owning the system	• Complete authority will be vested with the University. • Source of part time jobs to the students.	• If the shuttle system is not practically feasible, the buses are to be sold back, which causes a loss of initial investment.
Contracting out the system	• No initial investment to buy the equipment. • If the service is not acceptable by the students, the service can be stopped.	• Complete authority will not be in the University's possession. • If the service is not good, change of the contract is difficult.

3.3.9.4 Shuttle Schedules

On the recommended route discussed in the previous section, six buses are assumed to operate 11 hours a day between 7 A.M and 6 P.M., and 4 buses are assumed to operate 4 hours from 6 P.M to 10 P.M. The buses run 5 days a week Monday through Friday and 15 weeks/semester. During the summer, it is assumed that 4 buses run from 7 A.M to 6 P.M., and 2 buses run from 6 P.M to 10 P.M.

The total number of hours operated for two scenarios are given below.

1. Only during Fall and Spring Semesters

$$\begin{aligned} & 2 \text{ semesters } [6 \text{ buses } (11 \text{ hrs} \times 5 \text{ days} \times 15 \text{ weeks}) + \\ & 4 \text{ buses } (4 \text{ hrs} \times 5 \text{ days} \times 15 \text{ weeks})] = 12,300 \text{ bus hours.} \end{aligned}$$

2. Full year

$$\begin{aligned} & 2 \text{ semesters } [6 \text{ buses } (11 \text{ hrs} \times 5 \text{ days} \times 15 \text{ weeks}) + \\ & 4 \text{ buses } (4 \text{ hrs} \times 5 \text{ days} \times 15 \text{ weeks})] + [4 \text{ buses } (11 \text{ hrs} \times 5 \text{ days} \times 8 \text{ weeks}) + \\ & 2 \text{ buses } (4 \text{ hrs} \times 5 \text{ days} \times 8 \text{ weeks})] = 14,380 \text{ bus hours.} \end{aligned}$$

3.3.9.5 Sources of Revenue

The different sources of revenues from which the shuttle system could be financed are

- Federal Grants
- State Grants
- User subsidies

Federal Grants Federal Grants are not available for funding the university shuttle system.

Details of the Federal Transit Administration (FTA) sections are provided in Appendix B.

State Grants The State of Kansas does not have any programs to assist Transit programs for State Universities.

User Subsidies

Student funding of the shuttle system could consist of:

1. Compulsory fee at the time of enrollment
2. User fares
3. Combination of student fee and user fares.

1. Compulsory Fee at the Time of Enrollment

Annual enrollment figures for K-State for the period 1990 - 1993 are shown in Table 3.16.

Table 3.16 Enrollment Figures for KSU, Manhattan Campus

YEAR	SPRING	SUMMER	FALL
1990	17,711	6,387	19,367
1991	18,113	5,417	20,155
1992	18,931	5,949	19,977
1993	19,061	---	19,677
AVERAGE	18,454	5,917	19,794

The average of Spring and Fall enrollment is 38,250. A telephone survey with different firms given in Appendix C showed that it would cost between \$34 to \$44 per bus hour to run buses on K-State campus. These figures may change in the process of actual bidding when additional bus companies participate. For the purpose of this study, an average of \$39 per bus hour was assumed to estimate the operating costs for the two scenarios outlined in the previous section. The total cost of the system for the two scenarios is shown in Table 3.17.

Table 3.17 Cost Per Year for the Scenarios Considered

Option	Cost/Bus Hour	No.Of Bus Hours	Total Cost
Scenario 1.	\$ 39	12,300	\$ 479,700
Scenario 2.	\$ 39	14,380	\$ 560,820

Estimating a total enrollment of 38,250 students for Fall and Spring semesters, the cost per student for the two scenarios are given in Table 3.18

Table 3.18 Cost Per Student Per Semester for the Scenarios Considered

Option	Total Cost	Enrollment	Cost/Student/Semester
Scenario 1.	\$ 479,700	38,250	\$ 12.55
Scenario 2.	\$ 560,820	38,250	\$ 14.6

The number of Faculty and Staff on the KSU campus in 1993 are as follows

Staff 1921

Faculty 2457

Total 4378

Table 3.19 summarizes the per capita costs of the shuttle system assuming that the system would be financed by students, faculty and staff.

Table 3.19 Cost Per Person Per Semester for the Scenarios Considered

Option	Total Cost	Students +Faculty	Cost/Person/Semester
Scenario 1.	\$ 479,700	38,250 + 4,378	\$ 11.25
Scenario 2.	\$ 560,820	38,250 + 4,378	\$ 13.15

2. User Fare to Ride the Shuttle Buses

Previous studies have shown that revenues from fares would not be sufficient to finance the shuttle system. Therefore, this option is not recommended as a viable means of financing the proposed system.

