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KSU TRANSPORTATION PLAN

by

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A MASTER'S REPORT

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requirements for the degree

MASTER OF REGIONAL AND COMMUNITY PLANNING

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Major Professor

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TRANSPORTATION PLAN

KSU

**KANSAS
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UNIVERSITY**

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INTRODUCTION

1

PROBLEM

Recent publicity has focused on the use of nearby city streets by KSU students for parking their automobiles. The reasons for this include the prohibition of Freshmen to park on campus, the lack of sufficient on-campus space for long-term parking by dormitory residents, and a perceived general shortage of short-term parking spaces in convenient locations for students during daily peak class hours. Other related items of concern include pedestrian/bicycle/vehicular conflicts, the existence of pedestrian "cowpaths," and the normal physical growth of the university in terms of additional destination points being created by proposed new facilities. All of these problems are inter-related and are major elements of the overall transportation circulation patterns of the campus.

The basic issues of transportation include getting into and out of the campus, and once on campus, getting from one place to another within its boundaries. The problem can be further classified into user categories such as students, faculty, staff, visitors, service, emergency, etc., and modal categories such as pedestrian, bicycle, auto, mass transit, etc. Who gets what? When? How? Where? How much will it cost the user and/or the university?

The urgency of solving the present parking controversy and related issues has illustrated the need for a comprehensive circulation plan which should provide short range solutions to these problems as well as long range plans and policies for future development of the university's transportation network and its relationship with the City of Manhattan. A previous study, the "KSU Circulation Plan," was commissioned by the university (Board of Regents) and conducted by the private consulting firm, Oblinger-Smith Corporation, in 1972 and 1973. The final document containing their report and recommendations was released in December, 1973. However, in the five years since then not only has the university failed to make any substantial progress toward implementing the proposed plan, but it has actually approved a new building construction site which conflicts with one part of the recommendations. Therefore, there exists an obvious need to re-evaluate transportation circulation/parking related objectives of KSU, update previous proposals, and explore other alternative solutions.

LOCAL/REGIONAL CONTEXT

Manhattan is a city of approximately 30,000 residents located in the Flint Hills of northeast Kansas. Including Kansas State University, with an enrollment of 18,000 students, the total population of Manhattan is about 48,000. Because of the transient nature of many of Manhattan's residents and visitors (students, Fort Riley personnel, visitors to campus athletic and cultural events, Tuttle Creek Lake vacationers, etc.), it is estimated that a volume of 4,000 - 5,000 trips flow on regional and state-wide highways to KSU, alone, each day, and this number would be greatly increased if non-KSU oriented traffic to Manhattan is considered.¹

The routes by which the regional and state-wide traffic reaches the KSU campus are shown in Fig. 1-1. K-18 from the southwest, and K-177 from the southeast provide the two main connections to Interstate 70, which is less than 10 miles south of Manhattan. Other primary entrances to the city are from US-24 on the east, K-177 on the north, and K-113 to the northwest. Once inside the city, the major arterial and collector streets providing direct access to the KSU campus are Bluemont from the east (K-177, US-24), 17th Street from the south (K-18), Anderson Avenue and Claflin from the west (K-113), and Denison and Manhattan Avenues from the north (K-113, K-177, US-24).

In addition to these vehicular routes, the city is served by two railroad lines, two commercial bus lines, and an airport with two commercial airlines providing regularly scheduled flights daily. The major intra-city transportation is by private automobile. There is a bus service (which has only one bus and runs only two days a week) providing a limited link between the university and downtown. Manhattan also has a taxi service.

¹See page 105 for reference notes.

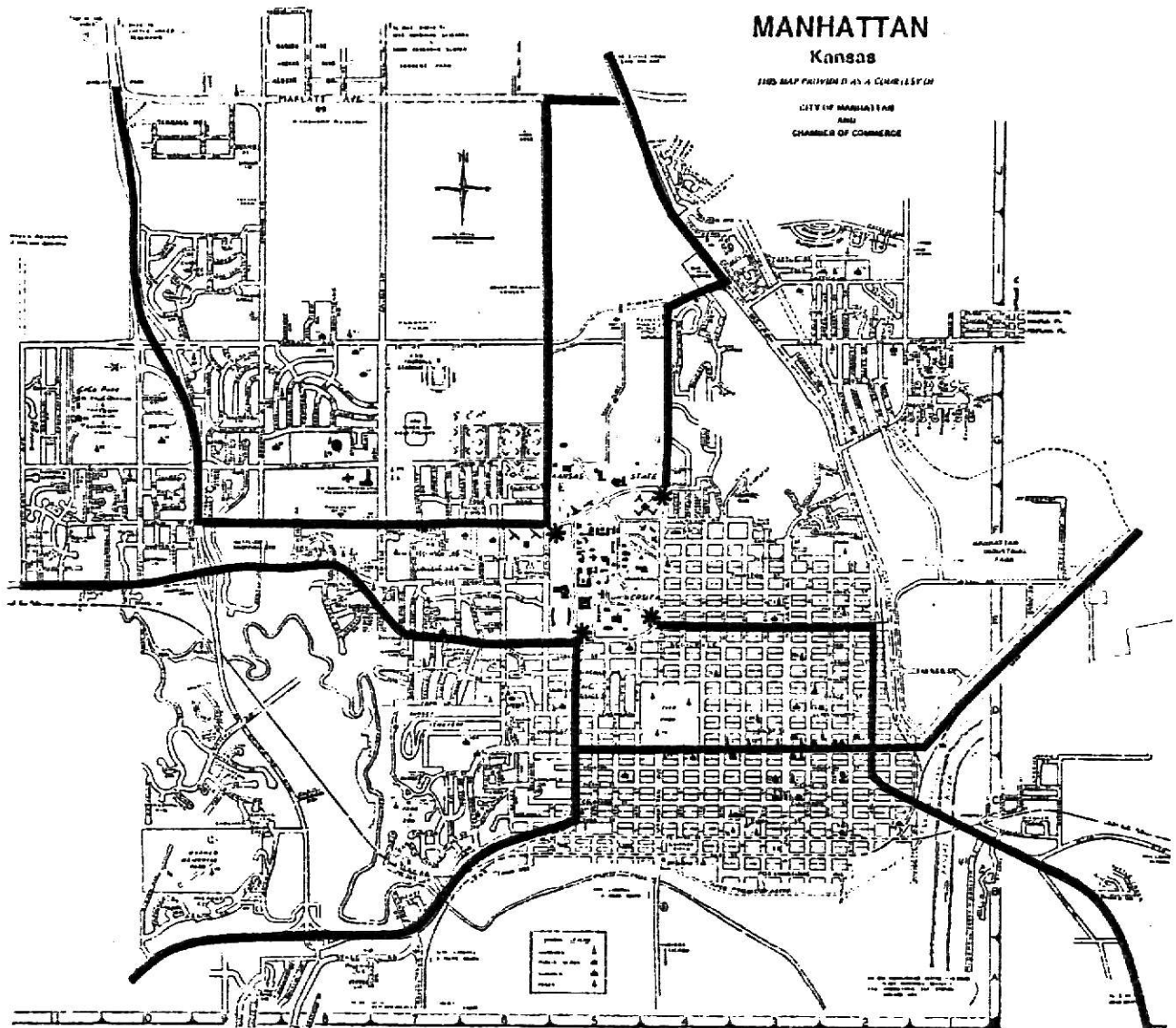


FIGURE 1-1: MAJOR ROUTES AND ENTRANCES TO MAIN CAMPUS

CAMPUS GROWTH

The history of the growth of the KSU campus is one of piece-meal and build-as-you-need planning. There was no comprehensive plan for the movement and storage of vehicles until 1952 when President McCain commissioned Hare and Hare, a landscape architecture firm, to prepare a plan for campus development. However, this plan was little more than a well drawn logical site plan. In 1973 the Oblinger-Smith Corporation was chosen to do a circulation plan for the campus. However, its recommendations and outline for the future development of KSU's vehicular circulation patterns, which are discussed in detail in the "PROGRAM" section of this report, have been largely ignored.

Figures 1-2, 1-3, and 1-4 show the campus streets and buildings in the years 1899, 1909, and 1939, respectively. It can be seen that the major vehicular routes of the existing campus were established by 1939. Concurrently with the construction of the new agricultural complex in what is now known as the north campus, the northern boundary of the main campus was extended beyond Claflin Road, and Claflin was relocated northward to service that area. Fig. 1-5 shows the present campus as divided, for purposes of clarity and conceptual terminology, into three basic areas. The MAIN CAMPUS is the area bounded by Anderson Ave., Manhattan Ave., Claflin Road, and Denison Ave. The CORE CAMPUS, which is contained entirely within the Main Campus, is characterized by high density building development and is bounded by 17th Street on the west, the existing street between Seaton Hall and the Union on the south, Mid-Campus Drive on the east, and the southern edge of the parking lots behind Waters and Cardwell Halls on the north. The NORTH CAMPUS consists of all university-owned property north of Claflin Road.

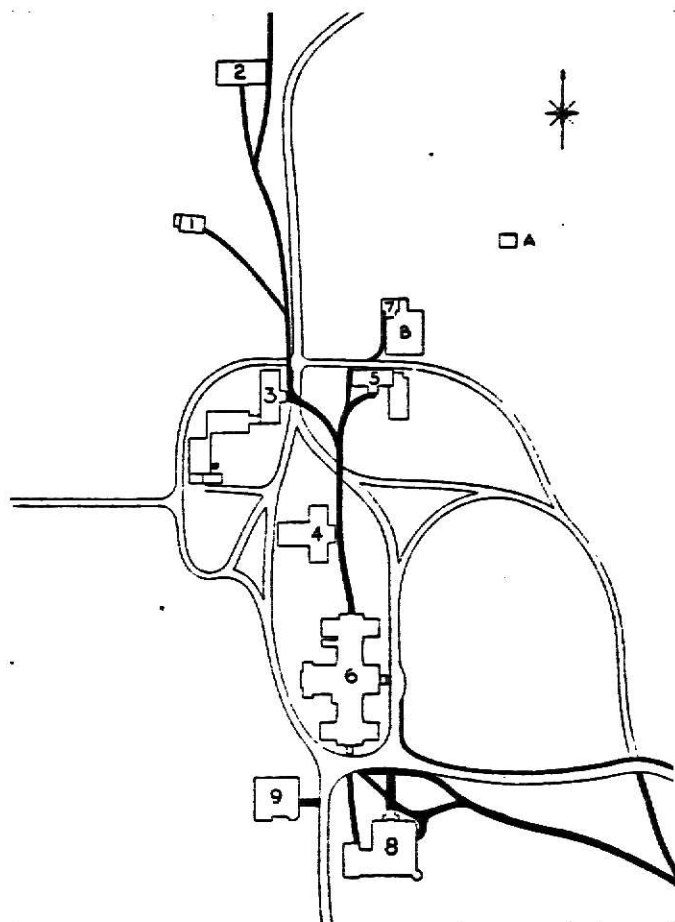


FIGURE 1-2: CAMPUS LAYOUT 1899

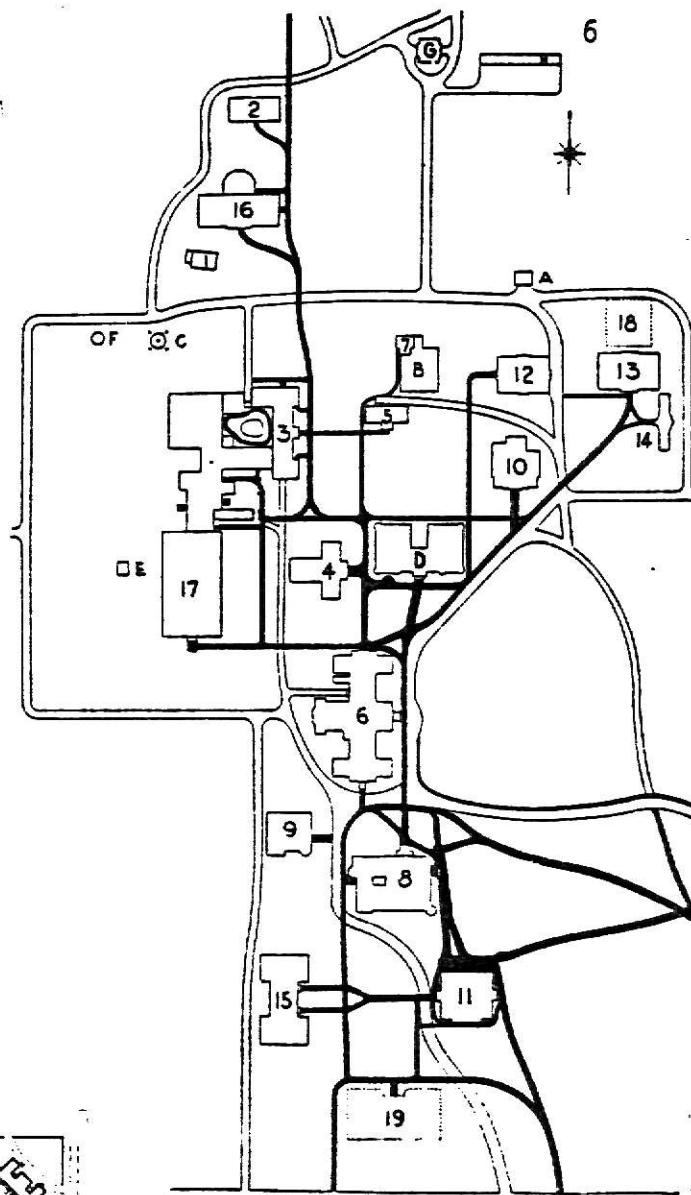


FIGURE 1-3: CAMPUS LAYOUT 1909

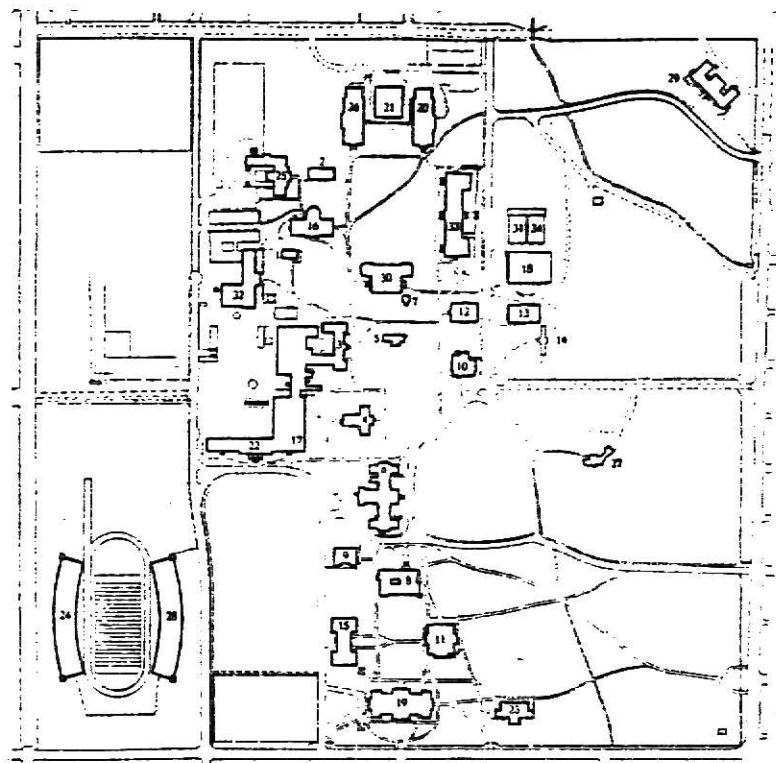


FIGURE 1-4: CAMPUS LAYOUT 1939

LAND USE

The types of land use, on-campus and adjacent to the campus, are major determinants of the traffic flow patterns and parking lot location requirements which must be accommodated to meet the activity needs of the different types of facilities. Due to its "self-contained community" nature, it is recognized that on-campus land use must be discussed in different terms than the surrounding city.

On-Campus

Fig. 1-6 shows the land use relationships of the present KSU campus. Included are building types, parking lots, and major circulation routes. The different types of facilities within the campus boundaries can be grouped into the following four main categories for the purposes of this study:

- (1) On-Campus Housing -- includes all residence halls, married student apartments, and campus trailer park;
- (2) Major Activity Facilities -- includes the Student Union, McCain Auditorium, All-Faiths Chapel auditorium, Ahearn Fieldhouse, and the Football Stadium;
- (3) Other Non-Classroom Facilities -- includes Anderson Hall, Farrell Library, Holtz Hall, all Physical Plant facilities, International Student Center, Lafene Student Health Center, Pittman Building, and the Conservatory;
- (4) Classroom Facilities -- includes all other buildings not mentioned above which are used for academic instruction and research.

Each of these types of facilities has its own parking and access requirements. For instance, the residence halls presently do not have enough parking to accommodate all those residents who wish to have a car on campus. Since students living on-campus don't have a great need for daily driving, their autos are often parked in one place on a long-term basis. The overflow onto Manhattan city streets, which are mostly narrow and residential in nature, is a major point of the university-city controversy at the present time.

The major activity facilities, however, generate completely different parking and circulation requirements. Generally, the special events occurring in these buildings attract a very large number of people for relatively short-term visits. These athletic and cultural events, and large meetings or conventions, are frequently the focal point of university activity and may also attract many visitors from the community and state. Therefore, the circulation and parking considerations for these facilities must include provisions for convenient access for large numbers of pedestrians and vehicles, and for relatively convenient short-term storage of autos.

Other non-classroom facilities may require continuous, but light traffic. Classroom buildings are the dominant land use on campus.

However, if a relatively compact pedestrian-oriented campus layout can be accomplished and maintained, the major vehicular priority would be consideration of emergency and service access rather than door-side parking for all students who wish to drive to class. Another important point is that the bulk of traffic to and from academic facilities is generated during the ten minute class changing periods and, of those times, certain hours of the day there are more students on campus than at other times. Thus, it can be seen that the traffic flow and parking demand depends on many different elements of the campus structure such as the type and duration of traffic being generated, the physical layout of the campus, and scheduling of activities.

Off-Campus

The variety of land uses adjacent to the campus and their relationship to the on-campus activities is also of considerable importance. Presently, the major land use around the university (on the east, south, and west sides) is single-family residential mixed with small concentrated areas of apartment complexes scattered within several blocks of the campus perimeter. Many units of organized housing (fraternities, sororities, scholarship houses) are located near the northeast, northwest, west, and southwest boundaries of the campus. These areas generate continuous daily traffic (mostly pedestrian) to and from the campus when classes are in session. Aggieville, which is adjacent to the southeast corner of the campus, is a major commercial area that serves primarily student clientele. It has its own continuous daily traffic flow and parking problems, but the main consideration in its relationship to the campus is its rather large attraction of students at night and on weekends. A great deal of traffic, both pedestrian and vehicular, flows between university facilities and Aggieville, especially after special events occurring on the campus.

One other important land use located adjacent to the campus is the Ramada Inn Hotel which is just south of the K-State Union. Because that facility provides the most convenient over-night lodging for campus visitors, the pedestrian traffic to and from the nearby major activity locations on campus can be somewhat substantial and, at the very least, the area near the Ramada Inn and the Union should be considered the major entrance to the university. This concept is reinforced by the existing location of the Union parking lot which is the ultimate destination for many visitors and university-personnel autos.

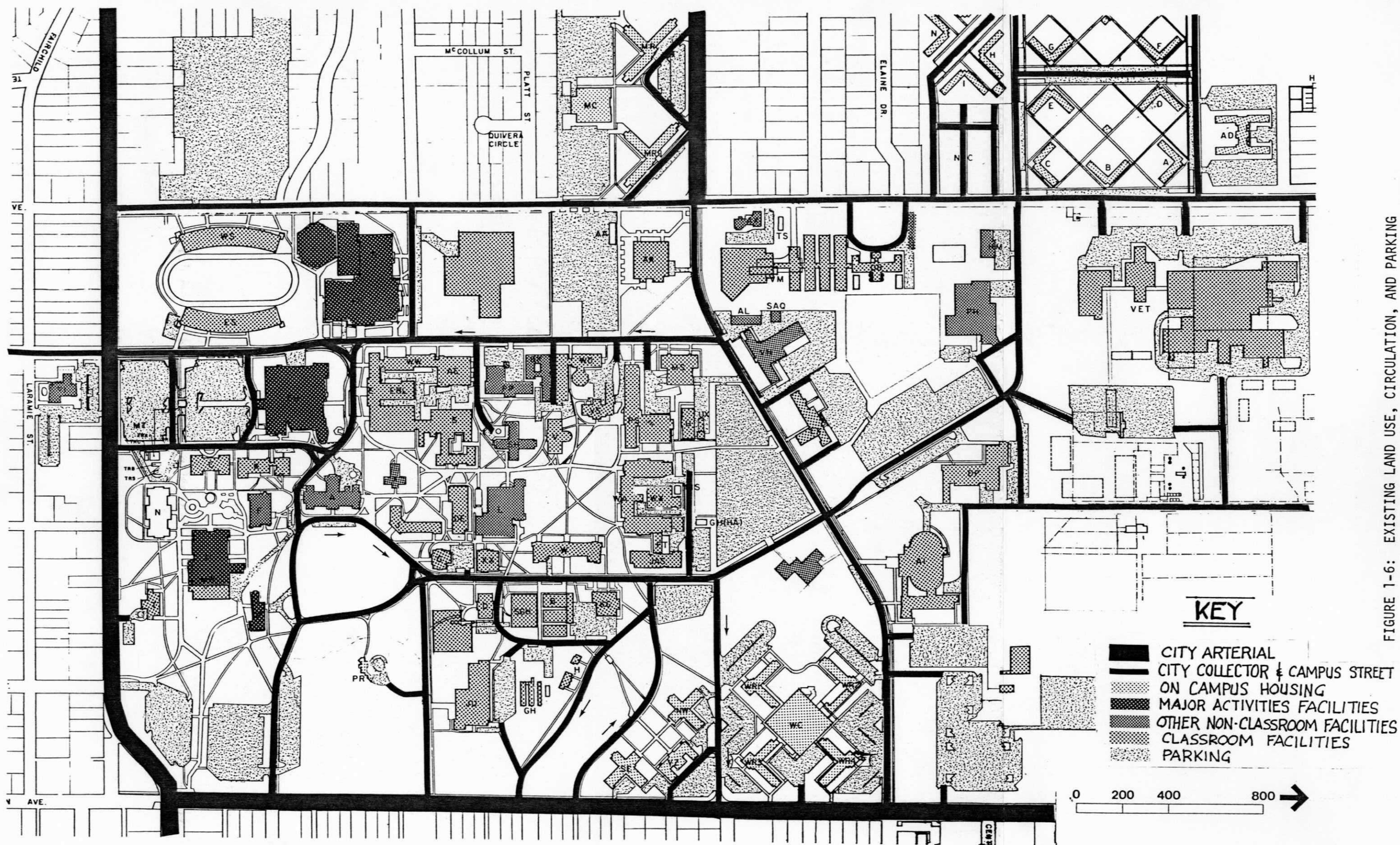


FIGURE 1-6: EXISTING LAND USE, CIRCULATION, AND PARKING

Kansas State University Campus Map

CIRCULATION

2

PEDESTRIANS

As a semi-pedestrian oriented campus, KSU has certain areas of concentrated pedestrian traffic. For the purposes of this study, the most critical areas are where there are deficient sidewalks or conflicts with vehicles, both within the campus and around its perimeter. Although it is a stated rule that pedestrians have the right-of-way at all times within the campus, carelessness by both pedestrians and motorists may endanger the safety of pedestrians who must cross the several major campus streets. Pedestrians entering the campus from across busy city streets have protection only at signalized intersections or at the very few existing mid-block cross-walks. Pedestrian traffic composed of off-campus students, faculty, and staff is primarily contained within a four block walking radius from the west, south, and east sides of campus. The major pedestrian routes from university affiliated housing (residence halls and Greek houses) are from the northeast and west sides of campus.

The largest concentration of KSU student residents is in the seven northeast campus residence halls which have a total population of approximately 3,000. There are no major city streets separating these halls from the core campus area. However, high volume pedestrian movement crosses Petticoat Lane, College Creek Drive, and proceeds all along Mid-Campus Drive. This volume of pedestrians is increased by residents from a concentration of fraternity, sorority, and apartment houses in an area northeast of the Derby Food Center residence hall complex. These pedestrians coming from off-campus must cross North Manhattan Avenue, a major city arterial. There is currently a lack of adequate sidewalks and cross-walks in this area. The combination of heavy pedestrian movement, heavy vehicular traffic, and random street crossing by the pedestrians, creates a hazardous situation for both pedestrians and motorists.

At the northwest edge of the main campus heavy pedestrian movement originates from the Kramer Food Center residence hall complex, Jardine Terrace (married student housing), and other residential areas. This results in a high volume of people crossing Denison Avenue near Ackert Hall, and 17th Street in front of the Power Plant and between Ackert and Cardwell Halls. Another conflict point on 17th Street is where heavy pedestrian traffic crosses near the northwest corner of the Student Union. Major problem areas along Denison Avenue are located adjacent to Jardine Terrace, Goodnow Hall, and the West Stadium parking lot. Conflicts at Jardine Terrace are due not only to the usual daily trips to and from the campus, but are also due to special event traffic on football game days. Problems in this area can be expected to increase upon completion of the new indoor recreation building which will be located west of the existing Washburn Complex. The conflicts at Goodnow Hall are increased by the random crossing of pedestrians into the parking lot (#6) south of Ackert Hall. Pedestrian/vehicular conflicts arise at the entrance of the West Stadium parking lot as a result of the poor location of the existing crosswalk.

Another major concentration of students, faculty, and staff living in a variety of Greek houses, apartments, and houses is located southwest of the main campus. This creates heavy pedestrian traffic along Anderson

Avenue and Denison. With the additional pedestrian volume from the West Stadium parking lot (#2), these routes result in a major pedestrian movement across 17th Street in front of the Union.

The intersection of Bluemont Avenue and Manhattan Avenue forms the southeast corner of the main campus and the northwest corner of Aggieville. There is a significant amount of pedestrian traffic from this area because of the commercial services offered by Aggieville merchants, and also from the surrounding residential areas.

Major sidewalk/crosswalk deficiencies are shown in Fig. 2-1. Areas where additional sidewalks may be needed have been identified where there presently exist major "cowpaths," which are unpaved routes on which pedestrian traffic has been sufficiently heavy to wear a path in the grass. Existing crosswalks are identified as are the locations where additional crosswalks may be needed, although, in some cases a better solution might be to close off the street to vehicular traffic.

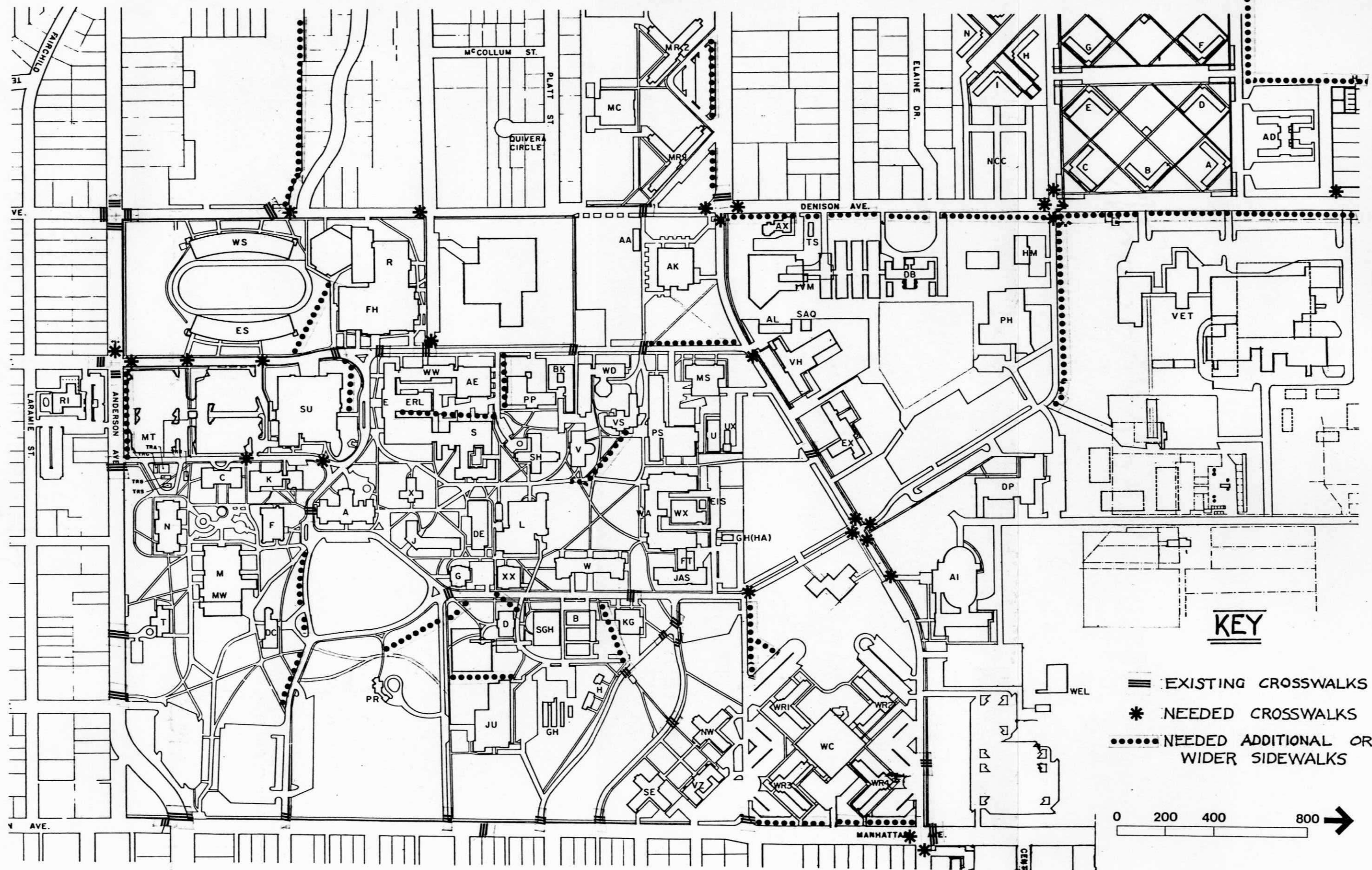


FIGURE 2-1: EXISTING PEDESTRIAN FACILITIES

Kansas State University Campus Map

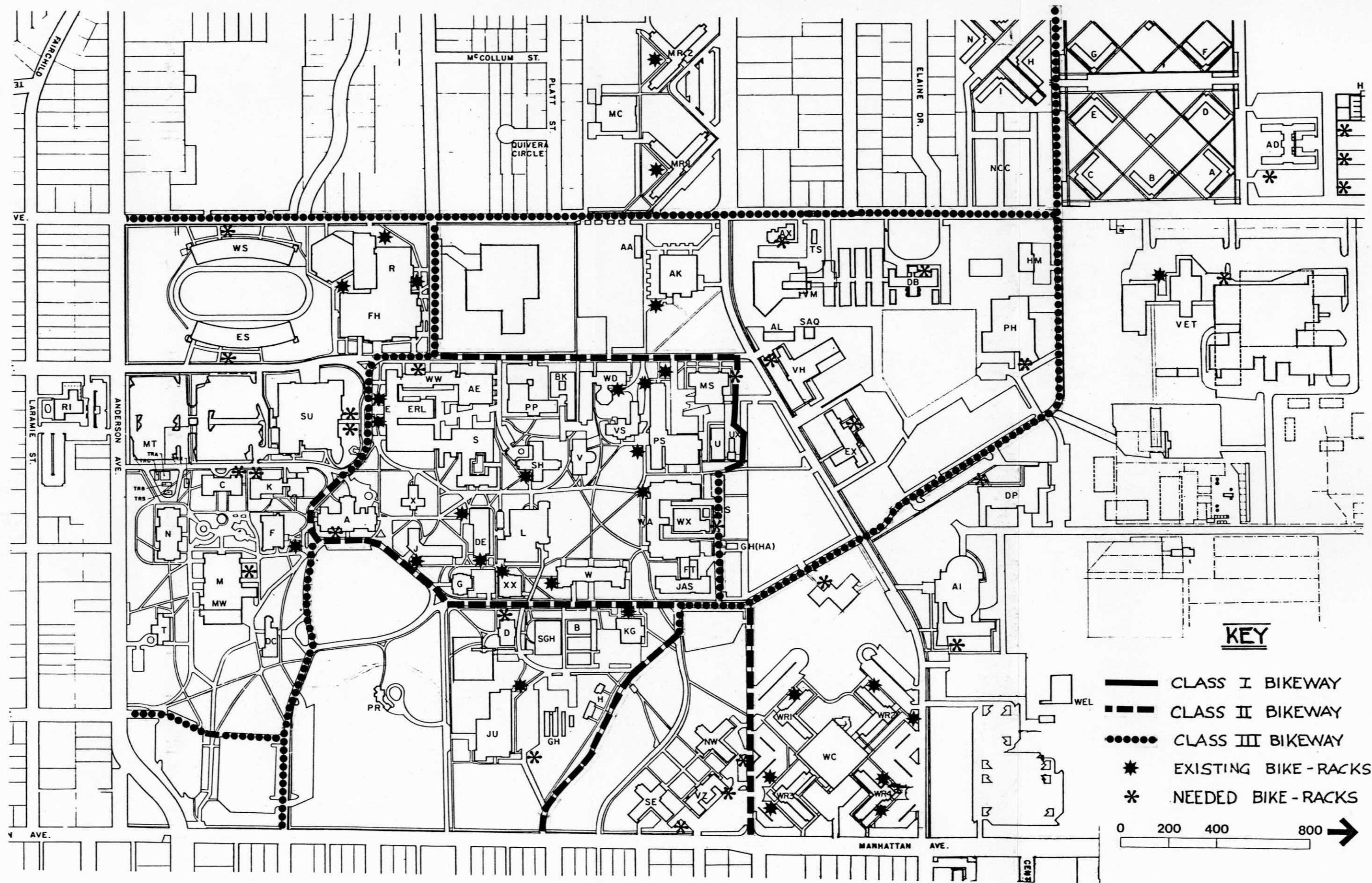
BICYCLES

The "Manhattan Bikeway Plan II" (1976),² which is currently being implemented, designates the location and phasing of three different classes of bikeways on the KSU campus as well as throughout the City of Manhattan. A Class I bikeway is a completely separate right-of-way designated for the exclusive use of bicycles. Bicycles and motor vehicles share the same roadway on a Class II bikeway, although a separate lane (one-way or two-way) is reserved for bicycles through the use of striping, signs, and stencils on the pavement. A Class III bikeway is combined right-of-way for autos and bicycles on which the only special designation is "Bikeway" signs posted along the route.

A bike-rack inventory was made, including the location of existing bike-racks on campus and locations of deficient or non-existent bicycle storage facilities where they are needed. Fig. 2-2 shows existing bike-rack locations, areas where bike-racks are needed, and the existing bike-way routes. The proposed locations for new bike-racks are determined according to perceived current need and convenient access to the bikeway routes.

Currently there are two problem areas where implementation of the bikeways has caused some concern. One is caused by the restriction of lanes and direction of traffic to accommodate the bikeway system on 17th Street between College Heights and Claflin. The changing of 17th Street to one-way south will possibly create a problem for semi-trailer trucks and large fuel oil trucks which unload at the Power Plant. The turning radius at the corner of Claflin and 17th Street may be too short for the larger trucks which must come from that intersection if 17th Street is one-way south. This may indicate further consideration of re-routing vehicular traffic to minimize conflicts and access limitations. Another problem which may be of more immediate concern is the loss of space for a parking lane in front of the Child Development Lab on Campus Creek Drive. The addition of the two-way Class II bikeway lanes has limited the street width for motor vehicles, thus leaving insufficient space for the curb-side parking which was permitted prior to the construction of the bikeways. Since this is currently the only convenient area where parents can pick up their children, it is necessary to provide some means of parking or temporary loading zone. As shown in Figures 2-3, 2-4, 2-5, and 2-6, the campus planning office has proposed four possible alternative solutions to the problem. But these solutions are costly and could not be implemented for several years due to the time consuming capital construction budget process. Two other, more immediate, solutions might be to eliminate either one or both of the bike lanes to provide the needed extra width for on-street parking of motor vehicles in front of the Child Development Lab. The loss of the bike lanes is not critical at this time since a simultaneous count of bicycle traffic on Campus Creek Drive and the intersection of Mid-Campus Drive and Vattier taken between the hours of 8:00 a.m. and 5:15 p.m. on November 10, 1978 indicates that the number of bicyclists using Campus Creek Drive is almost insignificant as compared to the amount of usage of other bikeways on campus.

After two years of full implementation, Phase I of the overall bikeway plan should be evaluated to determine its effectiveness and popularity with bicyclists as well as pedestrians and motor vehicle drivers, and any necessary changes should be made to both the existing system and the proposed future phases.



Kansas State University Campus Map

FIGURE 2-2: EXISTING BICYCLE FACILITIES

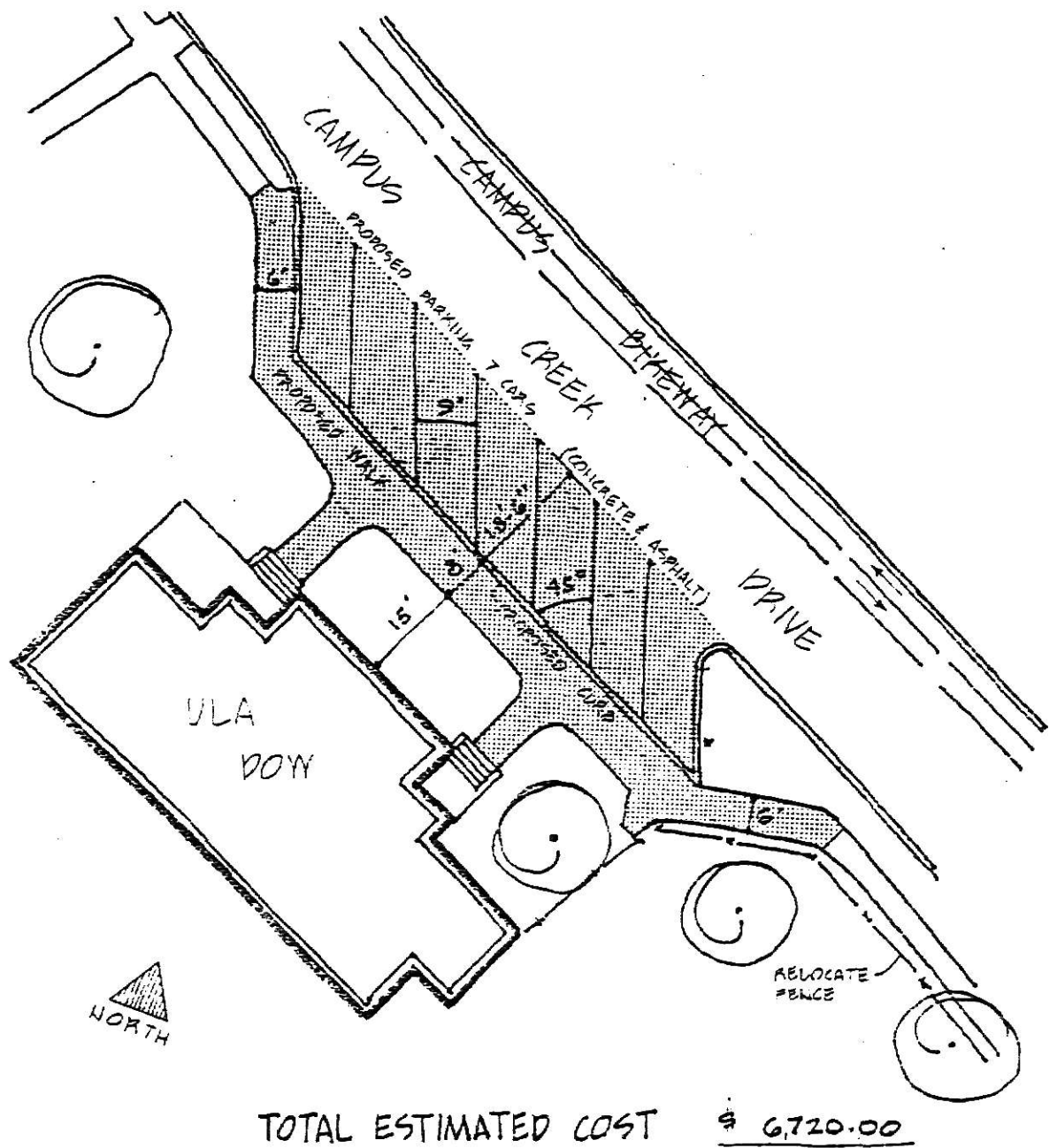


FIGURE 2-3: CHILD DEVELOPMENT LAB PARKING, ALTERNATIVE 'A'

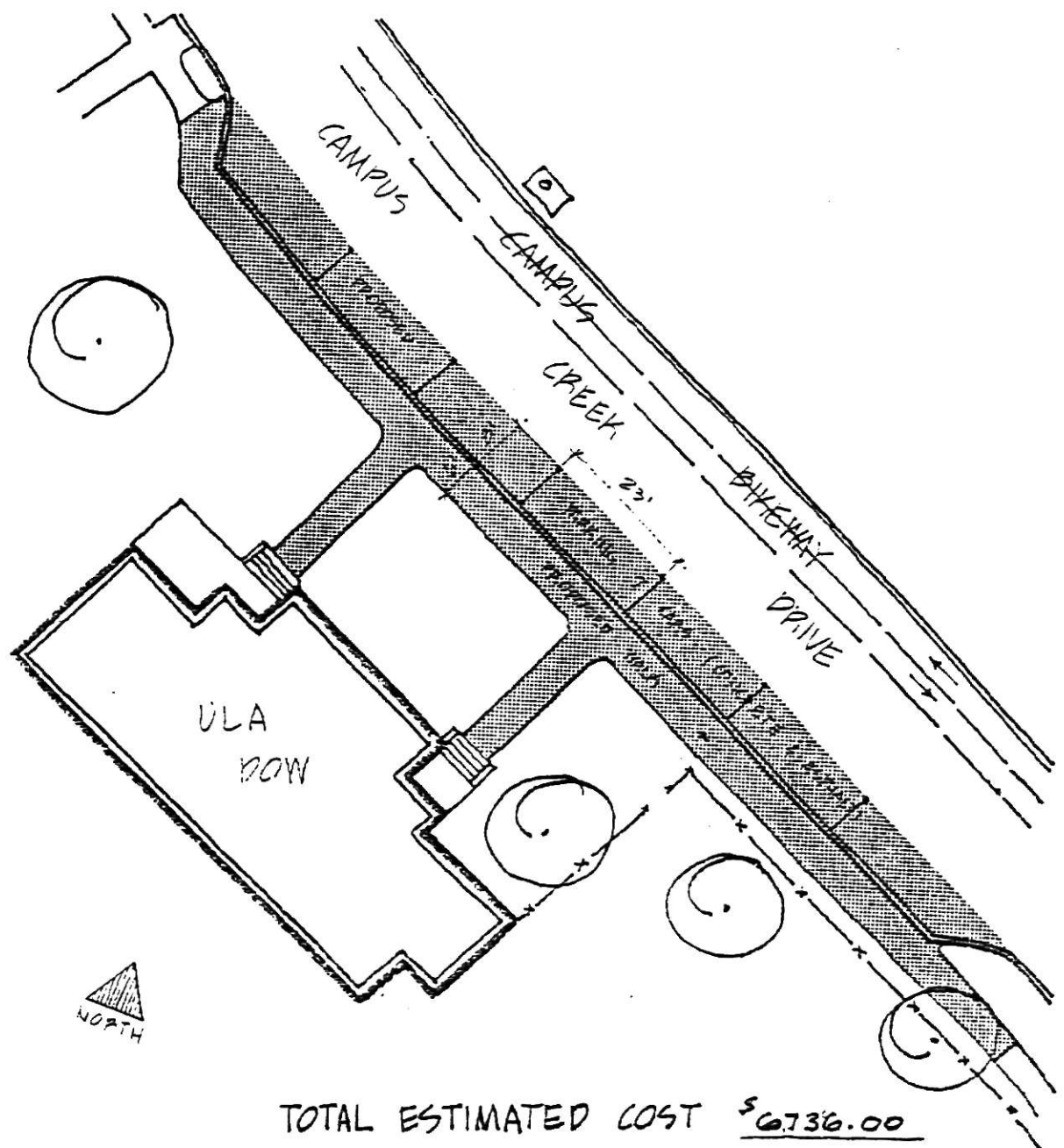


FIGURE 2-4: CHILD DEVELOPMENT LAB PARKING, ALTERNATIVE 'B'