3. Combination of Student Fee and User Fee

This option should be considered only if substantial numbers of non students and non faculty/ staff use the system. Under this option, only non student and non faculty/staff riders would be charged a fare. Student fees paid in other universities are

- University of Virginia \$ 30 per semester
- Iowa State University \$ 14 per semester
- University of Kansas \$ 7.5 per semester
- Texas A& M University \$ 6.5 per semester

All these figures are compulsory fees that students pay at enrollment. In addition to the compulsory fee, all universities, except the University of Virginia charge approximately \$ 55 per semester to use the service. The University of Georgia charges \$ 27 per quarter.

Summary of User Subsidies

Table 3.20 gives the Pros and Cons of the user subsidy strategies outlined above.

Table 3.20 Pros and Cons of Different Types of Shuttle Fees

Alternative	Advantages	Disadvantages
Compulsory Student fee	• Easy to manage the system. • Readily accepted by the student and Faculty community.	• This option may not be accepted by the students if the system is to be funded solely by the students.
User Fee	• Only who wants to ride will pay. • No Controversies.	• This option may not be able to fund the cost of the shuttle service to operate on KSU campus. • This will not encourage the Student/Faculty community to park at Bramlage.
Combination of Compulsory and User Fee	• This will be a best option when the shuttle service also serves the City of Manhattan in the future.	• This will cause the maintenance of the system more difficult. • This will not encourage the Student/Faculty community to park at Bramlage.

Hence the alternative of charging a compulsory fee at the time of enrollment is the best viable means to finance the system.

3.3.10 Changes Required in the Present Parking Fee Structure

In evaluating the effectiveness of the proposed shuttle system, the following changes in the present parking system were considered.

- Do nothing.
- Increase the costs of all parking permits.
- Increase the cost of parking permits based on location.

3.3.10.1 Do Nothing

In this alternative, the present parking fee structure is not changed. This alternative assumes that the revenue stream for the parking services remains constant after the implementation of the shuttle service. Table 3.21 summarizes the revenues and expenditures of Parking Services for fiscal year 1992.

Table 3.21 Statement of Revenue and Expenditures.

REVENUE ITEM	REVENUE	EXPENDITURE ITEM	EXPENDITURE
Permit Fees	\$ 706,448	Salaries and Wages	\$ 366,737
Misuse Fees	\$ 343,542	Contractual Services	\$ 173,489
Bramlage Receipts	\$ 147,209	Commodities	\$ 75,572
Meter Receipts	\$ 93,787	Capital Outlays	\$ 639,392
Less Refunds	(\$ 4,777)		
Total	\$ 1,286,209		\$ 1,255,220

Source: KSU Parking Services, 1992.

3.3.10.2 Increase the Costs of All Parking Permits

By maintaining the present parking fee structure, and increasing the cost of all parking permits by \$ 10, the extra revenue obtained from the permit sales compensates the reduction in the misuse fee and also pays for the renovation of the parking lots. The existing and new revenue streams are shown in Table 3.22

Table 3.22 Comparison of Existing and New Revenue Streams

Existing				New			
	Permits	cost (\$)	Total (\$)		Permits	cost (\$)	Total (\$)
Student(Full)	4473	50	223650	Student(Full)	4473	60	268380
Student(Half)	6162	25	154050	Student(Half)	6162	35	215670
Faculty(Full)	1689	70	118230	Faculty(Full)	1689	80	135120
Faculty(Half)	1597	35	55895	Faculty(Half)	1597	45	71865
Res. 10 hr.	380	245	93100	Res. 10 hr.	380	245	93100
Res. 24 hr.	20	335	6700	Res. 24 hr.	20	335	6700
Cycle(Full)	177	20	3540	Cycle(Full)	177	20	3540
Student(sum)	651	5	3255	Student(Sum)	651	5	3255
Faculty(Sum)	31	5	155	Faculty(Sum)	31	5	155
State (W/reserve)	43	100	4300	State (W/reserve)	43	100	4300
State(W/out)	178	50	8900	State(W/out)	178	50	8900
Temporary	3053	1	3053	Temporary	3053	1	3053
Conference	2944	1	2944	Conference	2944	1	2944
			677772				816982
Excess Revenue							139210

Source: Parking Services, KSU

3.3.10.3 Increase the Cost of Permits Based on Location

Excluding the residence hall and Jardine permits, the total number of permits sold on campus for one full year is 7225 permits. The total number of stalls available for Faculty/Staff and students is 5014. Therefore the ratio of the permits sold to the available spaces is 1.44. Parking violations observed on campus are more prevalent in Zones 1 and 2 (39.44 % and 23.8 % respectively). This indicates that the problem is not with the availability of the spaces, but with the distribution of the parking spaces on campus. Based on the above details, parking on campus could be divided into 4 zones as described below and shown in Figure 3.10, and the present parking fee structure could be modified based on parking lot location.