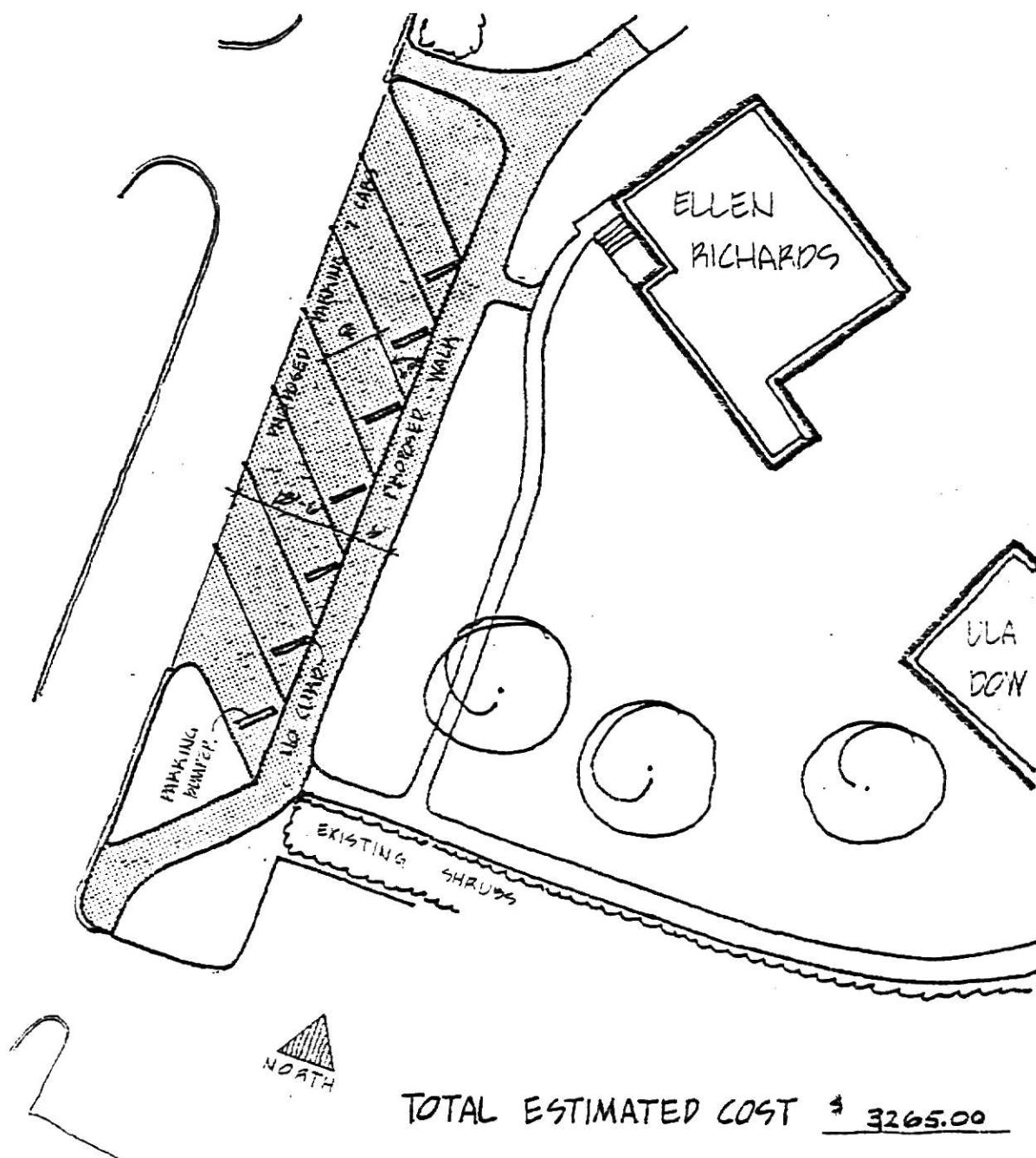
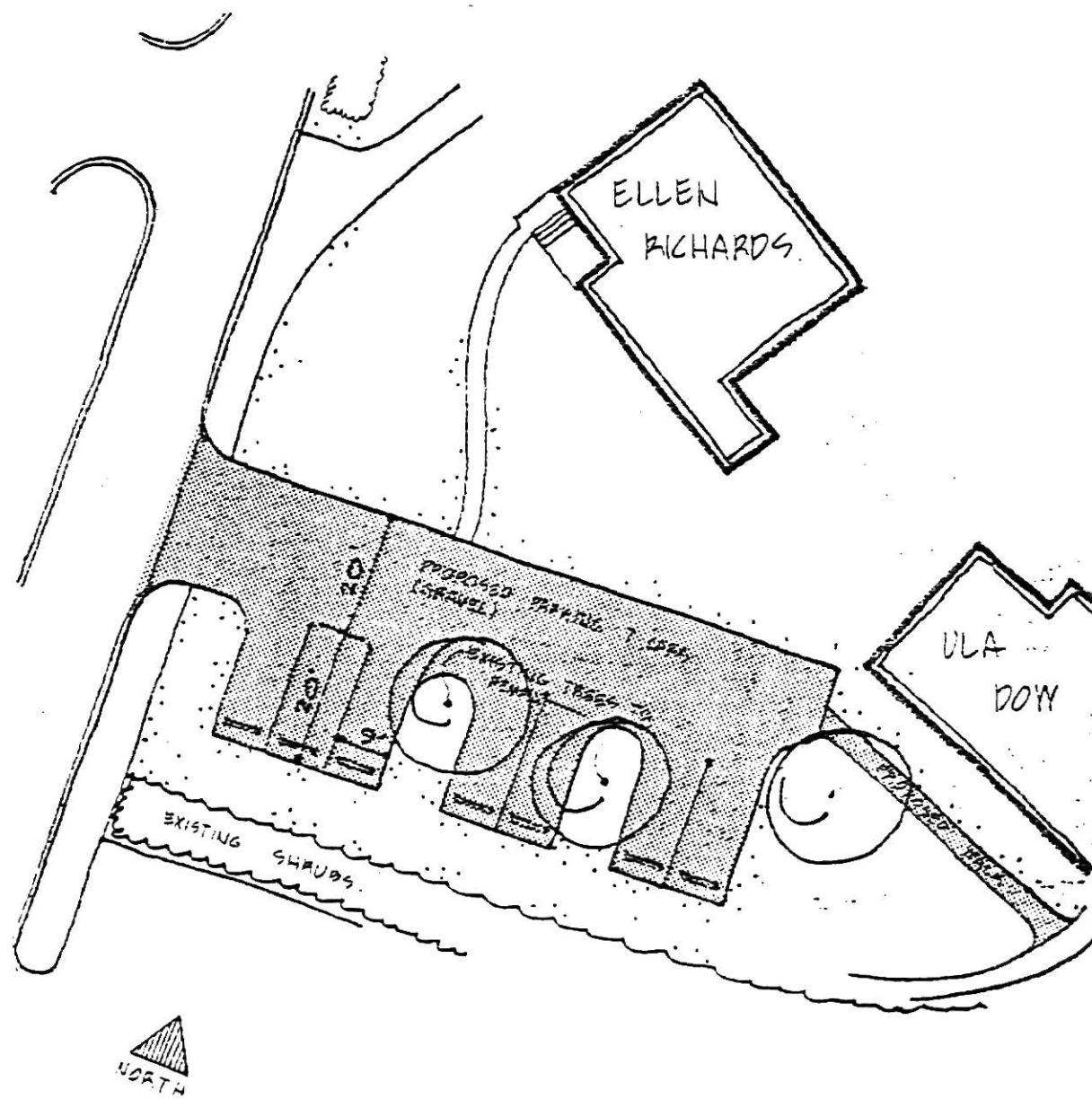


FIGURE 2-5: CHILD DEVELOPMENT LAB PARKING, ALTERNATIVE 'C'



TOTAL ESTIMATED COST \$ 2275.00

FIGURE 2-6: CHILD DEVELOPMENT LAB PARKING, ALTERNATIVE 'D'

MOTOR VEHICLES

All streets on and adjacent to the campus can be classified according to their function. Local city and campus streets are characterized by unlimited access, narrow width, and slow speed limits. City Collector streets are wider than Local streets, carry more traffic at higher speeds, and may have signalized intersections. Major Arterials have limited access, are at least four lanes wide with limited or no parking, and carry the most traffic--and at higher speeds than Local or Collector streets. Expressways are not discussed here as there are none which connect directly to the campus.

Campus streets are also classified according to location and function. A CAMPUS STREET is a through or continuous street which carries all-purpose traffic. A CAMPUS DRIVE carries less traffic and has limited access--usually to parking lots or service areas. SERVICE ACCESS is closed to all vehicular traffic except service and emergency vehicles. These are illustrated in Fig. 2-7.

Patrolling of campus streets by the Office of Security and Traffic from July 1, 1976 to June 30, 1977 resulted in 383 moving violations being issued. There were 139 accidents reported during this period as the campus police patrolled 131,844 total miles. Tickets, written primarily for illegal parking, totaled 32,328.³

The city of Manhattan presently has a mass transit system consisting of one bus sponsored by the downtown merchants. It runs on Thursday from 5:00 p.m. to 8:45 p.m. and on Saturdays from 10:30 a.m. to 5:30 p.m. The route starts at 4th and Poyntz, making stops on campus at Ford Hall, Moore Hall, Jardine Terrace, Goodnow Hall, and the Student Union. The route is completed every 45 minutes. Descriptions of mass transit systems at other campuses and university towns are listed in APPENDIX A.

Presently, one of the most urgent deficiencies in the current campus circulation system is the lack of general vehicular access to McCain Auditorium, according to Mark Ollington, manager of that facility. The alternative solutions to this problem would be to provide an access loop either on the North or South side of the building. Although there are various possible routes on both sides, a north-side loop would probably enter and exit off of Vattier Street between Fairchild Hall and Danforth Chapel, and a south-side loop would probably enter and exit on an access drive connecting with parking lot #9 near its entrance from Anderson Avenue. Another alternative for the north-side access would be from Mid-Campus Drive west of Nichols Gym via a route around or through the site of the burned out shell of Nichols Gym. However, because of the aesthetic value of the remaining "Castle" walls and potential reuse of the structure, it is recommended that any permanent vehicular encroachment on this site be postponed until the ultimate fate of Nichols Gym is decided. Therefore, the more expedient alternative for the north side would be to establish access from the east. Following are the comparative advantages and disadvantages of the north and south routes.

North Side Advantages

- 1) Involves less cost to build than the south-side access drive.
- 2) Provides more convenient access to the auditorium lobby for the handicapped because there are no steps at the entrance.

North Side Disadvantages

- 1) Enters and exits on a campus street, thus increasing traffic congestion.
- 2) Provides very little room for a pull-off loading zone area.
- 3) Involves removing some trees.
- 4) Causes greater conflicts with pedestrian flows to and from the core of the campus.
- 5) Provides direct access only to the front lobby of the auditorium.

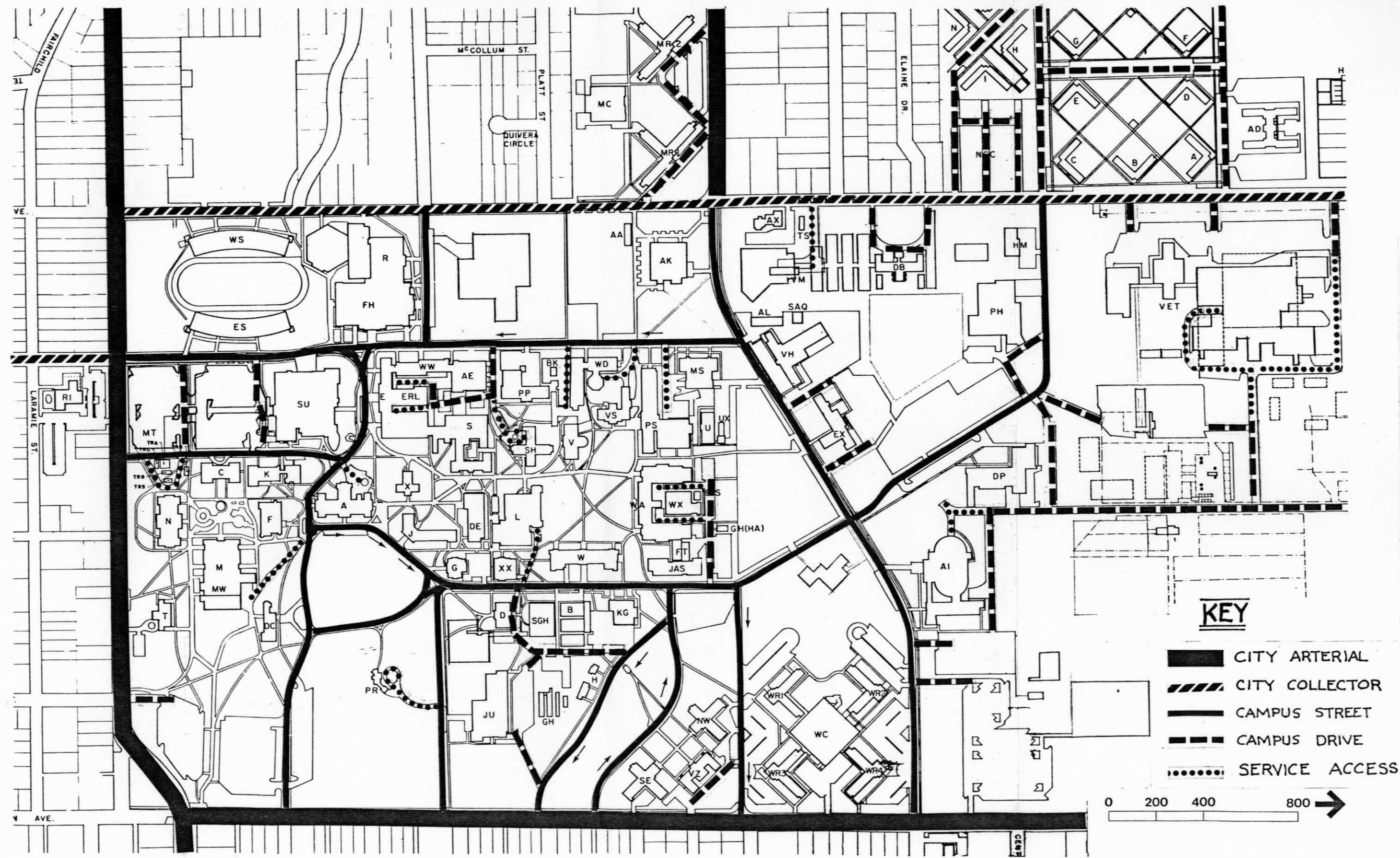
South Side Advantages

- 1) Indirectly connects to a major city arterial instead of a campus street.
- 2) Has sufficient length for a pull-off lane.
- 3) Does not conflict with major pedestrian flows from the main core of campus.
- 4) Connects directly to a major parking lot (#9), and could also provide access to a small parking lot placed on the east side of McCain Auditorium for guest celebrities, production staff, and handicapped patrons.
- 5) Provides access to all parts of the auditorium and music wings.
- 6) Provides access to Nichols Gym if it is renovated.

South Side Disadvantages

- 1) Involves higher costs.
- 2) Less convenient for handicapped people due to necessary modifications at level changes.
- 3) May impose conflicts with pedestrian movement to and from Thompson Hall, and therefore would tend to isolate that building from the remainder of the campus.
- 4) Requires an earth fill to level-up the area of the turning loop.

The south side appears to be the best alternative. A possible layout for the south side loop is presented in Fig. 2-8. In this design the loop has a turning radius sufficiently large enough for a 40 foot bus. The pull-off lane provides enough space for 8 cars and, if more space is required, the lane could be extended. The main traffic lanes are 11 feet wide and the storage lane is 9 feet wide. Allowing for a curb width of one foot, the total width required for the traffic lanes is 32 feet. The sidewalk width along the north side of the storage lane is 12 feet. The parking lot along the east side of the auditorium is optional. The university's policy guidelines do not recommend the addition of any small lots on campus. However, in this case, the lot would provide much needed parking for special event celebrities, technical personnel, and handicapped patrons. The new lot also would provide opportunities to experiment with earth berming and landscaping, which are definite prerequisites for the development of any new parking lots.



Kansas State University Campus Map

FIGURE 2-7: EXISTING MOTOR VEHICLE CIRCULATION

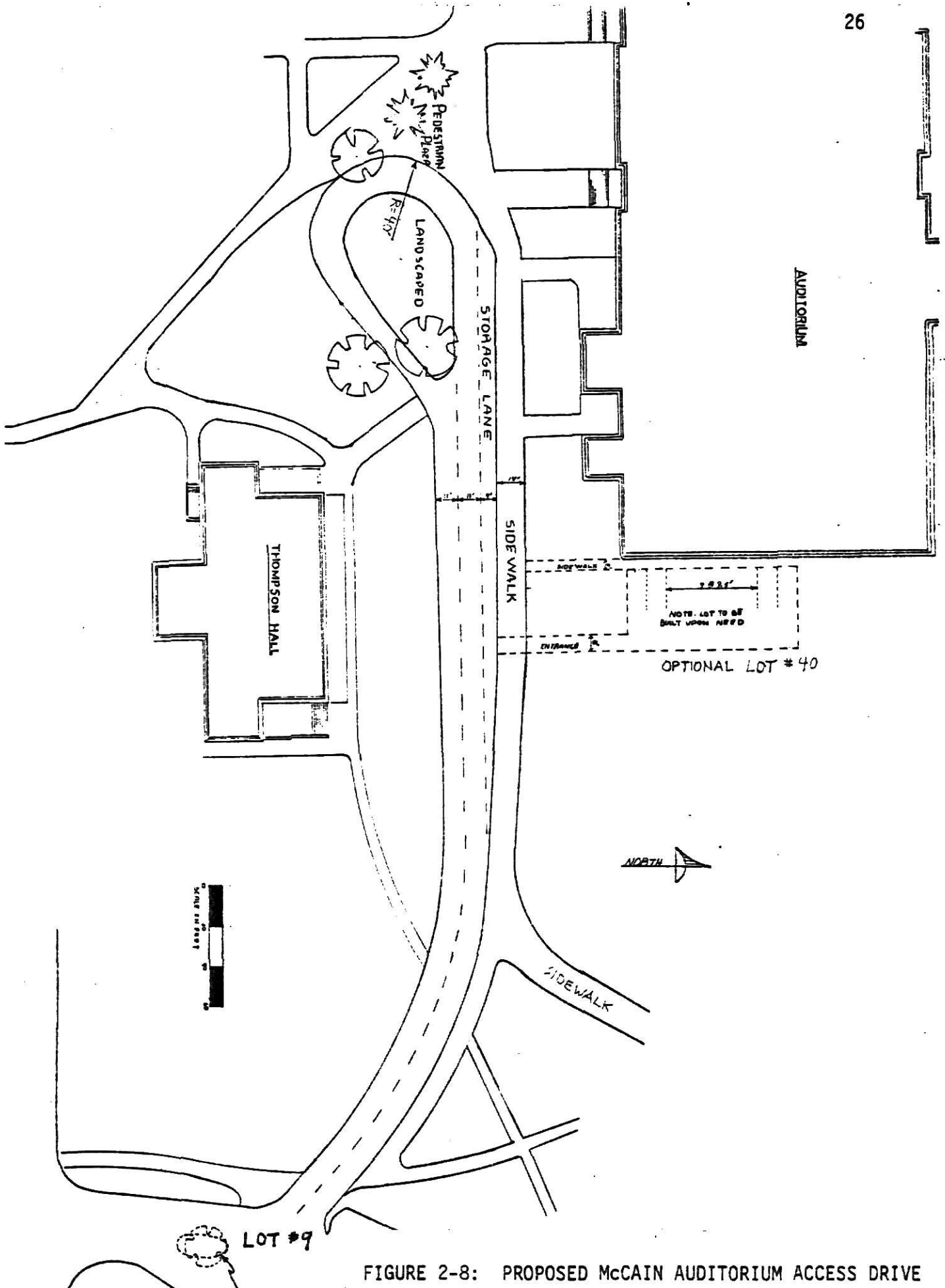


FIGURE 2-8: PROPOSED MCCAIN AUDITORIUM ACCESS DRIVE

PARKING

3

INVENTORY

The current problem of excessive student parking on city streets around the KSU campus is caused by three major factors. First, freshmen living off campus are not allowed to purchase a parking permit at all. They may register their vehicles with the Security and Traffic Office but may not park on campus during the regular weekday class hours. Second, since residence hall parking permits are awarded on a seniority basis, freshmen rarely are able to park in the residence hall lots, which are currently of inadequate capacity to accommodate all residents who have automobiles. Third, there is a general perceived shortage of on-campus parking space for all users. Although anyone above the freshman level may purchase a parking permit, that does not guarantee a place to park.⁴

An evaluation of the current issues pertaining to campus parking for motor vehicles should consist of information from various sources on and off campus, and an inventory of all campus parking lots for their total capacity and type of use. Existing parking lot space allocations as of August 1978 are listed in APPENDIX B. The parking lot distribution by types of parking permitted is graphically illustrated in Fig. 3-1, and the numerical allocation of the 7140 stalls is summarized below in Table 3-1.

TABLE 3-1: EXISTING PARKING SPACE ALLOCATIONS
BY PERMITTED USE

Student only (paid permit required)	241 spaces
Faculty/Staff only (paid permit required)	1780
Student/Faculty/Staff (paid permit required)	1345
On-Campus Housing (paid permit required)	2309
Restricted (reserved, client, loading, state vehicle)	718
Visitors only (<u>no</u> permanent registration ID or permit)	35
Handicapped only (special permit)	14
General (<u>any</u> permanent registration ID or permit)	698

As of November 10, 1978, a total of 6598 parking permits were sold for a total of 3366 regular Student, Faculty, and Staff spaces during the Fall 1978 semester. This translates to a ratio of 1.96 permits sold per available space. Free ID stickers were issued for 7594 autos, although there are only 698 spaces currently classified as General parking, for a ratio of 10.88 permits per space. Twenty-six Handicapped permits were issued for the 14 special parking stalls currently available. These figures do not include Motorcycle, Reserved, or On-Campus Housing parking permits. Students, faculty, staff, and visitors may park in any campus parking lot or time limit zone during the hours from 3:30 p.m. to 7:00 a.m. (reserved stalls 5:00 p.m. to 7:00 a.m. except 24 hour reserved stalls.)⁵

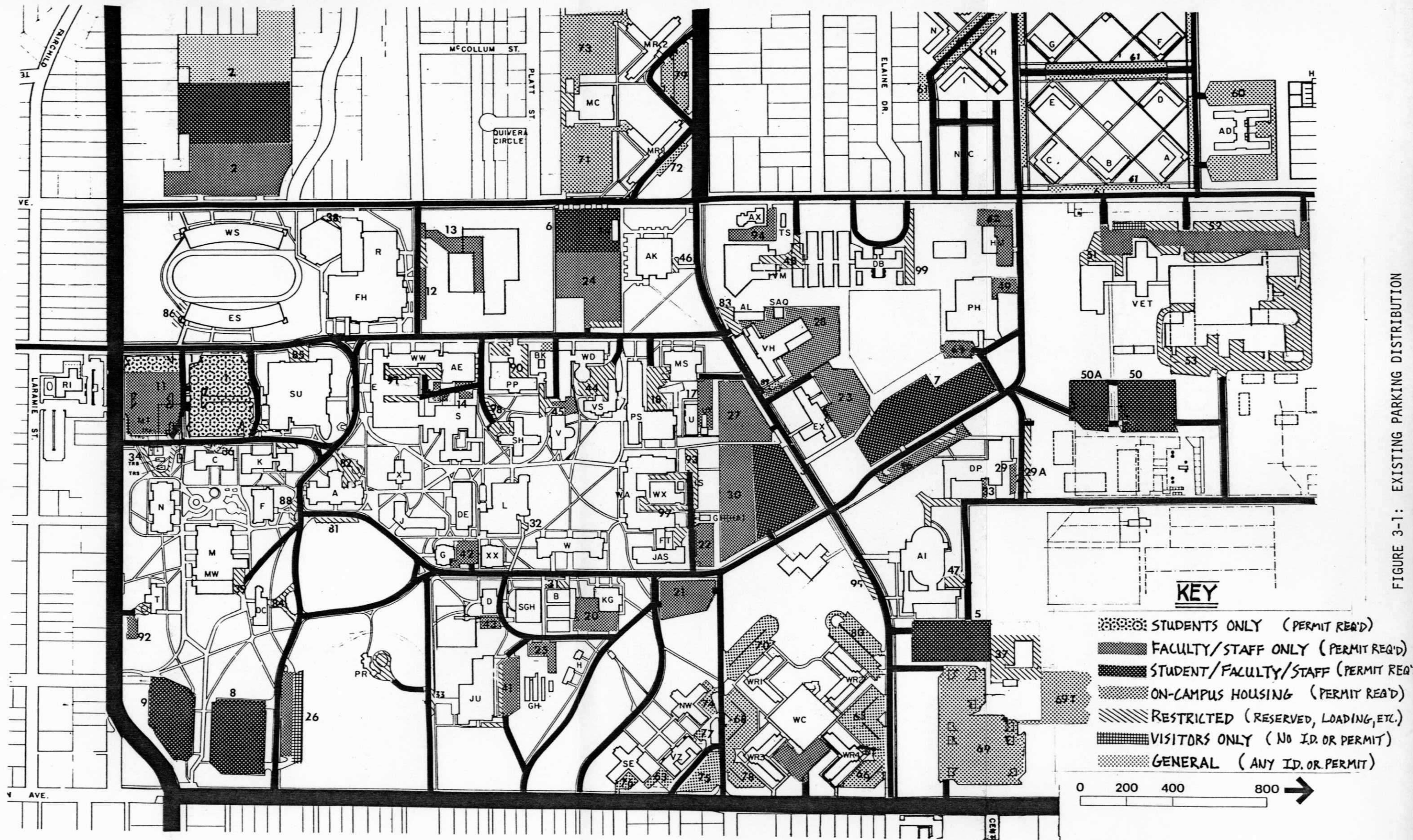


FIGURE 3-1: EXISTING PARKING DISTRIBUTION

SURVEYS AND PROPOSALS

In December of 1977, the KSU Division of University Facilities sent questionnaires concerning campus parking policies and situations to sixteen universities comparable to K-State. The survey included questions about dormitory parking availability, percent of students with parking permits, and parking permit rates. Also, the questionnaire asked what effective measures have been taken with respect to parking difficulties. Following is a sample of some of the more pertinent comments.

University of Colorado

- 1) Redesigned existing lots to increase parking capacity.
- 2) Contemplating shuttle-bus system.

University of Illinois

- 1) Built large areas of new parking on university property.
- 2) Storage parking is available for dormitory residents.

University of Indiana

- 1) Currently has extensive campus bus services.
- 2) Contemplating stricter enforcement of regulations requiring registration of vehicles.

Iowa State University

- 1) Maximum use of the "Iowa State Center" parking garage.
- 2) Use a computer program for simulating parking conditions.
- 3) Determined that additional parking structures are not feasible as of yet.

University of Kansas

- 1) Currently has student-financed shuttle-bus system to key campus destinations and Lawrence C.B.D.
- 2) Continuing consultant study of mass transportation, parking, and traffic flow patterns.

University of Minnesota (Minneapolis)

- 1) Encourage car-pooling, promote off-campus parking areas served by university bus, and provide commuter bus service in cooperation with city bus service.
- 2) Contemplating expansion of campus parking facilities and bus service.

University of Michigan

- 1) No problems -- parking for all who want it.

University of Missouri (Columbia)

- 1) Provided additional parking spaces.
- 2) Contemplating high-rise parking structure, and shuttle bus system.

Northwestern University

- 1) \$1.00 registration permits students to park on city streets for two hours at a time.
- 2) It is considered a privilege, not a right, to park on campus.

Ohio State University

- 1) Has seven parking garages, the latest built in 1977 for \$2 million and having a capacity of 652 spaces.

Purdue University

- 1) City enforces 24-hour limit for parking on city streets.
- 2) New students are advised not to bring their autos to the campus.

The following guidelines were formulated by the KSU Traffic and Parking Council in the Fall of 1977.

Long Range Goal Proposals For Traffic And Parking

- 1) The University will provide adequate parking for all employees, visitors, students, and residents of on-campus housing.
- 2) The University will utilize multiple level parking structures in appropriate locations to provide a small number of high density, relatively centralized parking areas.
- 3) The University will remove the small parking lots located within the core of the main campus.
- 4) The city will improve and enforce their zoning regulations, and encourage commuters to park in University parking facilities.

Temporary, Short Range, And Implementing Proposals For Long Range Goals

- 1) The University will substantially increase parking fees.
- 2) The University shall study and devise the necessary fee structures and methods for implementing the goals.

- 3) The University will implement a temporary distance range within which residents will not be allowed to purchase a permit, until adequate parking is constructed.
- 4) The University will seek funds from the State Legislature for visitor parking on the campus.
- 5) The University will include parking fees for on-campus residents in the rent that is charged those residents.

The KSU Student Government Association (SGA) categorized the parking situation into two problem areas. First, the storage parking problem involves a deficiency in spaces for dormitory residents' autos which require long-term storage facilities; and secondly, the transient parking situation arises from the apparent problem of there not being enough on-campus parking spaces where users want them.⁶ Although many of the existing parking lots may not be conveniently located, the SGA Student Task Force on Traffic and Parking concluded that there is an adequate number of spaces available, especially in the West Stadium lot (#2). This conclusion is based upon the results of a parking survey conducted by university officials on the consecutive days of December 6, 7, and 8 (Tuesday, Wednesday, and Thursday), 1977. The study consisted of a count of the empty stalls in selected lots on campus at various times between 8:00 a.m. and 3:00 p.m. The count was interpreted by the Task Force to indicate that the users of KSU's parking facilities just don't like to walk. For that reason, and for the preservation of the natural beauty of the campus, it was felt that more spaces allotted on campus for daytime parking are unnecessary.

It should be noted that, in comparison to the other Big Eight schools and Big Ten schools, Kansas State has the lowest parking fees, one of the lowest students per space ratios, and shorter walking distances from available lots than most.⁷ With this in mind, the Task Force concentrated on finding suggestions for making the existing parking facilities more efficient and easier to use. Below is a summary of the recommendations made by SGA.

Short-Range Alternatives

- 1) Construct a 425 stall graveled parking lot north of Weber Hall for long-term residence hall storage parking.
- 2) Designate certain lots or parking stalls solely for use by compact cars (up to 20% of total spaces on campus). Since compact cars require less space, this measure could effectively increase the capacity and efficiency of existing lots.
- 3) Implement a coordinated color-coding system for the striping and signing of parking lots (by type of permitted use) to eliminate the current confusion.
- 4) Construct a Visitor Information booth in the Union Parking lot (#1 and #11), and issue special limited-time visitor permits.

- 5) Prices for all parking permits should be doubled to help pay for future improvements in the campus parking facilities and services.
- 6) Ban parking permits to persons living within a five block radius of the campus boundaries.
- 7) Issue special transferable permits to encourage car-pooling.
- 8) Encourage walking, bicycle riding, and the use of mopeds and motorcycles to alleviate current automobile parking space shortages.

Long-Range Alternatives

- 1) Construct a multi-level parking garage.
- 2) Implement a shuttle-bus or other mass-transit system.

These issues and ideas will serve as a base upon which further consideration and recommendations may be made for the proposed program and plan.

PARKING STRUCTURE DESIGN

The primary consideration in improving the facilities for motor vehicle parking on the KSU campus is to meet current and probable future space shortages. Currently, a major issue is the desirability and need for a parking garage on the campus. A study is needed to compare the feasibility of a parking structure with that of a surface lot.

The two major determinants of feasibility are parking demand and cost effectiveness. Although construction costs, maintenance costs, and financing can be predicted to a certain degree, the income which will pay back those costs is dependent upon future parking demand, which is very difficult to predict. The university enrollment and transportation technology are two factors influencing parking demand which are ever-changing and therefore can only be predicted by extrapolating past and current trends. Perhaps more precise calculations could be made if a professional parking demand study is conducted. However, that is beyond the scope of this report. The following outline was used as a guide for creating a suggested design for a parking garage upon which further analysis can be made.

1. A new parking facility should be located on the site of an existing surface lot. There is little additional land properly located near the core of the main attraction area (K-State Union, Ahearn Fieldhouse, McCain Auditorium, etc.) which is available for parking lots.
2. Any new structure should be operated at the least possible cost to the users while insuring a sound financial base. Therefore, the structure should be:
 - a. part of the parking system in which income from surface lots (permit fees) helps finance the structure;
 - b. cost-effective (number of levels to achieve required capacity) and located on a site with efficient design dimensions.
3. Desirable design criteria should be employed to ensure:
 - a. efficient, attractive, and above all, safe pedestrian linkages;
 - b. attention to appearances;
 - c. overall safety and security;
 - d. efficient geometrics and circulation patterns;
 - e. recognition of trends to small vehicles.
4. Parking garage function, operation and design criteria should include:

- a. facilities to accommodate "self parking" type operation;
- b. stall widths and angle of parking;
- c. access points;
- d. stair locations;
- e. lighting;
- f. elevators;
- g. maintenance.

Refer to APPENDIX C entitled "Parking Garage Function, Operation, and Design" for more detailed information. On the basis of existing conditions and those expected to apply within the next five to ten years, a possible addition to KSU's parking facilities might be a 648 stall garage located on the site of Lot #11 (south Union). A suggested plan layout is shown in Fig. 3-2, and the approximate design data are listed below.

Levels: 3 level open structure with vertical access by one-way ramps.

Ramp Grades: 4.16%

Area: $235' \times 356.25' = 83,718.75$ sq. ft. per level; Total structure = 251,156.25 sq. ft.

Parking Stalls: Minimum stall width for self-parking operations is 8.5 feet for 60° angle parking, and the minimum length is 20 feet. Special compact car stalls are standardized at 7.5 feet wide by 15 feet long.

Aisle Width: Minimum for one-way aisles is 16 feet.

Floor Heights: 10 feet, floor to ceiling.

Clear Span Design: Structural design provides for 56 ft. span between column supports.

Elevators: Two hydraulically operated units serving all levels with machine works below the ground level.

Stairs: Two stair wells with access to all levels.

Lighting Intensity: 15 foot-candles along straight aisles, 50 foot-candles immediately inside entrances and exits, 25 foot-candles in areas where drivers are expected to turn, and 20-50 foot-candles in attendant booths, elevators, and stair areas.

Preliminary cost estimates indicate that a structure of the type described above can be built for approximately \$3,300 per space.⁸ This

cost includes site preparation, construction, and architectural and engineering fees, plus an allowance of up to \$100 per space for parking control devices and an allowance of up to \$50 per space for graphics and landscaping. The parking control system would be capable of accommodating both monthly and variable fee parkers. Based on these estimates, the construction of a 648 stall garage will cost \$2,138,400.

In addition to the above construction costs, there would be certain costs related to financing the project. Capitalized interest, reserves, legal, financing, and other fees as well as contingencies can vary. These costs are reviewed in more detail in the next section, entitled "Parking Structure Financial Analysis." Since a major parking structure is not in the "Proposed Long Range Building Requests" list for K-State, the design and type of financing for a garage should be conducive to a self-supporting facility if it is to be built within the next 10-20 years.

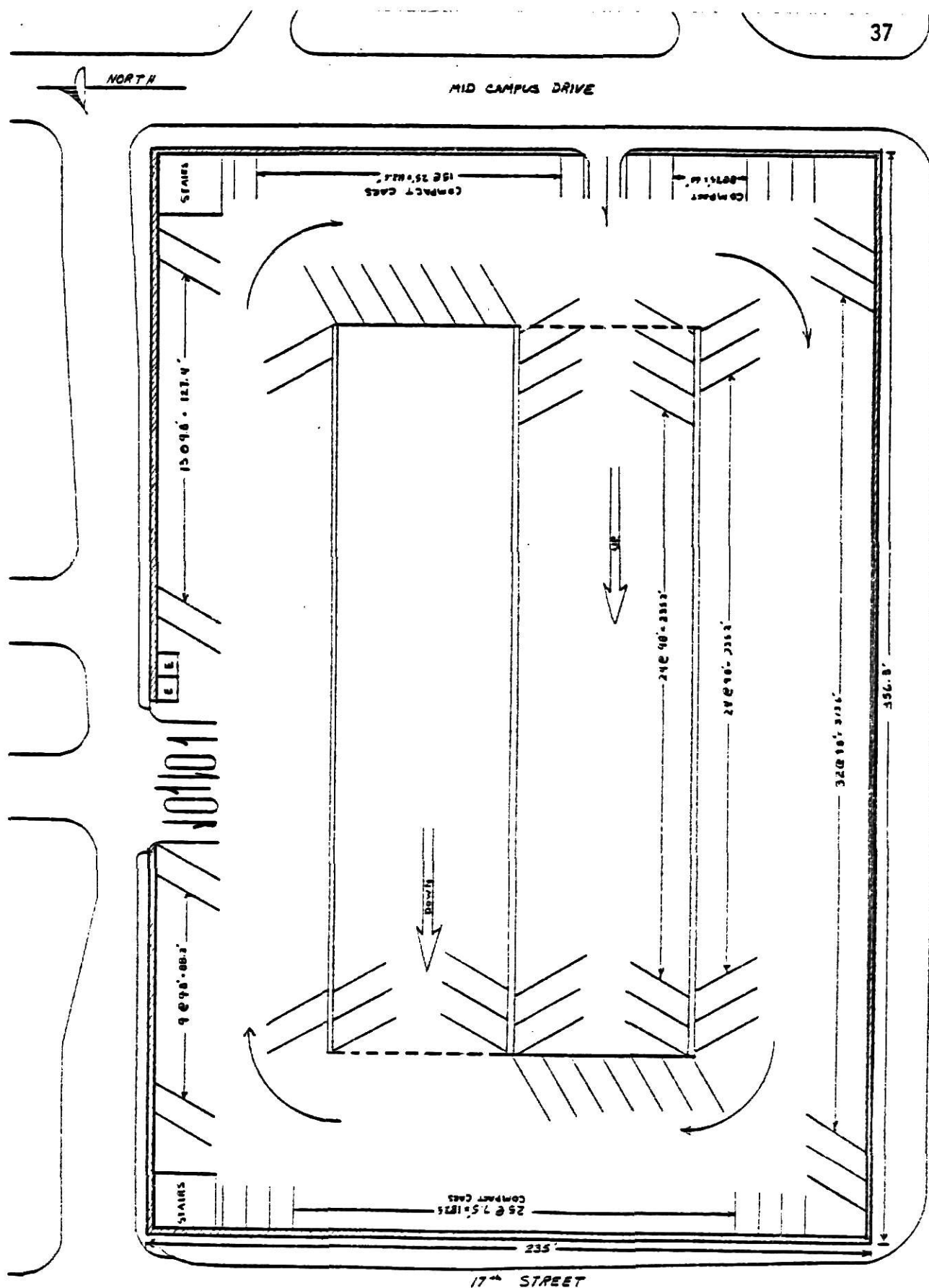


FIGURE 3-2: STUDENT UNION PARKING GARAGE LAYOUT

PARKING STRUCTURE FINANCIAL ANALYSIS

Parking garage cost/revenue relationships vary depending on the type of construction and financing arrangements. These factors, in turn, influence the break-even income required for any given facility. This analysis assumes State financing through general obligation bonds. Alternate financing arrangements might result in different costs.

Table 3-2 illustrates the cost of construction and operational expenses of the proposed parking structure based on the following assumptions:

1. Construction cost at \$3,300 per space (\$3,200 for superstructure and \$100 for control equipment and landscaping);
2. Operating costs of \$0.20 per space per day;
3. Interest rate of 8% during 2 year construction period;
4. 30-year general obligation bond financing (2-year construction and 28-year earning period);
5. 150 revenue producing days per year (class days).

TABLE 3-2: PARKING STRUCTURE CONSTRUCTION
AND OPERATING EXPENSES

Initial Cost:

648 stalls @ \$3,300 per stall	\$2,138,400
--------------------------------	-------------

Estimated Annual Expenses:

Electricity	9,600
Striping @ \$2.00 per stall every 3 years	432
Sweeping	2,820
Operators	10,000
Administration	3,200
Miscellaneous	<u>2,000</u>
Total Yearly Expenses	\$28,052

The amount which must be received each year is \$253,667, or \$391.46 per stall per year. Thus, assuming full capacity in the garage, the amount that must be collected is \$2.61 per stall per day. If the bonds were to be paid off over 50 years instead of 30, the amount which must be collected is \$2.08 per stall per day.

Because of increasing development and operating costs for parking garages, and the need to keep parking rates at levels the public is willing to pay, efficient management of parking facilities today is critical. As previously calculated, the minimum amount that must be collected to break even is \$2.61 per stall per day. Obviously a lower rate would be preferable and make the garage more competitive with other existing parking facilities. One means to lower this rate would be to subsidize the parking structure by increasing the cost of all parking permits issued by the Office of Security and Traffic. Table 3-3 shows the amount which must be collected per stall per day if the garage was subsidized through the increase in parking permit fees.

TABLE 3-3: PARKING GARAGE BREAK-EVEN
FINANCIAL ANALYSIS

Increase Permit	Amount Collected per Year*	Amount Needed to Collect per Stall per Day**
\$ 5	\$ 35,000	\$2.48
10	70,000	2.13
15	105,000	1.77
20	140,000	1.40

*Based on 7,000 permits issued Aug. 1976 to Aug. 1977.

**Based on an assumed 30 year bond retirement period.

Taking an example from Table 3-3 of increasing the parking permit fee by \$20, the amount which must be collected by the parking garage operations to break even is \$1.40 per stall per day. If the parking rates for the garage were \$0.30 for the first hour and \$0.25 for each additional hour to a maximum collection of \$1.50 per stall per day, the proposed parking garage would be self-supporting. However, a professional feasibility study of parking demand is needed to assure that this maximum could actually be realized.

The cost for parking a car in the structure 8 hours a day, 5 days a week, would be \$30.00 per month. In addition to the \$30.00 a month, which is \$122.50 per semester, there would be, of course, the current cost of a permit plus the \$20 increase for subsidizing the garage. The total cost to park in the structure on a daily basis would then be approximately \$255.00 per two semester school year.

With this fact in mind, and considering that this is based on the least possible cost for the structure, it can be concluded that the construction of a parking garage at KSU is not feasible at this time. To further determine the desirability of a structure as an alternative, the cost of a surface parking lot of similar capacity is calculated for purposes of comparison in the next section entitled "Surface Lot Financial Analysis."

SURFACE LOT FINANCIAL ANALYSIS

Table 3-4 illustrates the cost of construction and operational expenses of a 650 stall surface lot (270 sq. ft. per stall including isles) with a sidewalk-curb perimeter based on the following assumptions:⁹

1. 3 inch mat on compacted earth (10 year life-time) @ \$3.85 per sq. yd;
2. 2 inch overlay on reworked existing rock lot @ \$2.75 per sq. yd;
3. 2 inch overlay on existing paved lot (10 year life-time) @ \$2.50 per sq. yd;
4. 4 inch concrete sidewalk, 5 feet wide with curb @ \$2.22 per lin. ft.