- Zone R includes all the parking lots that serve the residence halls and the Jardine Terrace.
- Zone A includes all parking lots are in the south campus.
- Zone C includes all parking lots at Bramlage coliseum.
- Zone B includes all other parking lots.

Zone A

All the parking lots that are within the boundaries of Manhattan Avenue, Anderson Avenue, Denison Avenue and Claflin Road come under Zone A. The total number of General, Faculty/Staff and Student stalls in Zone A is given in Table 3.23. The total number of stalls available in Zone A is 1572. Assuming that an excess of 20 percent of the permits are sold in this Zone, 1886 permits can be sold. As reserved stalls also require

parking permits, another 473 permits could be sold. The total number of permits sold in this zone is therefore, 2359 permits. If the cost of each permit is raised to \$150 per year, the revenue obtained from this zone would be \$353,850 (2359*\$150).

Table 3.23 Parking Spaces in Zone A

Lot	Stalls	Reserved	Lot	Stalls	Reserved	Lot	Stalls	Reserved
A 1	107	12	A 17 E	--	1	A 22	9	24
A 2	144	27	A 17 w	185	--	A 23	44	43
A 3	40	74	A 18	78	19	A 26	9	34
A 5	85	72	A 20	--	1	A 27	13	13
A 6	42	27	A 28 S	26	14	A 29	--	1
A 8	4	9	A 28 N	186	30	A 30	221	22
A 31	--	6	A 24	--	3	A 25	--	20
Total							1572	2473

Source: Parking Services, KSU

Zone B

The total number of General, Faculty/Staff and Student stalls in Zone B is given in Table 3.24. The total number of stalls available is 2356. If an excess of 20 percent of the permits are sold in this zone, the total number of permits that could be sold in this zone is 2827. Since the number of reserved permits sold in this zone is 14, the total number

of permits that could be sold is 2841 permits. If the cost of each permit in this zone is raised to \$100 per year, the resulting revenue from this zone would be \$284,100 (2841 * \$100.00).

Table 3.24 Parking Spaces in Zone B

Lots	Stalls	Reserved	Lot	Stalls	Reserved
B 1	106	--	B 12	37	--
B 4	104	--	B 13	168	7
B 5 S	106	--	B 16	327	--
B 5 N	237	--	D 1 E	400	1
B 6	188	6	D 1 W	558	--
B 11	100	--	A 16	25	--
			Total	2356	14

Source: Parking Services, KSU

Zone C

From Table 1.4 the commuter parking permits sold for the year 1992-'93 are 7225. Excluding the permits assumed to be sold for Zones A & B the remaining number of permits is 2025. So these cars are to be accommodated at Bramlage parking lot. The number of parking lots available at Bramlage is

Bramlage(east) 2083.

Bramlage(west) 2668.

So the 2025 permit holders can park their cars at Bramlage (east) and if the demand is more, then Bramlage(west) parking lot can also be used. If the parking permit in this zone is set at \$ 25/year, then the revenue that could be obtained would be \$ 50,625.