TABLE 3-4: SURFACE LOT CONSTRUCTION
AND OPERATING EXPENSES*

Initial Cost:

650 stalls (19,500 sq. yds.) @ \$3.85 per sq. yd.	\$75,075
Curb with 5 foot sidewalk	2,797

Estimated Annual Expenses:

Lighting, 10 poles with 2 lights each	2,922
Maintenance, 15% of initial investment per 10 yrs.	1,168
Striping @ \$2.00 per stall every 3 years	432
Sweeping	2,820
Administration	3,200
Repaving, once every ten years	<u>4,875</u>
Total Yearly Expenses	\$15,417

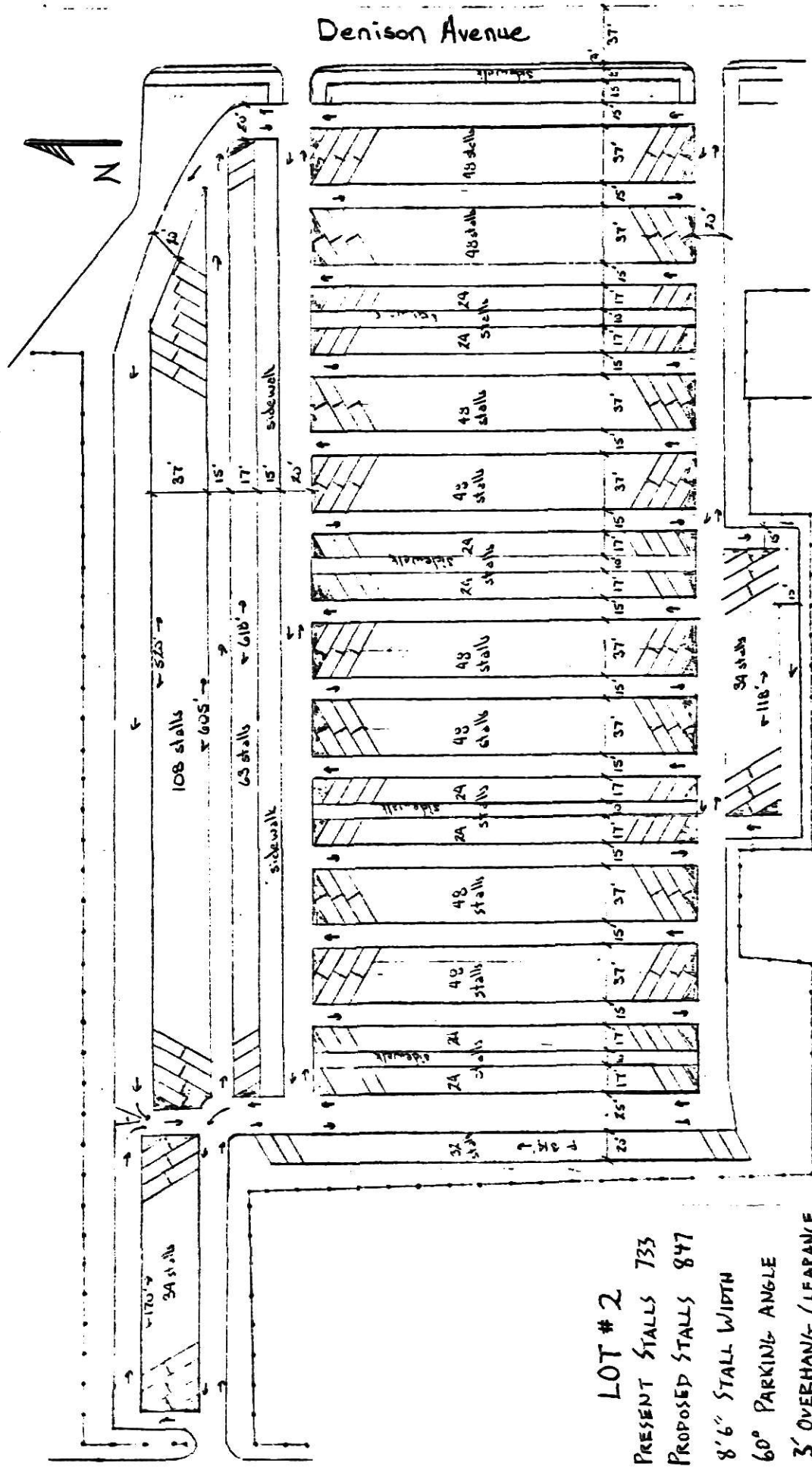
*Based on costs as of May 1, 1978.

Using the same assumptions as with the parking garage, the amount of receipts needed per year is \$20,690. This amounts to \$31.93 per stall per year, or approximately \$0.21 per stall per day based upon 150 class days as compared to \$2.61 per stall per day to park in the garage detailed in the previous section. Maintenance of existing lots at KSU amounts to approximately \$12.00 per stall per year, which includes striping, maintenance of cracks and potholes, and the cost for repaving every ten years. This amounts to a total of \$78,000 per year spent for the entire campus.

Although it is aesthetically preferable to enclose auto parking in a structure rather than display it in the open over large areas of land, surface parking lots are the most preferable alternative in terms of financial feasibility. Only in cases of extreme shortage of land and urgent demand for more parking space should a parking garage be considered. KSU, at the present time or in the foreseeable future, does not meet those requirements. Perhaps the layout of many existing surface parking lots could be changed to permit more efficient circulation and increased capacity.

To set an example of how existing parking lots may be upgraded and designed more efficiently, a study was conducted on the West Stadium lot (#2) to determine if it is being utilized to its maximum capacity. An inventory of the present lot reveals that there are 733 stalls covering 38,400 square yards. 11,400 square yards of this lot is paved, and 27,000 square yards has a rock surface. By redesigning this lot, it was found that the capacity could be increased to 847 stalls as shown in Fig. 3-3, or 841 stalls as shown in Fig. 3-4.

The cost to resurface the entire lot would amount to \$102,750. Assuming only the rock portion of the lot would need to be resurfaced, the cost would be only \$74,250. Concrete curbing for planters at the end of the isles would cost \$0.75 per linear foot, or an additional cost of approximately \$2,500. 5-foot sidewalks would increase the total by another \$5,000. Not only do these alternatives substantially increase the capacity of Lot #2, but they also provide an opportunity for more landscape development and pedestrian convenience. This example provides even more convincing evidence that perhaps further development of existing surface parking lots on the K-State campus is preferable to investing in a parking structure at the present time.



LOT # 2

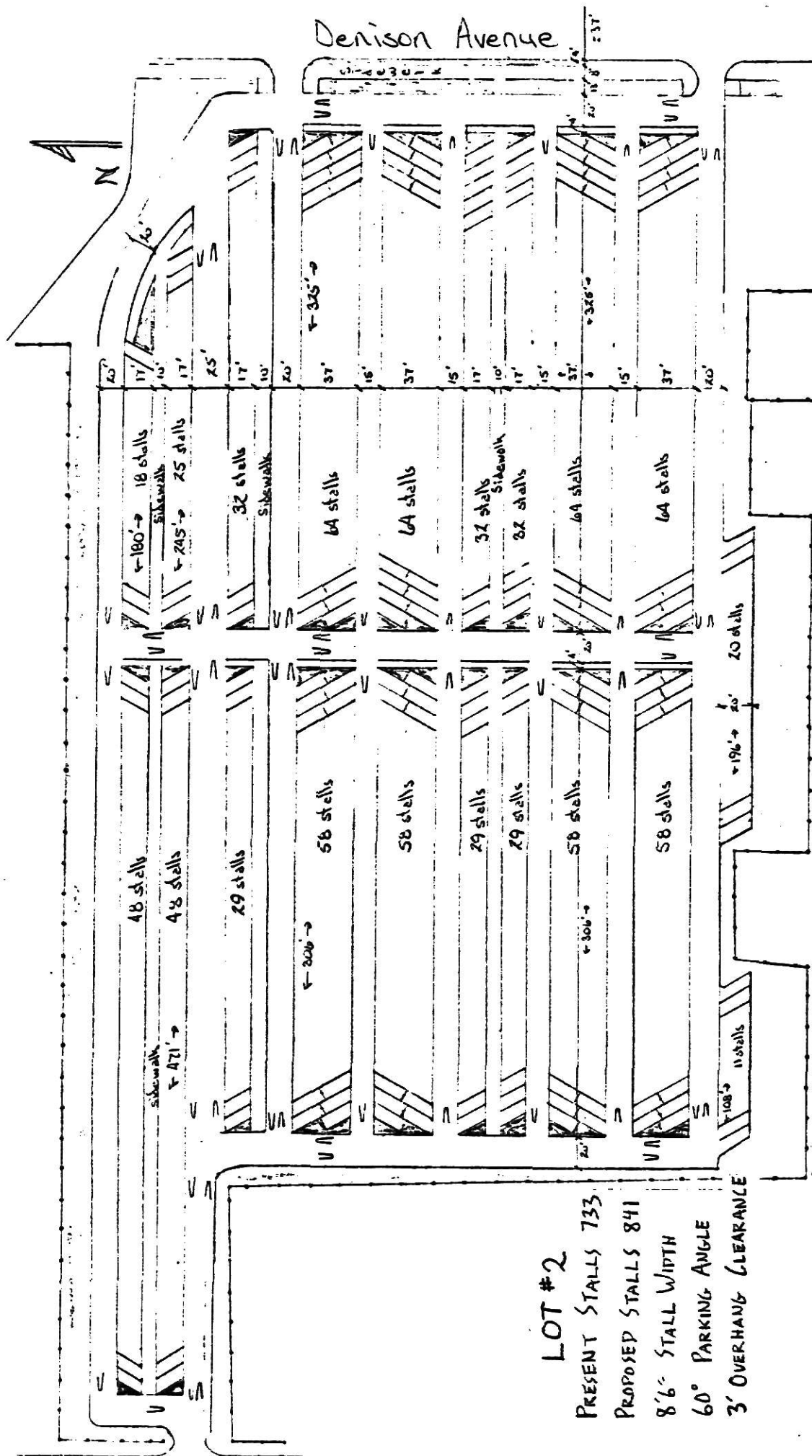
PRESENT STALLS 733

PROPOSED STALLS 847

8'6" STALL WIDTH

60° PARKING ANGLE

3' OVERHANG- CLEARANCE



PARKING LOT LANDSCAPE DEVELOPMENT

The automobile is currently the most significant mode of urban transportation. As unfortunate as it may be, no other invention so controls our lifestyle than does the car. Highways, streets, and parking lots need to be provided to accommodate these vehicles. And, at Kansas State University, like anywhere else, the job of making the parking lots and roads aesthetically and environmentally acceptable is a difficult one. Frequently, the landscaping of parking lots has been neglected due to cost factors or space limitations. In some cases, existing landscape planning was done poorly, either because of a lack of sufficient criteria or a lack of understanding of materials, habits, and problems. A few trees scattered indiscriminately in a parking lot is not the solution.

The following list of needs illustrates the general criteria for landscape development of parking lots that should be considered at KSU. These issues are detailed in APPENDIX D, where more specific criteria for parking lot landscaping material and function are explained in full.

Screening

- 1) From off the site.
- 2) From within the site.

Shading

- 1) Of parked cars.
- 2) Of pedestrian circulation system.

Separation

- 1) Between parking areas of different permitted uses.
- 2) Between vehicular and pedestrian circulation.
- 3) Between parking areas and surrounding buildings.

Seepage

- 1) Penetration of run-off.
- 2) Use of concrete curbing, walks, planters, and islands.

VISITOR PARKING

Visitor parking at KSU has always been a problem. The critical need is not so much in terms of capacity as it is in proper location. Because the only existing Visitor lot (#26) is located at the southeast corner of the campus, away from most visitor destinations, it is not used to its maximum potential. To the visitor, the main entrance to the campus is the corner of 17th and Anderson. The location of the main buildings of interest--Union, Ahearn Fieldhouse, and McCain Auditorium--that the majority of visitors seek would suggest that a Visitor lot would be most utilized if it were near all these attractions. The most convenient location is perhaps the K-State Union lots (#1 & #11).

Ideally, visitor parking facilities should be financially self-supporting and operated in such a manner to discourage use by university students, faculty, or staff. One possible solution would be to install 34 parking meters in the north Union parking lot (#1), which currently contains 241 student stalls. There are 17 parking stalls on each side of the sidewalk linking the Union entrance with the south Union lot (#11). These 34 stalls could be designated as a visitor parking area. Cars with campus parking permits or registration stickers could be ticketed for being parked in the metered stalls.

The number of visitors who would be willing to park in the metered section is not known. However, based on the following assumptions, the needed income per day can be estimated to determine the feasibility of installing the meters. These assumptions are as follows:

1. \$100 initial cost for each meter installed;¹⁰
2. 4 hour time limit per meter;
3. \$0.25 per hour rate;
4. Meter receipts collected 3 times per week (Mon., Wed., Fri.);
5. 1/2 hour required to empty 34 meters;
6. \$6.00 per hour labor costs to collect meter receipts.

Table 3-5 shows computations for varying parking times in the stalls per day, the percent of total capacity, and the resulting revenue per day. As an example, if 50% of the total capacity (17 stalls) is in use for an average of 5 hours each, the total amount collected each day is \$27.25. At this rate, assuming 5 days income per week and 150 revenue days (class days), the amount collected per year is \$3187.5. Assuming the conditions listed above, the labor costs to collect the revenue amounts to \$486 per year.

TABLE 3-5: METERED VISITORS'
PARKING DAILY REVENUE

Meter Income per Day (\$)									
Time in stall per day (hours)	8	68	62	54	48	40	34	28	20
	7	59.5	54.25	47.25	42	35	29.75	24.5	17.5
	6	51	46.5	40.5	36	30	25.5	21	15
	5	42.5	38.75	33.75	30	25	21.25	17.5	12.5
	4	34	31	27	24	20	17	14	10
	3	25.5	23.25	20.25	18	15	12.75	10.5	7.5
	2	17	15.5	13.5	12	10	8.5	7	5
	1	8.5	7.75	6.75	6	5	4.25	3.5	2.5
		100%	90%	80%	70%	60%	50%	40%	30%
		Percent of total capacity (34)							
		34	31	27	24	20	17	14	10
		Number of stalls							

In addition, there should be visitor parking spaces distributed about the campus at other key locations where there are facilities frequently visited by people who are currently not directly associated with the university, e.g., the Athletic department, the Alumni Association, Anderson Hall, the Housing office, the Music department, the Veterinary Medicine complex, and the agricultural facilities which sell products to the public--Animal Science, Dairy Science, and Bakery Science. These scattered locations of visitor parking spaces would probably not be metered, but would instead be designated and enforced by signs or other graphic means. The proposed allocation and distribution of Visitor Parking spaces is listed in APPENDIX B.

RESIDENCE HALL PARKING

A major topic of current interest is the lack of sufficient long-term storage parking space for dormitory residents who wish to have cars on campus. The recent construction of Lot #69T was an attempt to alleviate this problem. However, the 192 extra spaces may not yet be sufficient to relieve the original cause for concern which is the problem of dormitory residents leaving their cars parked on nearby city streets for long periods of time because they are not allocated a permit to park in any of the lots designated specifically for dormitory residents, nor are they allowed to purchase a regular Student parking permit if they are a freshman.

Since there were over 1450 permits issued for the 1382 residence hall Student parking spaces (including Lot #69T), and a total of 4327 residents, obviously not all residents who have autos and wish to have a parking permit are allocated one.¹¹ The present policy for deciding who gets a permit is based on a system of points representing the applicant's seniority at KSU and in the residence halls.

It has previously been proposed by the KSU Traffic and Parking Council that a new 425 stall parking lot be constructed in an area north of Weber Hall for the purpose of long-term storage parking by dormitory residents. However, that idea was discarded in favor of the smaller Lot #69T by the university administration. Because many more permits (exact number unknown) were requested than could be sold this year, it can be concluded that still more parking spaces for this use may be needed.

A key question at this point, though, is how far away from their dorm residents are willing to park. Even if a large storage lot were to be provided in the area behind Weber Hall, it may be so far away for some residents, e.g., those living at the Kramer Complex, that they would still prefer to park on nearby city streets rather than walk long distances across campus. Logically this really shouldn't be a major factor because, supposedly, students living on-campus will not need to use their cars very often so, therefore, the storage aspect is more important than the convenience aspect. Psychologically, however, many residents may perceive any distance of over one or two blocks as being too much of a barrier between them and their cars. So, it will be assumed that although a resident may seek a parking permit for a residence hall lot, if they are permitted to park only in a lot which is a long distance away, then there will always be some who insist on parking on the city streets anyway. Accepting that theory, it can be concluded that, although another storage parking area needs to be provided, it should be located and classified such that it can still be used to its maximum potential even if not all residents who are given a permit to park in it, use it.

A quick survey easily reveals that there is no available land area of sufficient size for a storage parking lot near any of the residence hall complexes. One site, though, which is approximately equidistant from all of the residence halls, is the area bounded by the sites of Umberger Hall, Dykestra Hall, the old dairy barns, Pittman Hall, and the existing Lot #7. This area was previously used for cattle pens but is now vacant since the Dairy Science operations were moved to a new location north of the campus.

The university is already considering making this area into a parking lot once Phase I of the new Plant Science complex (Throckmorton Hall) is completed. Although the new lot, henceforth designated Lot #4, may have a total capacity of over 400 autos, the net increase in parking spaces will be much less because it is expected that the nearby existing gravel Lot #7 will be eliminated to permit a park-like open space to be extended along the adjacent drainage creek.

If the new Lot #4 could be classified such that dormitory residents as well as the current users (Students, Faculty, and Staff) of Lot #7 could use it, then perhaps that flexibility would provide the most efficient compromise between availability and convenience of parking space for dorm residents who are unable to purchase permits for any other lots closer to their residence. The solution, then, is to classify the new lot as General Parking, which currently requires only that the student display in the car window an ID sticker which simply shows that the car has been registered with the Campus Security and Traffic office. This sticker is free and is required on all motorized vehicles on campus (except visitors) which do not have a paid permit.

Although the proposed Lot #4 is located outside of the Core Campus area, and quite distant from any major activity areas (Union, Library, Auditorium, etc.), it is perhaps an ideal location for a large all-purpose parking lot. The suggested classification will ensure that it is used to its maximum potential, and at the same time provides long-term parking space for dormitory residents who want to park on-campus but are unable to purchase a Residence Hall parking permit due to space limitations in these lots. Although the new lot would be some distance from the residence halls, this disadvantage should be more than compensated for by the fact that the required permit is free, and there would be no threat of penalty for parking on a long-term basis. During the day, of course, Lot #4 could also be used by anyone having business in that part of the campus.

PROGRAM

4

CONCEPT

The previous sections have presented an inventory and analysis of the current issues of traffic circulation and parking on the KSU campus. It is the primary purpose of this study to resolve the existing deficiencies and conflicts by evaluating possible alternative solutions, and to synthesize the most desirable elements into a single comprehensive plan. Realizing that, to be physically feasible and financially reasonable, a comprehensive plan must include short-range solutions as well as long-range goals, the scope of this proposal will be for a ten year implementation period. Ten years is a short enough period that the influence on campus development can be predicted with some accuracy, but long enough to permit full implementation of large-scale, long-range proposals. It is felt that any proposals for beyond ten years would be rather arbitrary and based on unsound criteria.

Although specific physical improvements are not detailed for any period beyond ten years, the following written policy guidelines may be used as a framework within which all future decisions and proposals concerning campus transportation issues may be made. The guidelines, which are compiled from various sources, include the rewording of some existing policies and also contain several new recommendations. The overall concept for these guidelines is derived from the "Environmental Guidelines," adopted by the KSU Long-Range Planning for Physical Facilities Committee. An asterisk (*) before a policy statement indicates a new guideline not previously listed in the "Environmental Guidelines."

POLICY

General Guidelines

1. The physical environment at Kansas State University shall express and facilitate the implementation of the objectives of the University. It shall stimulate the mind, body, and spirit, and provide appropriate surroundings for thought, feeling, and action. It shall encourage contact between all members of this community of scholars, but also allow for solitude and reflection. In matters of health, safety, beauty, and ecological impact, the university shall strive to teach by example.
2. Availability of land is insufficient reason to spread out the campus, and because greater density can be an asset to improve and maintain the pedestrian character of the campus, efforts shall be made to keep all new buildings within suitable walking distance of the Core Campus.
3. Forbidding fences and other symbols of isolation from the surrounding community are to be avoided, and entrances to the campus shall signify arrival at a place with distinct identity.
4. Distinctions in paving shall be used to identify types of permitted traffic and parking. Provisions shall be made to handle run-off from paved areas. Where possible, the choice of paving materials and design of facilities should allow rain to be absorbed by soil rather than storm drains.
5. Green-belts on campus are recognized as valuable assets and shall be improved as the campus extends, particularly in the northward and westward directions.
6. There will be an annual review of parking and circulation, and a yearly report of recommendations will be made to the President by the Traffic and Parking Council.

Circulation Guidelines

1. There will be a continuing effort to solve university/city circulation problems by working closely with the City of Manhattan. The City will improve and enforce their zoning regulations, and encourage commuters to park in University parking facilities.
2. *Full cooperation and support by the university should be given to the City of Manhattan in the further development and implementation of a regularly scheduled community mass-transit system which would also serve the K-State campus.
3. The university will provide a system of signing and marking to aid in the safe and proper use of the circulation system. All traffic control devices will be in accordance with the Manual on Uniform

Traffic Control Devices. A consistent graphic system shall be implemented for orientation, traffic control, and building identification. International traffic symbols shall be phased in and used when appropriate.

4. Control of vehicular and pedestrian traffic should be exercised through design with a minimum of enforcement required.
5. In all planning, the needs of the handicapped shall be taken into consideration. Curb-cuts and ramps will be provided at all major changes in level to promote safe and convenient access to buildings, parking lots, and drop-off zones.
6. *Maximum effort shall be made to eliminate or reduce all hazardous conflicts between pedestrian, bicycle, and motorized vehicle circulation routes.
7. *The university will provide sidewalks on all parts of the campus for safe and convenient pedestrian access to all buildings and high pedestrian use areas within the campus, and from parking and off-campus areas. New or extended pedestrian paths will be planned in consideration of new destination points and routes caused by anticipated future facilities.
8. Bicycle routes will be provided to encourage safe use of bicycles. They will be periodically evaluated to determine needed modifications for increased safety and convenience. Bicycle routes and parking racks should have graphic identification. Parking facilities should be adequate in number, appropriately located adjacent to bikeway routes, and properly designed for durability, convenience, and security.
9. It will be the aim to minimize the intrusion of all motor vehicles into the Main Campus. No through traffic shall be permitted on the Main Campus, and speed limits on all campus streets shall be strictly enforced. Maximum access for emergency vehicles will be provided. Service vehicles shall be permitted only when necessary, at very low speeds, and on designated routes.

Parking Guidelines

1. The university will provide adequate motor vehicle and bicycle parking for all employees, visitors, and students, including residents of on-campus housing. Equitable distribution and allocation of parking space shall be studied and assigned both within the periphery and off the Main Campus.
2. *All parking lots, loading zones, special permit and service areas should be clearly identified through a consistent graphic sign system.
3. *Plant material and landscaping elements such as earth berms shall be used where necessary in and around parking areas to provide continuity and definition of spaces, serve as visual, acoustical, sun, and wind screen, and to improve the air quality.

4. Major parking will be kept on the periphery of the Main Campus and shall be available near the intercollegiate and intramural athletic facilities, Union, auditorium, and any other major-attraction facilities. Parking structures will be utilized when and where feasible.
5. No new parking areas will be developed in the Core Campus and the existing vehicular parking shall be restricted to special needs, such as emergency and security patrol vehicles, service vehicles, cars for the handicapped, and cars for individuals who must have close access by virtue of their jobs or business on campus.
6. *Special consideration should be given to the planning and design of parking facilities for compact cars, mopeds, pedal and electric personal vehicles, etc., as the need arises, and as existing lots are resurfaced and restriped.
7. *Commuting to campus in motorized vehicles by students and university personnel living within four blocks of the campus should be discouraged by restriction of parking permits. Exceptions to this would be made for handicapped persons, students with jobs off-campus, or those who need to carry large articles to class.
8. *Car pooling should be encouraged by reduced-rate transferable permits.
9. *Any added revenue from increased permit prices should be used for continuing improvement of campus parking and circulation facilities towards implementation of this plan.