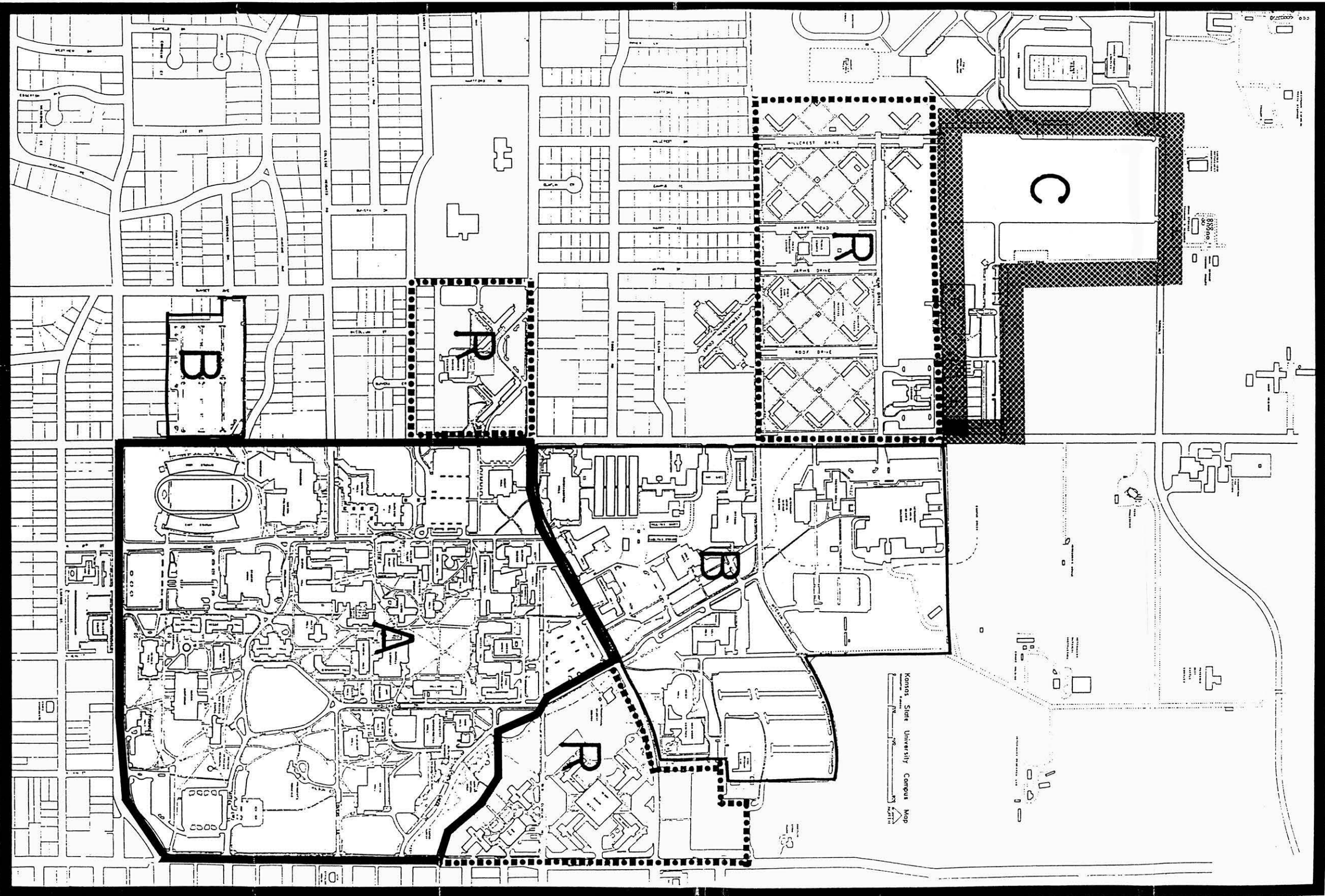


Figure 3.10 Suggested Parking Zones

Zone R

It is recommended that present parking fee structure be maintained in Zone R. Keeping the cost of the permit at the Residence halls and the Jardine terrace as \$55/year, the revenue obtained for the 2817 permits sold (Table 1.3) is \$ 154,935.00.

Summary of Changes Made Based on Location

The comparison between the existing and modified revenue streams is shown in Table 3.25.

Table 3.25 Comparison of Existing and New Revenues

Existing				New			
	Permits	cost	Total		Permits	cost	Total
Student(Full)	4473	50	223650	Zone A	2359	150	353850
Student(Half)	6162	25	154050	Zone B	2841	100	284100
Faculty(Full)	1689	70	118230	Zone C	2113	25	50625
Faculty(Half)	1597	35	55895	Zone R	2817	55	154935
Res. 10 hr.	380	245	93100	Res. 10 hr.	380	245	93100
Res. 24 hr.	20	335	6700	Res. 24 hr.	20	335	6700
Cycle(Full)	177	20	3540	Cycle(Full)	177	20	3540
Student(Sum)	651	5	3255	Student(Sum)	651	5	3255
Faculty(Sum)	31	5	155	Faculty(Sum)	31	5	155
State(W/res)	43	100	4300	State(W/res)	43	100	4300
State(W/out)	178	50	8900	State(W/out)	178	50	8900
Temporary	3053	1	3053	Temporary	3053	1	3053
Conference	2944	1	2944	Conference	2944	1	2944
			677772				971657
Excess Revenue							291685

Sum = Summer

W/res = reserved

W/out = not reserved

The advantages and disadvantages of the above alternatives are given in Table 3.26

Table 3.26 Advantages and Disadvantages of the Proposed Changes in the Parking Fee Structure

Alternative	Advantages	Disadvantages
Do Nothing	• There is going to be no change in the revenue of Parking services.	• As the fee at Bramlage and on campus are same, all the people will try to park on campus only. So this may not decrease the parking problem on campus.
Increase the Parking Fee	• The increase in the revenue from the permit sales will compensate the loss of misuse fee.	• The cost/student paid for the shuttle and the raise in the parking fee with the same parking structure may not be accepted by the students.
Increase the parking fee according to the location of parking on campus.	• Those who pay more fee for parking can park any where on campus. • The relative difference in the cost of parking permits will encourage the people to park at Bramlage, there by increasing the use of shuttle service on campus. • The revenue of the Parking services is increased with the above changes, which will pay off the loss of misuse fee and pays for the extra maintenance cost due to the opening of Bramlage parking lot for daily use.	• People with Zone B permits cannot park in the areas of Zone A and people with Zone C permit cannot park in the areas of Zones B and C. • By limiting the sales of parking permits in Zones A and B, people are forced to park at Bramlage. • There is no guarantee that the permits in Zones A and B will be completely sold out.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the principle conclusions drawn from this research effort and recommends options based on the study.