ALTERNATIVES

Initially, three possible circulation plans will be considered in terms of their desirability and feasibility. Two of the alternatives--leaving the campus the way it is now, and the "KSU Circulation Plan" by the Oblinger-Smith Corporation--are presently the only physical alternatives upon which any future planning may be based. However, since a major goal of the university is to have a primarily pedestrian oriented campus, a radical "all auto circulation banned from Main Campus" plan is arbitrarily proposed as an influence toward that goal which may be compromised by desirable features of the other two alternatives. The final recommended plan will be a synthesis of the most desirable and feasible elements of these three initial alternatives, along with some special solutions to specific existing problem areas.

Previous sections of this report have dealt with the existing transportation situation, thus, further explanation is unnecessary. Obviously any current problems will remain or worsen if nothing is done to improve the campus circulation and parking facilities and policies. To leave the campus the way it is now (Fig. 1-6, Fig. 2-1, Fig. 2-2, and Fig. 2-7) is the least expensive financially, but may incur decreased desirability in terms of environment, aesthetics, and safety. It is realized that the existing conditions are the base from which all future changes must be made and thus, where possible, maximum use must be made of existing facilities while the most undesirable elements--deficiencies, conflicts, etc.--are eliminated or altered.

A radical change from the present campus circulation system would be to eliminate all through traffic from the main campus. As can be seen in Fig. 4-1, all regular auto traffic can be restricted to the major perimeter parking lots, with all interior campus circulation facilities being converted for exclusive pedestrian or pedal vehicle use. Most routes would have to be open for use by service and emergency vehicle use also. The disadvantage of this alternative is that it might discourage access for visitors and the handicapped, especially at some major buildings such as Anderson Hall and Farrell Library. The advantages are obvious--a pedestrian can go almost anywhere within the Main Campus and not be concerned about dodging the auto traffic. Also, a change of paving and addition of more pedestrian-oriented facilities (plazas, landscaping, etc.) will greatly improve the aesthetic qualities of the existing abundance of concrete. Current policy states that the campus should move toward the goal of an all-pedestrian campus. However, some elements of this alternative may not be practical in terms of necessary vehicular access to major campus destination points.

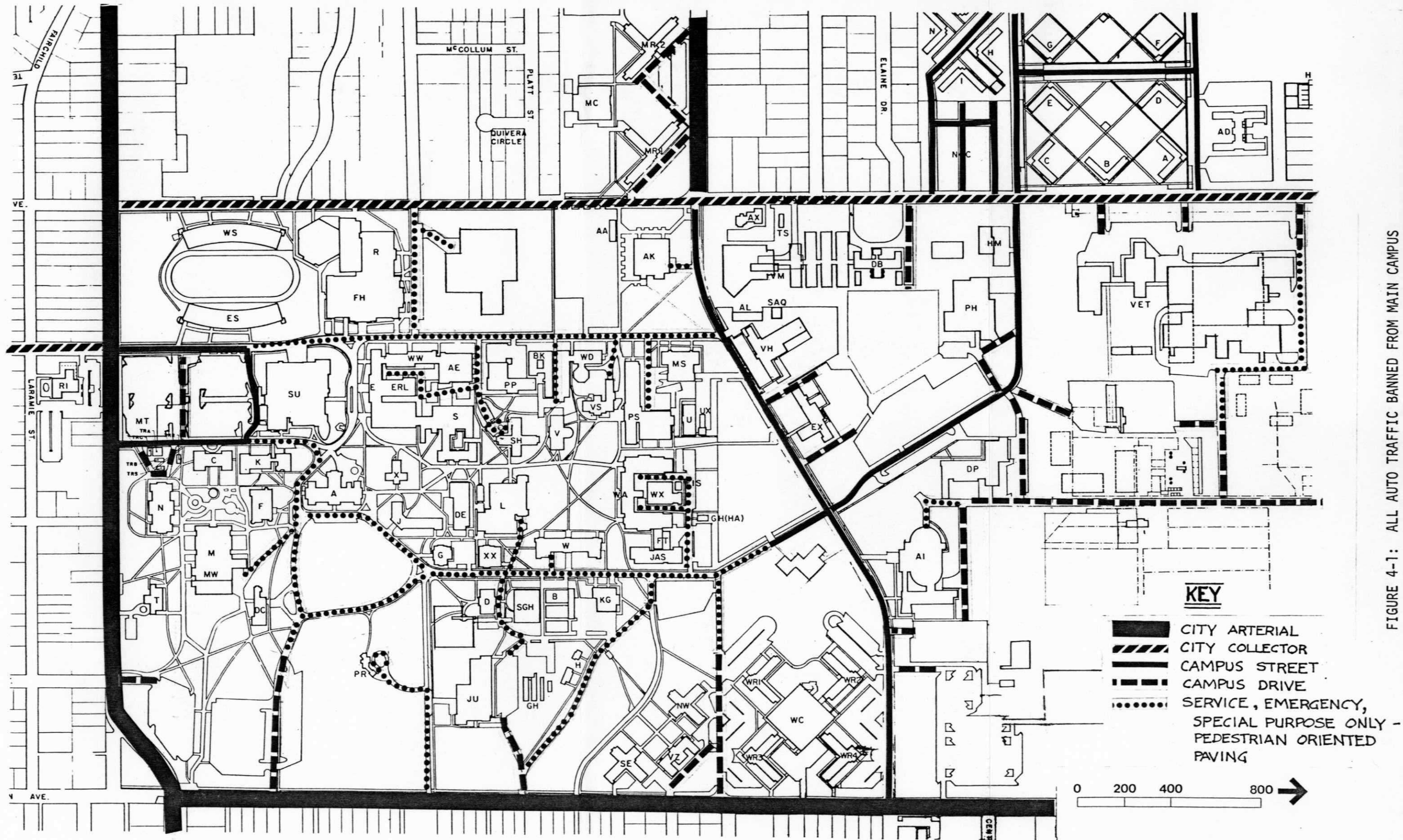
A recent attempt at a comprehensive transportation plan for K-State was the "KSU Circulation Plan" proposed by the Oblinger-Smith Corporation in 1973. The circulation routes are shown in Fig. 4-2. The philosophy of this alternative is that, in keeping with the Environmental Guidelines, vehicular traffic on the Main Campus should be kept to a minimum, while still providing adequate access and parking. This was to be achieved by restricting parking on the Core Campus to "non-personal" vehicles and the

handicapped, encouraging bicycle usage, and improving pedestrian circulation by upgrading sidewalks and reducing pedestrian conflict points.

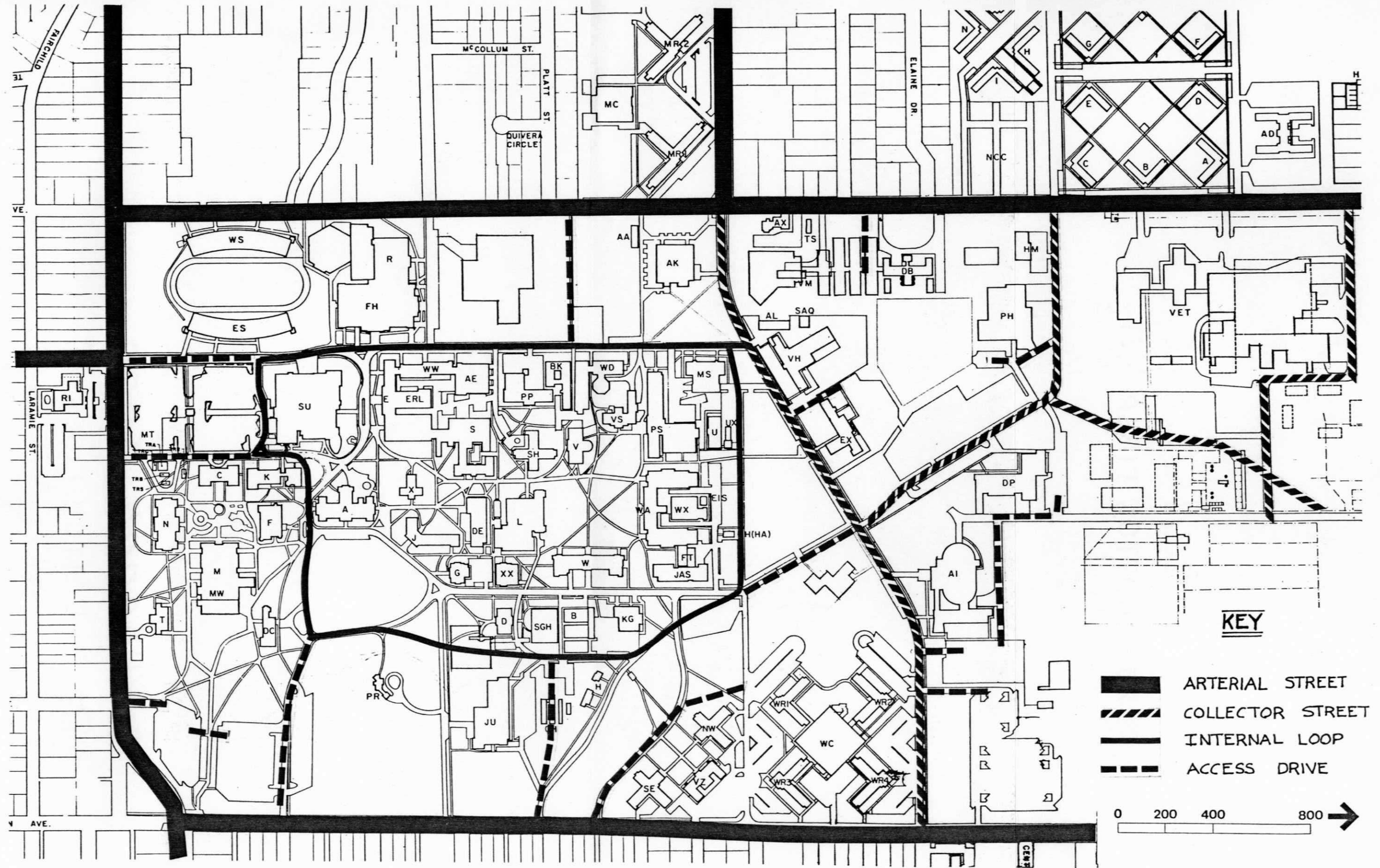
The Oblinger-Smith proposal consists of ten main points, of which the most important is the concept of developing an interior loop to encompass the core of the Main Campus. The purpose of this loop would be to route vehicular traffic around the Core Campus, while not letting any vehicles within the area bounded by the loop. Much of the inner loop consists of new streets, one of which was proposed to be located through the site of the new general classroom and office building (Education and Psychology). It was suggested that the area in which the greenhouses are located should be used to construct a parking structure. Also suggested was that the parking lots between the Derby Complex and the three older residence halls (Strong Complex) be relocated to the west of the Derby Complex, and green plaza areas be installed in the vacated areas. Since 1973, however, the new International Student Center has been built on part of the area west of the Derby Complex.

The proposal also states that existing inner core parking lots #14, #22, #42, and #45 should be completely removed along with the parking in front of Anderson and Eisenhower Halls. In this area an inconsistency is shown throughout the study. For example, it states that Lot #42 should be removed and then turns around and says in another section of the proposal that Lot #42 should have meters installed. Other parts of the proposal included installing additional parking behind Justin Hall, installing visual screens around existing parking lots, changing College Heights from a vehicular to a pedestrian/bicycle corridor, and developing a central street through the North Campus.

None of the "KSU Circulation Plan" has been implemented and, at this point, because of certain discrepancies pointed out, parts of it will never be implemented. Although many of the recommendations contained in the study are quite desirable, some parts of the plan such as the internal loop road, are physically and financially unreasonable for this campus. Since this plan has apparently been ignored by the campus planners and administration, it can be assumed that this proposal, taken by itself, is not adequate or feasible to solve the transportation problems facing the university. An outline of specific recommendations made in the "KSU Circulation Plan" is included in APPENDIX E.



Kansas State University Campus Map



Kansas State University Campus Map

FIGURE 4-2: OBLINGER-SMITH CIRCULATION PLAN

PLAN

5

CIRCULATION

Each of the three alternatives previously mentioned contain some interesting advantages as well as some serious disadvantages. By methods of optimization (minimizing disadvantages and maximizing advantages), a final recommended circulation plan is proposed. Elements of the three initial alternatives were combined into a traffic circulation concept which seeks to eliminate existing conflicts and deficiencies, and to further conform to the Policy Guidelines presented in this document.

The street classification and proposed layout are shown in Fig. 5-1. All general motor vehicle circulation on the Main Campus is confined to a series of loops which connect with adjacent city arterial or collector streets. Many existing streets are either eliminated or closed off to all but service and emergency vehicles. Three new sections of street are recommended. The plan is designed to accommodate the currently proposed bike routes with only minor changes of Class II to Class III on three short sections of street where one-way motor vehicle traffic is changed to two-way.¹² This occurs on Mid-Campus Drive between the Farrell Library loop access and Lover's Lane, on College Creek Drive between Manhattan Avenue and the access street to Lot #41 behind Justin Hall, and on the street between Lot #70 southwest of West Hall and Manhattan Avenue. Pedestrian routes should be upgraded as shown in Fig. 2-1, and many of the existing streets which are to be closed off could be repaved and landscaped as pedestrian areas. Fig. 5-2 shows the proposed general motor vehicle circulation within the context of the parking lots, campus buildings, and proposed future building sites.

A quantitative analysis is necessary to compare the final recommended plan with the three preliminary alternative circulation plans, and to document the relative desirability and feasibility of all four concepts. Following is a list of criteria considered most important as a basis for comparison.

- (A) **COST OF STREETS:** includes consideration of construction costs of new sections of streets, and the total amount of paving which must be maintained.
- (B) **ACCESS TO PARKING:** pertains to convenience and amount of access to Main Campus parking areas.
- (C) **ACCESS FOR HANDICAPPED:** considers convenience of access to special parking areas and drop-off zones close to all campus facilities.
- (D) **VISITOR PARKING AND ACCESS:** ease of identification and access to the major campus destination points (Union, McCain Auditorium, Anderson Hall, Farrell Library, etc.).
- (E) **SERVICE AND EMERGENCY ACCESS:** convenience of access to all facilities for service and emergency vehicles.
- (F) **PEDESTRIAN CONFLICTS:** considers pedestrian safety and amount of real or potential conflicts with general motor vehicle traffic.

- (G) COMPATIBILITY WITH BIKEWAYS: includes consideration of coordination with existing bikeway routes, and amount of changes required in traffic flow or bikeway classification.
- (H) INTERFERENCE WITH BUILDINGS: pertains to any possible conflicts with existing or proposed campus building projects.
- (I) ENFORCEMENT REQUIRED: includes the amount of manpower, vehicles, and equipment necessary to maintain proper traffic flow, and to patrol restricted areas and transition points.
- (J) AESTHETICS AND ENVIRONMENT: qualitative measure of impacts on factors of visual and environmental importance (landscaping, paving, drainage, etc.).

The four circulation concepts under consideration are: (#1) Leave the campus as it is now; (#2) Ban all auto circulation from the Main Campus; (#3) The "KSU Circulation Plan" by the Oblinger-Smith Corporation; and (#4) The final Recommended Plan. These alternative proposals are each rated in a matrix according to the ten given criteria. The ratings are based on a quantitative value scale of 0, 1, and 2, with "0" indicating the least desirable and "2" indicating the most desirable in terms of satisfaction of the criteria. In addition, each of the criteria is weighted with a factor of "1" (low importance) or "2" (high importance) which is multiplied by the given quantitative value (in parentheses) to arrive at a weighted value which more accurately reflects the relative importance of each of the criteria. The values of each column (alternative plan) are added to determine an overall rating. The highest rating, of course, indicates the most preferable vehicular circulation concept. According to the results of Table 5-1 below, the Recommended Plan (#4) is indeed the most advantageous, and the "KSU Circulation Plan" (#3) is the least desirable alternative.

TABLE 5-1: COMPARATIVE EVALUATION OF
VEHICULAR CIRCULATION CONCEPTS

CRITERIA/ALTERNATIVE		WEIGHT	#1	#2	#3	#4
(A)	Cost of Streets	2	(2) 4	(2) 4	(0) 0	(1) 2
(B)	Access to Parking	1	(2) 2	(1) 1	(2) 2	(2) 2
(C)	Access for Handicapped	1	(1) 1	(0) 0	(1) 1	(2) 2
(D)	Visitor Parking and Access	2	(0) 0	(0) 0	(1) 2	(2) 4
(E)	Service and Emergency Access	1	(2) 2	(0) 0	(0) 0	(2) 2
(F)	Pedestrian Conflicts	2	(0) 0	(2) 4	(1) 2	(2) 4
(G)	Compatibility with Bikeways	1	(2) 2	(2) 2	(0) 0	(1) 1
(H)	Interference with Buildings	1	(2) 2	(2) 2	(0) 0	(2) 2
(I)	Enforcement Required	1	(2) 2	(1) 1	(1) 1	(1) 1
(J)	Aesthetics and Environment	2	(0) 0	(2) 4	(1) 2	(2) 4
OVERALL RATING			15	18	10	24

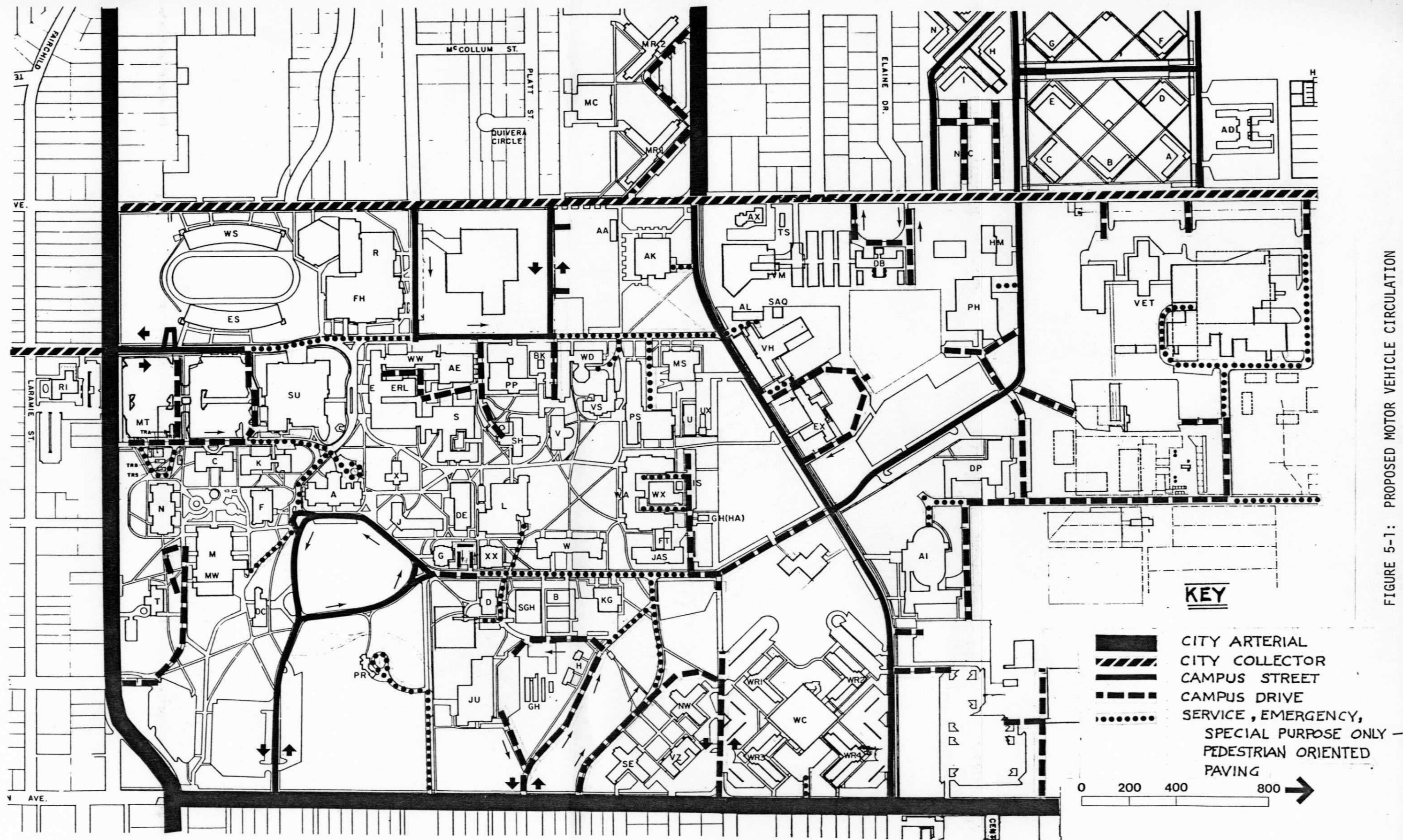
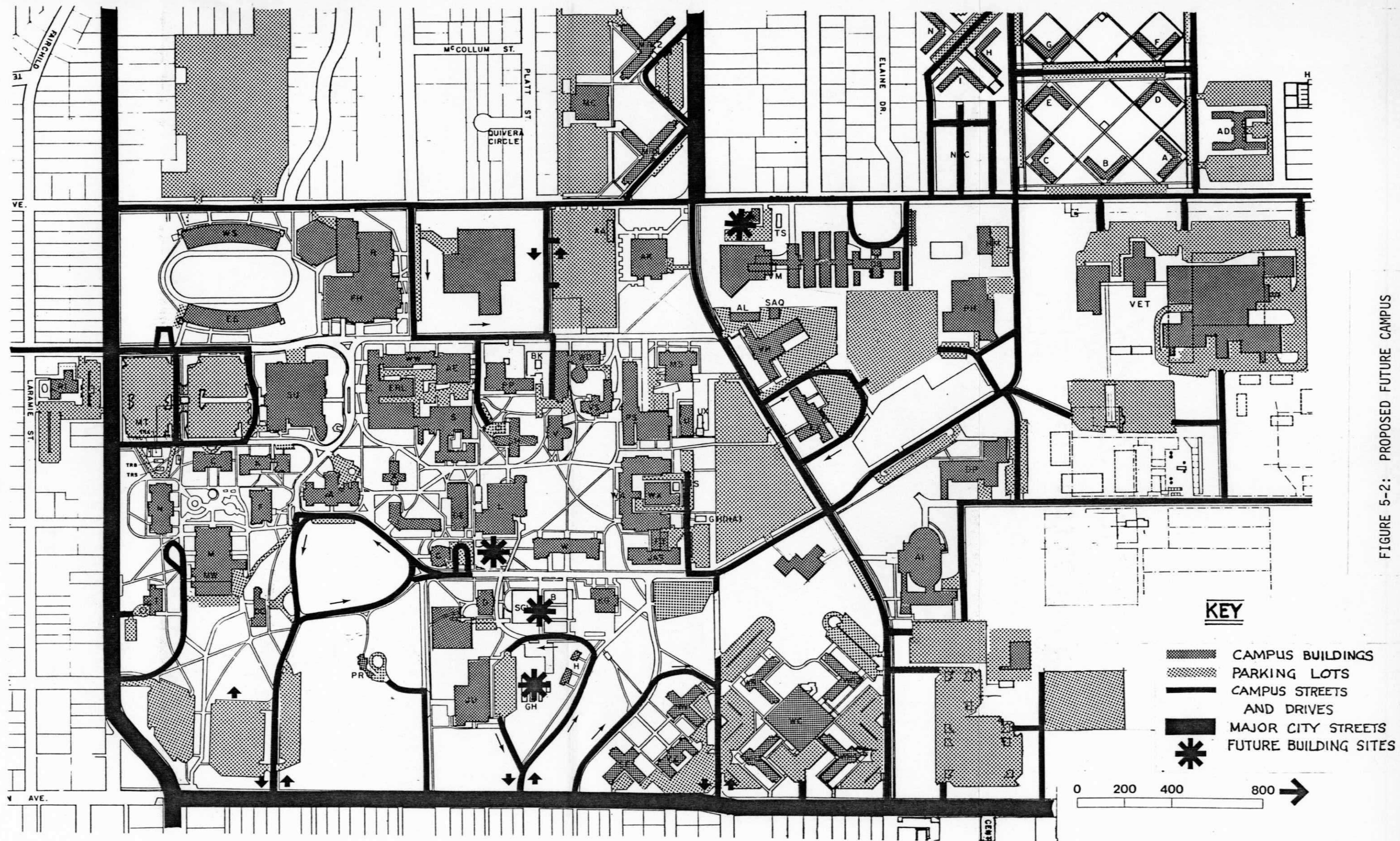


FIGURE 5-1: PROPOSED MOTOR VEHICLE CIRCULATION

Kansas State University Campus Map



Kansas State University Campus Map

FIGURE 5-2: PROPOSED FUTURE CAMPUS

PARKING

A few distinct changes are recommended in the allocation of parking stalls within the campus. The first is the elimination of some inner-core parking. The smaller a parking lot is, the less economical it is to maintain it. Most of the existing lots in the Core Campus are left only for service entrances, loading zones, and stalls for the handicapped. By not using these lots for the current predominant use of Faculty parking, their usage is reduced (traffic to and from), their required maintenance is less, and the aesthetic value of the campus is greatly increased.