4.1 CONCLUSIONS

The study was charged with evaluating "available information relating to parking on the KSU campus." Using past parking studies as a foundation, the objective of this study was to evaluate the feasibility of a campus shuttle system, a series of parking structures, and other parking alternatives for the KSU campus. This task included identifying financial implications, potential routes, site locations, and other pertinent information relating to these alternatives.

Three problems were identified with campus parking. First, a shortage of parking spaces exists on the campus. The ratio of parking permits sold compared to the number of

parking spaces available for campus activities was greater than 1.5. secondly, the distribution of current parking spaces is uneven. Approximately 70 % of all parking violations occur on the south campus indicating a clear shortage of parking spaces where most classes and university activities take place. The remaining 30 % of violations occurring on the north campus would suggest that the shortage of parking spaces in this area is much less drastic. Finally, in the near future construction will reduce the number of available parking spaces and create a circulation problem resulting from the closing of Mid Campus Drive.

Three alternatives were considered as potential solutions to resolving these parking problems on the KSU campus. Below is a summary of the principle conclusions draw from the research report.

4.1.1 Increasing the Surface Parking Lots

This alternative would create a total of 350 parking spaces over existing green spaces on the core campus, of which 200 spaces compensate for the loss of parking spaces due to construction scheduled to take place on campus. So only 150 additional spaces would be provided. The anticipated cost is atleast \$ 400,000.

4.1.2 Construction of a Multi-Level Parking Structure

In this alternative 5 locations were considered for the construction of a 1000 space parking structure. A traffic impact analysis proved that with present traffic conditions

building a parking structure in both the south Union lot (A 30) and the West Stadium lot (D 1) would not be feasible, as this would cause relatively high congestion and delays in traffic on the adjacent Anderson Avenue. The parking lots south of Ackert (A 28), north of Waters (A 17), and north of Justin (A 5) were found to be feasible in terms of traffic flow. The construction of a multi-level parking structure would cost between \$ 7,000,000 and \$ 9,000,000 for a capacity of 1000 spaces. The annual maintenance is estimated at \$ 250 per space.

4.1.3 Implementation of a Shuttle System

This alternative connects the parking lot at Bramlage Coliseum with different locations on campus by way of shuttle bus. Consideration was given to different routes and a best route was recommended. One complete trip would cover 4 miles and take 30 minutes. With a headway of 10 minutes, 3 buses would be sufficient to cover the route in one direction. Another 3 buses would move on this route in the opposite direction, making the time between buses 5 minutes, but in opposite directions. Operating between the hours of 7:00 a.m. and 10:00 p.m. each fall, spring and summer class day (with reductions in the number of buses in the evenings and summers) is estimated to cost \$ 560,820 per year.

4.1.4 Comparison of the Alternatives

Below is a table which gives in brief the advantages of the above discussed options.

Table 4.1 Comparison of Alternatives

Alternative	Advantages	Disadvantages
Surface Parking Lots	• Easy to construct. • Relatively inexpensive.	• Does not alleviate the existing parking problem. • Displaces lot of green space.
Multi - level Parking Structure	• This will serve the shortage of parking on campus in the long run.	• Construction of the structure itself creates a severe parking shortage during its construction. • Expensive to construct and high maintenance costs. • Must be paid for if not used. • Increases traffic congestion on adjacent streets.
Shuttle System	• Serves campus community during severe weather. • Redistributes a large number of "new" parking spaces. • In the long range, this system could be extended to Manhattan city also. • Easy to terminate if found ineffective. • Source for part time student jobs.	• If the system is to be funded solely by the students, it may not be accepted. • May create some traffic problem on campus.

4.2 RECOMMENDATIONS

Out of the 3 alternatives, only the second and third appear to have considerable effect on the existing parking problems. Considering the cost issues, practical feasibility, campus construction, and long range planning, the shuttle system is the recommended option to pursue. Only a drastic change in traffic patterns would make a parking structure feasible. It is also likely that a shuttle system would be necessary during the construction of a parking structure. Below, the recommended steps in implementing a shuttle system are given.

1. In cooperation with Planning and Evaluation Services, conduct a campus survey to establish favored routes and revenue streams.
2. If sufficient interest is established, then prepare a Request for Information (RFI).
3. Make final agreements on budget (i.e., contribution from Parking Services, compulsory fees versus student fees).
4. Restructure parking fees based upon location.
5. Request new revenue stream from the Board of Regents (can be done by student referendum)
6. Follow the normal state procurement procedure.

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U.S. DOT, 1992 Americans with Disabilities Act- Transportation Regulations, 49 CFR

37.25 (a), 46,125.

APPENDIX A

Table A 1: Operating Statistics and Performance Indicators for Bus Systems in 1990 fiscal year

City	Urbanized Area Population	Annual Passenger Trips	Annual Bus Miles	Annual bus Hours	Annual Operating Cost	Miles per hour	Operating Cost per Bus Hour	Passengers Per Bus Hour
Anderson, IN	74,037	279,860	287,669	21,336	1,009,675	13.5	47.32	13.12
Battle Creek, MI	77,921	721,175	498,821	33,738	1,246,830	14.8	36.96	21.38
Bay City, MI	74,118	497,980	951,929	59,601	2,512,621	16.0	42.16	8.36
Beloit, WI	56,076	411,867	252,001	21,645	830,801	11.6	38.38	19.03
Bloomington, IL	94,186	858,213	664,227	48,528	1,635,178	13.7	33.70	17.68
Bloomington, IN	71,440	632,151	565,186	46,447	1,282,943	12.2	27.62	13.61
Columbia, MO	75,854	487,836	273,966	18,290	1,135,673	15.0	62.09	26.67
Dubuque, IA	63,705	706,778	411,748	37,642	1,221,428	10.9	32.45	18.78
Eau Claire, WI	80,293	846,297	489,473	33,230	1,243,005	14.7	37.41	25.47
Grand Forks, ND	58,103	638,589	313,354	23,068	859,094	13.6	37.24	27.68
Iowa City, IA	71,372	1,454,795	520,815	43,689	2,062,779	11.9	47.22	33.30
Jackson, MI	78,126	689,704	359,706	26,986	1,424,702	13.3	52.79	25.56
Janesville, WI	52,995	466,792	389,458	25,149	1,155,567	15.5	45.95	18.56
Kenosha, WI	94,292	1,185,195	663,163	56,985	2,078,578	11.6	36.48	20.80
La Crosse, WI	78,928	812,668	631,744	48,395	1,875,093	13.1	38.75	16.79
Lima, OH	68,621	289,751	284,088	22,544	721,064	12.6	31.98	12.85
Mansfield, OH	76,521	397,261	235,226	21,232	774,267	11.1	36.47	18.71

Table A 1: Operating Statistics and Performance Indicators for Bus systems in 1990 Fiscal Year

Middletown, OH	98,822	194,383	207,896	13,832	516,198	15.0	37.32	14.05
Muncie, IN	88,073	1,065,655	815,098	56,550	2,691,203	14.4	47.59	18.84
Oshkosh, WI	58,935	924,685	592,339	45,244	1,645,267	13.1	36.36	20.44
Rochester, MN	73,560	867,923	494,839	33,747	1,183,153	14.7	35.06	25.72
St. Cloud, MN	74,037	1,487,260	634,815	47,717	1,474,414	13.3	30.90	31.17
St. Joseph, MO	73,395	300,785	434,804	37,897	1,166,536	11.5	30.78	7.94
Sheboygan, WI	61,012	1,079,636	834,131	64,479	2,051,212	12.9	31.81	16.74
Sioux City, IA	96,211	1,553,180	636,243	66,770	1,769,180	9.5	26.50	13.26
Springfield, OH	88,649	274,733	183,388	15,879	664,821	11.5	41.87	17.30
Steubenville, OH	69,118	132,642	146,430	9,104	381,821	16.1	41.94	14.57
Terre Haute, IN	77,019	488,243	430,942	35,541	869,108	12.1	24.45	13.74
Wausau, WI	57,352	845,219	489,897	33,246	1,254,351	14.7	37.73	25.42
Totals	2,162,771	20,591,256	13,693,396	1,048,511	38,736,562			
Average	74,578	710,043	472,186	36,156	1,335,744	13.1	36.94	19.64

Note: Operating Cost does not include capital cost.

Source: Federal Transit Administration, U.S. Department of Transportation, Transit Profiles: Agencies in Urbanized areas with a population of less than 200,000; For the 1990 Section 15 report year. Washington: Government Printing Office, December 1991.

APPENDIX B

SECTION 9 FORMULA TRANSIT ASSISTANCE FOR URBANIZED AREAS

AUTHORIZING LEGISLATION:

Law: Urban Mass Transportation Act of 1964, as amended

Section: 9

FEDERAL ADMINISTRATION AGENCY:

Agency: Department of Transportation (DOT)

Operating Division: Urban Mass Transportation Administration (UMTA)

Administering Office/Center/Institute: UMTA Regional Offices (in ten Federal regions)

STATE ADMINISTERING AGENCY/GRANTEES:

In most cases, grants are made directly to local public bodies designated as recipients. A few States administer the section 9 program for cities with populations under 200,000.

PROGRAM DESCRIPTION:

General

The Section 9 Formula Transit Assistance for Urbanized Areas Program is UMTA's major transit formula assistance program for areas with populations over 50,000. The program provides grants to urbanized areas for mass transit planning, operating, and capital purposes. Section 9 grants are available to finance planning, acquisition, construction

improvement, and operating costs of facilities, equipment, and associated capital maintenance items used in mass transit service.