A second obvious change is the increase in Handicapped and Visitor parking. Presently, there are fourteen stalls specifically designated for the handicapped throughout the campus. A new state law requiring one Handicapped stall per building has gone into effect. To meet this standard, 79 additional stalls for the handicapped are proposed for various locations throughout the entire campus. The existing inadequate and ill-placed Visitor parking has been moved and dispersed among several locations closer to the major destination points for visitors to the campus. Three of the largest concentrations of Visitor parking, of which the center isle of the north Union parking lot (#1) is the largest, will be metered. All other Visitor parking will merely be designated and enforced by signs and special permits. This plan represents a total increase of 28 additional stalls for visitors to the campus.

Faculty/Staff parking has been reduced by 443 stalls, Student Only parking has been increased by 332 stalls, and Student/Faculty/Staff is proposed to increase by 308 stalls as itemized in APPENDIX B. To ease the storage parking problem for residents of on-campus housing a new 192 stall parking lot (#69T) was recently constructed north of the existing Lot #69. Also, another 400 stall lot to be classified as General (any permanent registration ID or permit) is proposed for the area east of the old dairy barns. The new distribution and classification of parking lots is graphically illustrated in Fig. 5-3.

Presently, the campus is divided into zones requiring those with Faculty/Staff permits to park only in the zone specified by a colored/lettered window sticker. This color-coded zoning system was created approximately 11 years ago with the aid of a computer. The main reason for instituting the zoning was to discourage students whose parents were employed as faculty or staff from driving their parents' cars from class to class.¹³ This is no longer seen as a problem due to the proposed rerouting of campus traffic circulation, so it is recommended that the colored parking zone system be discontinued, thus simplifying parking permit allocation and enforcement procedures. Another recommendation which would simply be a matter of administrative adjustment is that the present system of numbering parking lots be reviewed and completely re-vamped to show a more logical way of identifying the location of any particular lot. The present system is meaningless to anyone who is not already familiar with the campus.

Further, it is recommended that all existing parking permit fees be doubled, except for the handicapped, and that long-term visitors be required to buy at a minimal cost a special dated permit which allows them to park in any Student/Faculty/Staff or General lot. As noted previously, separate parking areas are to be provided for short-term visitors, and Handicapped parking will be enforced by a special permit system.

Freshmen students living off-campus should be allowed to purchase regular parking permits. Since freshmen enrollment is expected to decline over the next ten years, and since most freshmen reside in dormitories already on campus or in nearby organized living groups, it is not expected that this change will add an excessive burden to the campus parking facilities once this entire plan is implemented. The proposed overall increase of 207 stalls requiring paid permits, and increased use of currently under-utilized lots of Lot #2 (West Stadium), should help alleviate the "shortages" which force many students to park on city streets adjacent to the campus.

The current "Off-Hour Parking" rule should remain in effect. That regulation states that during the hours from 3:30 p.m. to 7:00 a.m., or at any time regularly scheduled classes are not in session, students, faculty, staff, and visitors may park in any campus parking lot or time zone with the exception of reserved stalls and other restricted areas (loading zones, state vehicle, handicapped stalls, etc.).

Although these recommended changes represent a net increase of only 109 in the total number of parking spaces on campus, the redistribution and reclassifications to be implemented should increase the overall flexibility, equitability, and efficiency in the use of campus parking lots at Kansas State University.

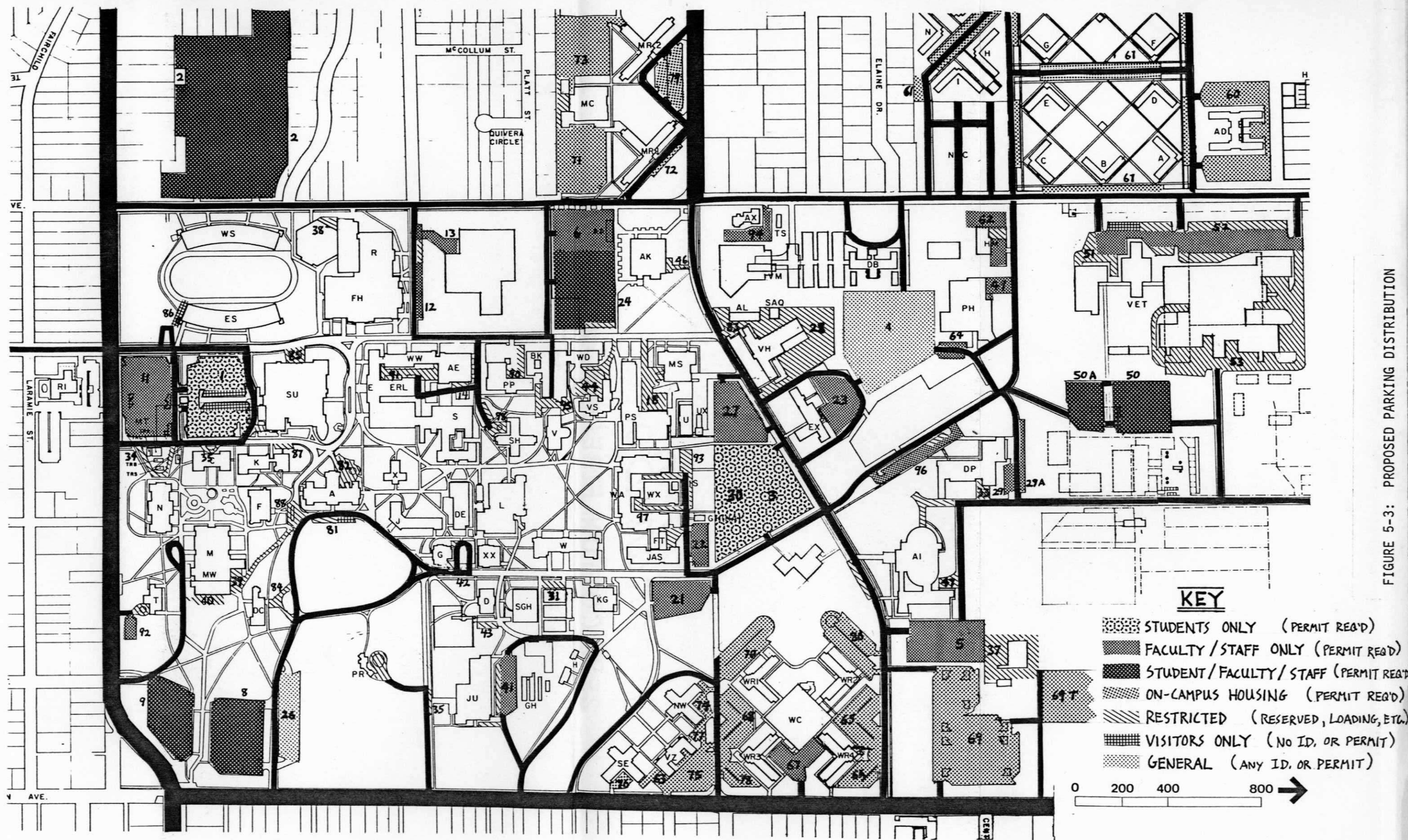


FIGURE 5-3: PROPOSED PARKING DISTRIBUTION

MODAL ALTERNATIVES

Thus far, this document has been primarily concerned with the pedestrian, bicycle, and auto traffic systems within the KSU campus. However, there are other modes of transportation which could be more consistent with the goals of this plan, and which, with increased use, may help alleviate many of the problems inherent in the traditional modes of transportation to and from, and within the campus.

As is evidenced by the data in APPENDIX A, mass transit systems have been successfully implemented at many colleges and universities around the country. Perhaps a workable mass transit system could be initiated at KSU. As of September 1978, the Kansas Board of Regents approved K-State's participation in a \$25,000 mass transit system feasibility study to begin soon in Manhattan. Under the proposed plan, K-State will pay the city of Manhattan \$2,500 from the parking fees fund, the City will pay \$2,500, and the remainder will be funded by a \$20,000 federal grant through the Kansas Department of Transportation and the Urban Mass Transit Authority.

Compared to many campuses of similar enrollment, the KSU campus layout--buildings, on-campus housing, parking lots, etc.--is relatively compact, therefore reducing the need for an intra-campus mass transit route. However, there may be some valid support for additional transit routes linking the campus with major off-campus destinations, particularly residential areas housing high concentrations of university faculty and students. Bus routes could be established to run on a continuous basis during peak class times, i.e. 8:00 a.m. to 5:00 p.m. There would be little or no need for the service in the evenings or on weekends except for special events.

Implementation of such a service would provide an alternative for many people who commute daily to the campus by private auto. That, in effect, would lessen the need for additional parking space on campus. Elimination of parking hassles by riding the bus might outweigh some peoples' preference for the privacy and convenience of driving their own vehicles. Also, people who would regularly use the mass transit services would have no need for purchasing a parking permit for their car.

A mass transit system could be financed by a variety of methods, many of which are listed in APPENDIX A. In any case, the suggested bus service should be a cooperative venture between the university and the City of Manhattan since it would serve both entities. The proposed mass transit study for Manhattan, with the involvement of KSU, is definitely a step in the right direction.

An increasingly popular mode of transportation is the "moped," which is a motorized bicycle that can be pedaled or engine powered. Legally it is considered more bicycle than motorcycle. This, plus other forms of innovative pedal and electric personal vehicles, may become a dominant influence in the design and location of campus transportation facilities

within the next 10-20 years. At this time, however, it is extremely difficult to predict the specific impacts that these vehicles will have on existing and planned campus circulation and parking.

Because mopeds are relatively light-weight compared to motorcycles, and therefore are susceptible to the same security problems as bicycles, they should be permitted to be parked and locked in bicycle racks as well as in existing motorcycle parking areas as is the current policy. If necessary, more bicycle racks could be added to accommodate the mopeds. The same rules of operation which apply to bicycles (or motorcycles in the case of mopeds under engine power) should apply to mopeds. They must follow the same rules as autos when the engine is in operation, they may use the bikeways if they are being pedaled, and they must be walked instead of ridden when on a campus sidewalk.

If other small, fuel-efficient, 3 or 4 wheel personal vehicles gain popularity and acceptance to the point where they substantially replace the existing use of automobiles for commuting to campus, a proportional amount of parking space previously designed for the current concept of the automobile could be redesigned to more efficiently accommodate the smaller vehicles. As is the current policy, all vehicles used on campus should be registered with the Security and Traffic Office, and anything larger than a moped should be required to have a paid permit for all parking areas other than those classified as "General."

CAMPUS INFORMATION SYSTEM

Along with the new circulation plan there develops the need for a clear and concise way to inform visitors to our campus where they are and how they can get to where they would like to be. The logical solution to this problem would involve a graphically consistent "campus information system."

The goal of the new circulation plan is to change the campus from a primarily vehicle orientation into a bicycle/pedestrian orientation. This involves closing many of the campus streets to through traffic. As a result, the unsuspecting visitor may find it somewhat frustrating to get from wherever they may be to wherever they may want to be. As the campus is presently--some buildings labeled, no street signs, confusing parking lot identification, etc.--a person can drive through the campus and eventually stumble upon the parking lot or building for which he was aiming. This random searching, however, is an unnecessary addition to the vehicular traffic confusion. It is assumed that a majority of visitors would know the name of their destination--a building or parking lot--when arriving on campus.

On the basis of the above assumptions, it is proposed that a number of sheltered visitor information kiosks be constructed. These facilities would consist of an area in which a visitor can pull out of the main flow of traffic and, without leaving his car, get the pertinent information needed from a carefully displayed campus map. The locations of these four pull-off areas, along with other components of the proposed campus information system, are shown in Fig. 5-4. A major visitor information "loop" is proposed to be constructed in the area near the southeast corner of the old football stadium with access from 17th Street. A suggested layout is illustrated in Fig. 5-5. All four of the information kiosks are to be located adjacent to city arterial streets and will have flags or other attention getting devices to alert visitors to the availability of the facilities.

To complement the visitor information kiosks, it is proposed that there be added a series of campus information signs to be placed at every entrance or loop into the campus. The function of these signs should be to inform the driver about: (a) the name of the street or loop; (b) those parking lots to which that drive has access, and what kind of permit is required for each lot; and (c) the speed limit on campus, and a friendly reminder that the pedestrian has the right-of-way. These signs could be very attractive if carefully designed, and of course would preferably be of a consistent format throughout the campus. A third category of signs would be located at all access points to each parking lot. These signs should identify the lot and its permitted use via appropriate graphic symbols.

By using the proposed system of campus information facilities, visitors to the campus can determine exactly what they need to know to proceed directly to their destination, thus minimizing much of the usual driving around to "find" the right place. These graphic information facilities, which should be financed by surplus parking meter revenue plus an allocation from the increase in parking permit fees, should provide a systematic increase in safety and convenience for all pedestrians and vehicle drivers. The specific design of all signs and graphic structures must be coordinated and implemented by the Campus Planning Office.

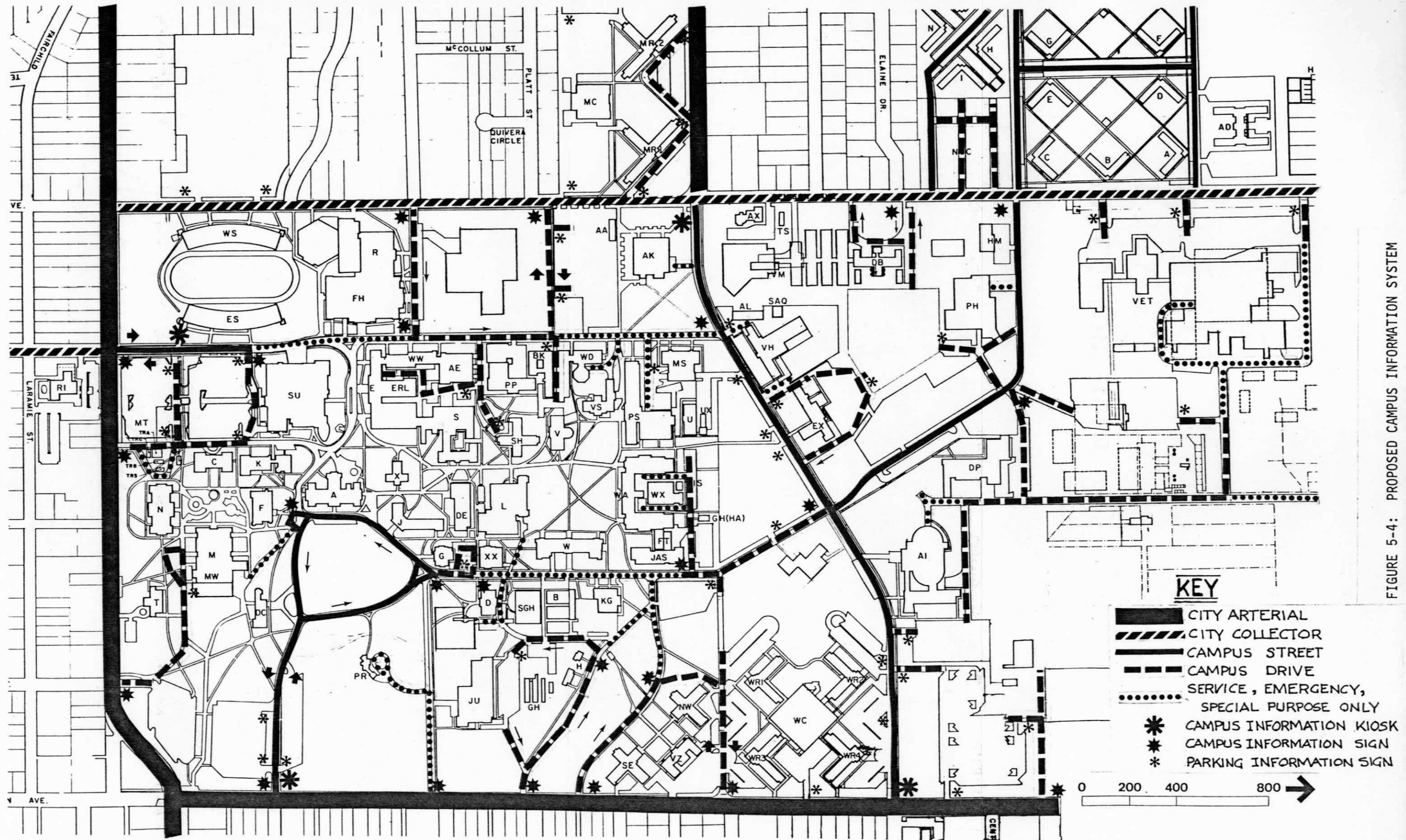


FIGURE 5-4: PROPOSED CAMPUS INFORMATION SYSTEM

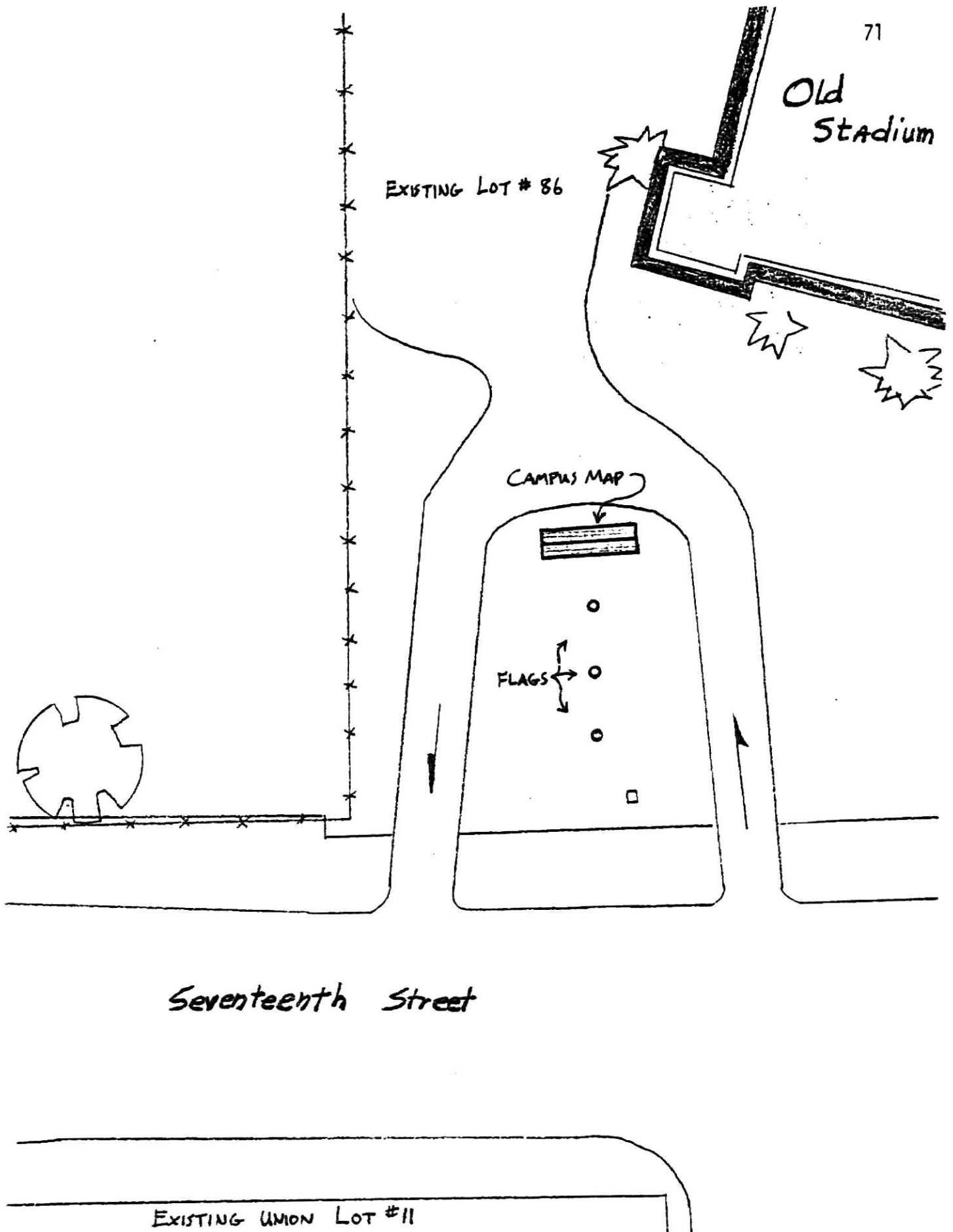


FIGURE 5-5: PROPOSED VISITOR INFORMATION KIOSK

IMPLEMENTATION

The KSU TRANSPORTATION PLAN, as proposed in this document, should serve as a reference for all future decisions involving new developments in the physical and policy aspects of the transportation facilities and services at Kansas State University. In order for this or any other similar document to be truly effective, there should be an obligation on the part of the university administrators and planners to follow a specified set of guidelines within which there remains ample flexibility to adjust for unanticipated or extraordinary circumstances that warrant special consideration.