Transportation Services

The DOT's Section 594 regulations require all recipients of UMTA funds to establish programs to provide transit services for handicapped persons. Section 9 recipients may provide either special service, such as dial-a-ride, or taxi vouchers, an accessible bus system, or a mix of the two, as long as they meet minimum service criteria (the regulation is currently being reviewed, following a court decision striking down aspects of it).

Local communities have the major responsibility for deciding how the transportation should be provided. Recipients are not required to spend more than three percent of their total annual operating costs to provide service to handicapped persons. Services for handicapped persons are often coordinated at the local level with transportation services for the public.

PROGRAM ELIGIBILITY:

A single grant recipient for Section 9 funds is designated for each urbanized area with populations over 200,000. The State Governor or the Governor's designee is the designated recipient for areas with populations under 200,000. The designee recipient must be a public body.

Private for-profit or nonprofit transportation providers may receive funds through contracts with the designated recipient. By statute, all projects funded with Section 9 funds must be contained in the annual element of the area's T I P.

FUNDING FLOW:

Section 9 program funds flow from the U.S. Department of Transportation to the State's designated grant recipients.

APPROPRIATED FUNDING:

Funding for Section 9 grants is authorized at a level of approximately \$2 billion per year. The formula apportionments to urbanized areas are published annually in the Federal Register.

APPLICATION PROCESS AND MATCHING FUNDS:

Application Process: Private for-profit or nonprofit transportation providers must negotiate contracts with the area's designated recipient. Interested organizations should contact the Section 9 designated recipient for their areas.

Matching Funds: The Federal match for operating funds may not exceed 50 percent of the net project. The Federal match for planning and capital funds is 80 percent of the net project cost, although a designated recipient is permitted to provide additional local match at its option.

SECTION 18 PROGRAM OF TRANSIT ASSISTANCE FOR NONURBANIZED AREAS.

AUTHORIZING LEGISLATION:

Law: Urban Transportation Act of 1964, as amended

Section: 18

FEDERAL ADMINISTERING AGENCY:

Agency: Department of Transportation (DOT)

Operating Division: Urban Mass Transportation Administration (UMTA)

Administering Office/Center/Institute: UMTA Regional Offices

STATE ADMINISTERING AGENCY/GRANTEES:

The Section 18 Program of Transit Assistance for Nonurbanized Areas is administered at the State level by the State transportation agency.

PROGRAM DESCRIPTION:

General

Section 18 of the Urban Mass Transportation Act of 1964, as amended, appropriate funds to each State for public transportation projects in non urbanized areas with populations under 50,000. The goals of the program are:

- o To enhance access of people in nonurbanized areas to health care, shopping, education, employment, public services, and recreation;
- o To assist in the maintenance, development, improvement, and use of public transportation systems in rural and small urban areas;
- o To facilitate the coordination of programs and services funded by other Federal programs; and
- o To provide for the participation of private transportation providers

Transportation Services

Program funds may be used for transportation planning, capital, and operating assistance to State agencies, local public bodies, nonprofit organizations, and operators of public transportation services

PROGRAM ELIGIBILITY:

State agencies, local public bodies, non profit organizations, and operators of public transportation services may receive program funds. The State transportation agency is responsible for informing eligible local entities about the availability of the program; soliciting applications; developing projects for approval; and forwarding an annual statewide program of projects and grant applications to UMTA.

There are approximately 1,000 transit systems which receive Section 18 funding nationally, Interested community organizations and transportation providers should contact

the Section 18 program manager in the State transportation agency for program and participant information.

FUNDING FLOW:

Funds for the program flow from the Department of Transportation directly to States, States disperse funds to community agencies and service providers selected to receive program funds.

APPROPRIATED FUNDING:

Funds are apportioned to the States by a statutory formula based on non-urbanized populations. Apportionments are published in the Federal Register annually.

FY 1988: \$64, 638, 868

FY 1989: \$66, 403, 600

APPLICATION PROCESS AND MATCHING FUNDS:

Application Process: Non profit organizations providers must submit applications to State transportation agency to be considered for funding.

Matching Funds: Matching funds are required. Federal funds from other programs which are received by a local Section 18 operation through a purchase of service contract may be used for the required local match.

Matching requirements are:

- o Operating funds - 50% Federal / 50% local
- o Capital and project administration - 80% Federal / 20% local
- o State Administration - 100% Federal

SECTION 8 PLANNING AND TECHNICAL STUDIES

PROGRAM

AUTHORIZING LEGISLATION:

Law: Urban Mass Transportation Act of 1964, as amended

Section: 8

FEDERAL ADMINISTERING AGENCY:

Agency: Department of Transportation (DOT)

Operating Division: Urban Mass Transportation Administration (UMTA)

Administering Office/Center/Institute: UMTA Regional Offices

STATE ADMINISTERING AGENCY/GRANTEES:

State Departments of Transportation and metropolitan planning organizations (MPO's) for urbanized areas.

PROGRAM DESCRIPTION:

The Section 8 Planning and Technical Studies Program provides financial assistance to State and local governments to conduct planning activities for the development and operation of mass transportation services, facilities, and equipment. The program is expected to support the basic transportation planning process underway in urbanized

areas, including capital planning, financial planning, and operations-related planning essential to the provision of transit services.

Section 8 funds support planning and cost-effective Transportation Improvement Programs (TIPS), which establish the framework for the use of Federal capital assistance resources. The plans and programs reflect a variety of State and local objectives as well as the Administrations national priorities.

Updating and planning transportation services for elderly and handicapped persons has been a Section 8 national priority in recent years, particularly for those funds allocated to States. State recipients are encouraged to develop a State Coordination Plan for rural and specialized transportation which coordinates UMTA assistance provided under the Section 18 Program of Transit Assistance for Nonurbanized Areas and the Section 16 (b) (2) Capital Assistance Program with other Federal programs, especially those administered by the United States Department of Health and Human Services. The State Coordination Plan should include a mechanism for ensuring coordination at the State level and promoting coordination of transportation service delivery at the local level.

PROGRAM ELIGIBILITY:

The metropolitan planning organization is normally the Section 8 grantee for an urbanized area. Approximately ten percent of the Section 8 funds is distributed to State departments of transportation.

FUNDING FLOW:

Section 8 program funds flow from the DOT to the State departments of transportation and the MPO's.

APPROPRIATED FUNDING:

In recent years, the annual appropriations have been approximately \$45 million. Although Section 8 is a discretionary program, the bulk of the Section 8 funds are distributed to States and each of 374 urbanized areas using a population-weighted allocation formula.

APPLICATION PROCESS AND MATCHING FUNDS:

Application Process

States and MPO's apply to the Regional Offices of UMTA.

Matching Funds

A 20 percent local match is required.

SECTION 16 (b) (2) CAPITAL ASSISTANCE PROGRAM

AUTHORIZING LEGISLATION:

Law: Urban Mass Transportation Act of 1964, as amended

Section: 16 (b) (2)

FEDERAL ADMINISTERING AGENCY:

Agency: Department of Transportation (DOT)

Operating Division: Urban Mass Transportation Administration (UMTA)

Administering Office/Center/Institute: UMTA Regional Offices

STATE ADMINISTERING AGENCY/GRANTEES:

The State transportation agency or other agency designated by the State administers Section 16 (b) (2) Capital Assistance Program funds at the State level.

PROGRAM DESCRIPTION:

The Section 16 (b) (2) Capital Assistance Program provides grant funds to private nonprofit organizations to assist them in providing transportation services for elderly and handicapped individuals where existing transportation is unavailable, insufficient, or inappropriate. Program funds may be used to purchase vehicles, wheelchair lifts and related support equipment.

Private nonprofit organizations who receive Section 16 (b) (2) grant funds may lease equipment to private for-profit providers to operate services. However, nonprofit organizations may not lease equipment purchased with grant funds to public bodies.

"Meals on Wheels" service may be provided using Section 16 (b) (2) vehicles on an incidental basis only. Vehicles purchased with program funds may be used in coordinated transportation for elderly or handicapped individuals described in the grant application is ensured.

PROGRAM ELIGIBILITY:

Private nonprofit organizations providing services to elderly and disabled individuals are eligible to apply for Section 16 (b) (2) grant funds.

FUNDING FLOW:

Section 16 (b) (2) Capital Program funds flow from the U.S Department of Transportation to the State agency. The State agency administers the program in the State.

APPROPRIATED FUNDING:

Program funds are allocated among the states by an administration formula which is based on the population of elderly and handicapped persons in each State, According to the latest U.S Census. In recent years, the program funding level has been approximately \$35 million per year. This funding level has allowed approximately 1,000 private nonprofit

organizations to receive a total of 1,500 vehicles. Allocations to the States are published in the Federal Register annually.

APPLICATION PROCESS AND MATCHING FUNDS:

Application Process

Private nonprofit organizations interested in applying for funds should contact the Section 16 (b) (2) coordinator in their State transportation agency.

Matching Funds

Funding is provided to States on an 80 percent Federal, 20 percent local matching basis.

CONSULTANTS

ATE Mgt. Co.	513-381-7424
American Contract Management	703-960-2264
Dave Systems	800-522-3283
McDonalds Transit	817-535-6066
Lewis Polin & Associates Transit planning	714-768-7552
Chance Coach	316-942-7411
Diamond Mfg.	316-795-2191
Collins Mobile Tech.	800-835-5007
Bus Industries of America	315-768-8101
Gillig Corp.	501-785-6819
El Dorado National	714-591-9557
Neopran	719-336-3256
New Flyer Inc.	204-221-1251
TMC	503-347-2011
	314-537-4670