Although the "KSU Circulation Plan" by Oblinger-Smith was a professionally conducted study intended to be used as an actual guide for campus planning, it has already been shown that that effort has largely been ignored by university officials. Perhaps that was partially due to the fact that there was apparently no formal commitment on the part of the University to move towards its implementation so, therefore, the Oblinger-Smith study ended up on the shelf to collect dust. To prevent a similar fate for this plan, it must be formally approved and adopted as a working guide for planning and implementation of the campus transportation facilities.

Top priority should be given to strict adherence to the policy guidelines contained herein, and any variance from implementation of the specific recommendations for physical improvements should be carefully studied and justified with respect to potential impacts on other items listed in this plan. It is suggested that this document be used as a working model to be studied and modified as necessary by campus planners, and then the amended version should be officially endorsed by the Traffic and Parking Council, the Long Range Planning Committee, and Kansas Board of Regents as an official part of an overall plan for the future development of the K-State campus.

Implementation of the KSU TRANSPORTATION PLAN is phased over the ten year period covered by the scope of this study. The various physical improvements recommended in the plan are grouped into three different time periods according to their priority of need and cost. Phase One covers a time period of 1-2 years. These short-range projects are either already planned by the University or have a high priority and can feasibly be implemented within the next couple of years. It is recommended that the items in Phase Two be accomplished within 3-5 years. These are major projects of medium or high priority which require extra time for planning and funding. Phase Three, covering a period of 6-10 years, involves low priority or costly improvements and projects which cannot be begun until after completion of Phase Two. Following is the recommended sequence of project scheduling to implement this plan. Refer to Fig. 5-3 for parking lot location and identification.

Phase One (1-2 years)

- 1A Permanently close the street between Seaton Hall and the Student Union. Repave and landscape the area as a major pedestrian mall with provisions made for the bikeway route.

- 1B Remove the old art annex building and physical plant equipment storage area from Ackert Hall parking lot (#6 and #24). Move Physical Plant construction vehicles to the area behind Dykstra, and remove all fencing around the existing storage lot adjacent to Lot #24. Also, close the east exit onto 17th Street and remove unnecessary sign posts.
- 1C Construct a pull-off loading zone lane on Denison Avenue along the west side of Ahearn gym and natatorium.
- 1D On specific dates, temporarily restrict one isle of parking in the north Union lot (#1) for paid visitor parking to be enforced by attendant and temporary signs. If it is determined there is sufficient demand and visitors are willing to pay to park in a specified area, install 34 parking meters along both sides of the center concrete walkway in Lot #1. All meter income not needed to pay for initial installation costs and long-term maintenance should be used to help finance the proposed campus information facilities.
- 1E Construct McCain Auditorium access drive and loop, including all landscaping and pedestrian walk relocation. Build a wheelchair ramp from sidewalk up to south lobby entrance level of auditorium. Also, if feasible, construct a small parking lot (#40) along east wall of the music wing of the auditorium as shown in Fig. 2-8. Extensive earth berming and foliage plantings around this lot are mandatory requirements.
- 1F Eliminate all parking in Farrell Library parking lot (#42) except on the north side which is to be allocated for visitor and handicapped parking only. Reconstruct the access loop with separate entrance and exit. Landscape the area inside the loop and provide for service access and loading zones along the south side of the loop next to Holton Hall.
- 1G Except for service/emergency access and bikeway route, close off Mid-Campus Drive from Library loop (1F above) to the access drive behind Waters Hall. Direct traffic from Petticoat Lane to College Creek Drive, thus forming a temporary, counter-clockwise one-way loop from Manhattan Avenue.
- 1H Except for service/emergency access and bikeway route, close Mid-Campus Drive from north Union parking lot (#1) entrance to intersection with Vattier Drive at southeast corner of Anderson Hall. Redesign this intersection to form a triangular drop-off loop between Fairchild and Anderson Halls. Redirect one-way traffic counter-clockwise around large loop in front of Anderson Hall.
- 1J Eliminate all parking from Lot #15 (Physical Plant) and replace with landscaping or service area only.
- 1K If Lot #69T is found to be successfully serving its intended purpose, it should be paved as a permanent lot, and a separate access drive should be constructed eastward to North Manhattan Avenue. If the lot is obviously under-utilized, it should be totally eliminated.

- 1L Install appropriate campus information, traffic control, and identification signs upon completion of each item listed.

Phase Two (3-5 years)

- 2A Resurface and restripe West Stadium parking lot (#2) as shown in Fig. 3-3 and Fig. 3-4.
- 2B Eliminate all parking on the east side of Lot #14 and construct a major pedestrian route along the east side of the access drive to the east basement door behind the center wing of Seaton Hall, and landscape appropriately.
- 2C Remove fence and construct an access road along the south side of Ackert Hall parking lot (#6 and #24). The road will connect Denison Avenue and 17th Street, and will have a minimum of two entrance/exits from Lot #6 and Lot #24. It will be two-way from Denison to the furthest east parking lot entrance/exit, and one-way west from 17th Street to the parking lot entrance.
- 2D Remove the multiple entrance/exits to Lot #6 along Denison and replace with continuous curb and sidewalk.
- 2E Resurface Lots #6 and #24 with asphalt and install concrete curbing, including a divider between the two lots. Construct earth berms and appropriate plantings along the west, south, and east sides. Also, construct a wheel chair ramp on the north side of Lot #24 near the existing steps to the sidewalk along the south side of Ackert Hall.
- 2F Except for service/emergency/special purpose traffic, close 17th Street from the north Union parking lot (#1) to College Heights Road, and from the new street along the south side of Lots #6 and #24 (2C above) to Claflin. These sections should be repaved and landscaped as major pedestrian corridors with provisions made for the bikeway routes. College Heights Road from Denison to 17th Street will be one-way east, and 17th Street from College Heights Road to the new street along Lots #6 and #24 will be one-way north. Therefore, a counter-clockwise loop will be formed around the site of Durland Hall and its future additions. The south side of College Heights in front of Ahearn will be reserved for automobile and bus loading.
- 2G Completely remove all vehicular traffic on Lover's Lane from the intersection of Oak Drive and Mid-Campus Drive to the President's driveway. This section of street should be replaced with a major pedestrian corridor from the Core Campus to Justin Hall. Also eliminate Lot #35. The remainder of the existing Lover's Lane from the President's driveway to Manhattan Avenue should be open only for vehicles having business at the President's residence.
- 2H Upon completion of the new Plant Science building (Throckmorton Hall), construct a new 400-stall parking lot (#4) east of the old Dairy Barn. The construction should include asphalt paving, concrete curbing, and earth berming around the perimeter with appropriate plantings. Eliminate Lot #99. Access to Lot #4 will be through Lot #23 on the south-east, Lot #64 on the north, and a new drive around the north end of the Dairy Barn to connect with Denison Avenue on the west.

- 2I Completely remove the existing Lot #7, and replace with landscaped green-belt along the creek.
- 2J Eliminate all parking in Lots #17, #20, and #25. These areas should become landscaped green spaces. A major east-west pedestrian path should be constructed through the site of existing Lot #20. Also, Lots #18, #44, #90, and #91 should be limited to service and special purpose parking only.
- 2K Install public information kiosks at four major entrances to campus as shown in Fig. 5-4 and Fig. 5-5.
- 2L Install appropriate campus information, traffic control, and identification signs upon completion of each item listed.

Phase Three (6-10 years)

- 3A Install concrete curbing and sidewalks in West Stadium lot (#2). Also, construct a concrete drainage culvert along the north side, and install earth berms around the site with planted landscaping throughout.
- 3B Remove the section of street between the entrances to Lot #70 and Lot #21, and replace with a major pedestrian mall. Eliminate the south entrance/exit of Lot #21. Therefore, the north entrance will be the only entrance/exit, and access to Mid-Campus Drive will become two-way. Construct earth berms around Lot #21 and landscape as appropriate.
- 3C Construct a curved connecting road between College Creek Drive and the street running along the east side of the existing greenhouses to provide a more gradual transition than currently exists at that intersection.
- 3D Construct a new section of street west of Boyd Hall connecting Petticoat Lane to the west end of the street near Lot #70.
- 3E Except for service/emergency access, the western section of Petticoat Lane from the new road west of Boyd Hall (3D above) to Mid-Campus Drive, and the western section of College Creek Drive from the new connecting road (3C above) to Petticoat Lane, are to be closed to all vehicular traffic. They may remain for pedestrian and bicycle traffic. Thus, two circulation loops are formed, both starting and ending on Manhattan Avenue. The loop starting at Campus Creek Drive to the south of the existing greenhouses and through Lot #41 back to College Creek Drive, is one-way counter-clockwise. The other loop is one-way clockwise, and runs from Petticoat Lane to the street (which is to be two-way) between the Strong and Derby residence hall complexes, and back to Manhattan Avenue.
- 3F If university enrollment and number of events involving large crowds or out-of-town visitors increase substantially, if the current parking facilities are definitely inadequate, and if it is financially feasible, a parking garage should be considered for construction at

the site of the south Union parking lot (#11) as illustrated in Fig. 3-2. If it is built, the parking meters should be removed from the center walkway of Lot #1.

- 3G Install appropriate campus information, traffic control, and identification signs upon completion of each item listed.

APPENDIX A: CAMPUS TRANSIT SYSTEMS AT U.S. UNIVERSITIES

<u>Campus</u>	<u>Description of Service</u>	<u>Costs, Methods of Funding</u>
UNIV. OF CHICAGO	Campus contracts with private contractor for service. Only available to University personnel. Service is to provide safety, feeder from transit and access to remote University housing. 7 - 48 passenger buses operating during day. 3 - 24 passenger buses operate from 8 PM - 1 AM. Patronage, 1974-75 fiscal year, 280,000 days and 163,000 evenings. Headway - 30 min. to 1 hr.	Evening service is free. Day service - 20c or 30c. All fares must be prepaid. Annual costs \$135,800. Fare income, \$62,700.
UNIV. OF CONNECTICUT	University operated bus service from fringe parking. 5.2 mile route. 6 buses from 7:30 AM to 5:00 PM on 8 minute headways. 2 buses from 5:00 PM to 10:30 PM. Totally student operated. (students are only assigned parking in fringe lots)	Annual cost \$100,000/yr. financed from student fees.
CORNELL UNIVERSITY	University sponsors two bus systems. The University bus system has 14 buses on 4 routes serving fringe parking, 1/2 mile from campus, student housing 1/4 to 1 mile from campus. On 5 - 15 minute headways. Service was initiated primarily to serve fringe parking. 3 million riders annually. Experimental bus system. Serves primarily apartment residential areas in adjacent communities.	General bus system supported by general funds. Annual cost \$293,000. Service is free. (are considering going to paid pass system) 33% of riders originate in parking areas. Annual cost of experimental system is \$24,000. University pays \$8,000. Peak hour service only. 25c fare is paid by apartment owners in some cases.
CABRILLO COLLEGE	Special service to campus by transit district. University pays for service based on ridership.	Student fees provide for either bus pass or parking permit. 5c fee levied per semester.
DUKE UNIVERSITY	University subsidizes local public transit company to operate buses on campus. Campus is in two parts, 1 1/2 miles apart. Buses reduce vehicle movements and provide access. 9 buses, 7 days a week, 7 AM to 1 AM on 10 - 20 minute headways.	University general funds pay transit company \$185,000 annually. All University personnel ride free.
UNIV. OF GEORGIA	18 buses, University owned system operating on 8 routes, 5 days a week from 7 AM to 6 PM. 4 million annual riders, primarily students.	Funded by \$4.50/quarter student fee and faculty staff parking fees and fines. Annual budget is \$350,000.
GEORGETOWN UNIVERSITY	University operated system with student drivers. 4 buses from 8 AM to Midnight. Several routes through student residential areas.	25c fee covers costs.
UNIV. OF INDIANA	University operates 21 buses on 5 routes 7 days a week from 7 AM to 11:45 PM. 1,740,000 annual riders, faculty, staff and students.	\$45/yr. to faculty, staff and students. \$10 semester evenings and weekends. General funds cover deficit.
KENT STATE	34 buses owned and operated by University. 3 routes, 7 days a week service. 3,000,000 riders annually, primarily students. Also operate dial a bus for handicapped and elderly.	\$500,000 annual cost. System is self-supporting through fees. Students, mandatory \$10/quarter. Faculty and staff without parking permit, \$7.50/quarter. 17,000 student passes, 780 staff passes yearly.
UNIV. OF MASSACHUSETTS AMHERST	Free system serving campus living areas, parking at fringe. 16 buses, 13,000 passengers a day. Service was coupled with plans to limit traffic growth, parking, increased parking charges. 6 on-campus routes, 7 routes to surrounding areas. 10 - 20 minute headways, 8:30 AM to 11:30 PM.	Annual cost \$387,000. Funded 40% parking fees, 15% student senate, 11% parking meters and 14% state funds.
MICHIGAN STATE	19 University operated buses on 12 routes 7 AM to 11 PM. More than 5 million riders annually, primarily students. Serve residential areas, parking areas.	Fees cover all costs. Non-commuting staff, faculty and Students - \$18/term. Commuters - \$11/term.
UNIV. OF MINNESOTA	Contracts for service on 4 routes, 7 AM to 6 PM, serve outlying parking. 140,000 riders annually, primarily students. Free service from parking areas or those paying for parking.	Charged \$12/quarter to faculty, staff and students. 25c to visitors. Additional \$15,000 from parking income and fines.
UNIV. OF MICHIGAN	Bus system owned, operated and maintained by University personnel. Operates 36 buses on 7 routes. Round trip lengths vary from 4.2 - 10.9 miles. Headway at peak, 10 minutes. 7 day service. Serves peripheral parking and dispersed campus facilities.	Service is free. Funded entirely from general funds.

<u>Campus</u>	<u>Description of Service</u>	<u>Costs, Methods of Funding</u>
UNIV. OF NEW MEXICO	Free shuttle bus from fringe parking areas (there are 4,000 parking spaces on central campus, 3,000 free spaces in fringe lots). 2-46 passenger buses, union drivers. Operates Monday - Friday, 7:00 AM - 1:00 PM and 3:00 - 6:15 PM. 10-15 minute headways. Route is 2 miles round trip.	\$34,000 annual cost funded with parking revenue.
UNIV. OF NORTH CAROLINA	University and City cooperated in the establishment of municipal transit system which provides good service to campus from residential areas and downtown. 8 routes, 5 - 20 minute peak headways.	\$330,000 worth of bus passes provide basic financial support to public transit. University sells passes to campus community, provides free pass to parking permittees. Parking fees were raised from \$10 to \$72 annually to raise funds to purchase passes. City uses revenue sharing funds for their share of costs.
UNIV. OF OREGON	Public Transit agency has discount on tokens for students.	ASUO had one year experiment in additional transit subsidy. Dropped as too expensive.
UNIV. OF PENNSYLVANIA	University provides free evening van service from 5:00 PM to 1:30 AM between campus and residential areas 4 - 8 blocks away. 1/2 hour headways, 7 days a week. Service is primarily for personal safety.	Annual cost of \$25,000 from general funds.
PENN STATE	Campus operates 7 buses for internal campus circulation on 4 routes, 7:30 AM - 12:30 PM. 430,000 riders annually, primarily students.	\$7/terms - faculty, staff and students. Annual deficit - \$70,000 - general funds.
UNIV. OF OKLAHOMA	University operates 4 trams, each is two open trailers pulled by a truck, serve student housing, student parking lots. Annual student ridership is 300,000 - 600,000 a year.	
UNIV. OF TEXAS	Service developed to alleviate traffic and parking problems on and around campus. Designed primarily to serve residential areas with high concentration of students. 51 buses operated by private contractor on bid basis. System has limited franchise from City of Austin. May only carry University personnel. Service operates Monday - Friday, 4 - 6 minute headways on routes with round trips of 2.7 to 9.1 miles. 7 routes serve residential areas, 2 routes circle campus. 40% of students use bus as primary mode.	Total cost for 74-75 was \$784,000. Serves 35,000 a day at rider cost to University of 12c. System financed through mandatory student fee of \$8/semester. Faculty and staff may buy semester pass for \$8.
YALE UNIVERSITY	Shuttle bus operated from fringe student parking garage from 7:30 AM to Midnight.	
UNIV. OF WISCONSIN	10 buses on 3 routes 7 day week service from 6:00 AM to 1:00 AM. 1,400,000 riders annually, faculty, staff, and students. Serves fringe parking.	Contract with city of Madison at \$1.02 vehicle mile funded through fares - \$5/mo. or \$50/yr. for all users. Visitors - 15c. 18,000 annual passes sold.
UNIV. OF VIRGINIA	University operates 16 buses on 3 routes from 6:00 AM to Midnight. 1,400,000 riders annually, students, faculty and staff.	Operating budget is \$1.5 million. Faculty and staff with parking permit free. Students free. Faculty and staff without parking permit, \$1.50/mo.

APPENDIX B: PARKING SPACE ALLOCATION

Below is a summary of the proposed changes in the allocation of parking spaces on the KSU campus. The breakdown of parking spaces by permitted use and lot number is detailed in the tables which follow.

TABLE 6-1: PARKING SPACE ALLOCATION SUMMARY

<u>Permitted Use</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
Student only	241	573	+332
Faculty/Staff only	1780	1337	-443
Student/Faculty/Staff	1345	1653	+308
On-Campus Housing	2309	2279	-30
Restricted	718	679	-39
Visitors only	35	63	+28
Handicapped only	14	93	+79
General	<u>698</u>	<u>572</u>	<u>-126</u>
TOTAL	7140	7249	+109

It is believed that the proposed re-allocation of spaces provides a more equitable and flexible system of use without greatly increasing the total amount of land devoted to parking lots. There should be little difficulty implementing these changes since the current parking lot classification is retained with only minor modifications. It should be noted that the decrease in On-Campus Housing parking space, along with decreases in some other categories listed above, is due to the re-allocation of some spaces for Handicapped only. The relocation of 400 General parking spaces to a new lot (#4) near the old dairy barn will greatly increase the convenience of storage parking for those on-campus residents who are unable to obtain a paid parking permit for the regular On-Campus Housing lots.

TABLE 6-2: STUDENT ONLY PARKING
(paid permit required)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
1	241	203	-36
3	0	170	+170
30	<u>0</u>	<u>200</u>	<u>+200</u>
TOTAL	241	573	+332

TABLE 6-3: FACULTY/STAFF ONLY PARKING
(paid permit required)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
2	87	0	-87
5	0	138	+138
6	0	162	+162
11	173	173	0
12	36	33	-3
13	26	25	-1
14	31	0	-31
15	9	-	-9
17	17	-	-17
20	39	-	-39
21	81	79	-2
22	30	28	-2
23	110	109	-1
24	236	0	-236
25	17	-	-17
26	25	0	-25
27	114	113	-1
28	41	0	-41
29	13	13	0
29A	0	83	+83
30	200	0	-200
31	4	0	-4
33	6	0	-6
41	36	35	-1
42	39	0	-39
43	9	0	-9
44	3	0	-3
45	2	0	-2
49	12	10	-2
51	14	14	0
52	150	150	0
62	45	41	-4
64	22	20	-2
67	60	60	0
86	10	0	-10
91	3	0	-3
92	7	7	0
94	28	27	-1
96	19	16	-3
98	1	1	0
99	25	-	-25
TOTAL	1780	1337	-443

TABLE 6-4: STUDENT/FACULTY/STAFF PARKING
(paid permit required)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
2	155	843	+688
3	170	0	-170
5	143	0	-143
6	160	0	-160
7	171	-	-171
8	170	170	0
9	130	130	0
24	0	264	+264
26	0	48	+48
50	161	161	0
50A	<u>85</u>	<u>85</u>	<u>0</u>
TOTAL	1345	1701	+356

TABLE 6-5: ON-CAMPUS HOUSING PARKING
(paid permit required)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
60	151	151	0
61	927	903	-24
65	60	58	-2
66	21	21	0
68	63	62	-1
69	397	397	0
69T	192	192	0
70	61	61	0
71	123	122	-1
72	20	20	0
73	135	134	-1
75	40	40	0
78	19	18	-1
79	68	68	0
80	<u>32</u>	<u>32</u>	<u>0</u>
TOTAL	2309	2279	-30

TABLE 6-6: GENERAL PARKING
(any permanent registration ID or permit)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
2	491	0	-491
4	-	400	+400
26	0	48	+48
29A	83	0	-83
100	<u>124</u>	<u>124</u>	<u>0</u>
TOTAL	698	572	-126

TABLE 6-7: RESTRICTED PARKING
(reserved, client, loading, state vehicle)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
1	8	8	0
5	4	4	0
6	1	1	0
9	2	2	0
11	4	4	0
12	11	10	-1
13	3	3	0
14	13	8	-5
17	4	-	-4
18	7	5	-2
20	4	-	-4
24	11	11	0
25	1	-	-1
28	10	51	+41
31	10	6	-4
32	3	3	0
33	0	5	+5
34	9	9	0
35	6	-	-6
36	3	2	-1
37	10	10	0
38	1	1	0
39	4	4	0
40	-	8	+8
41	12	12	0
42	12	4	-8
43	7	8	+1
44	7	5	-2
45	9	7	-2
46	2	2	0
47	4	4	0
48	26	-	-26
49	0	2	+2
51	12	12	0
52	41	41	0
53	17	17	0
62	1	5	+4
63	7	6	-1
64	12	12	0
65	23	23	0
66	8	8	0
68	14	14	0
70	11	11	0
71	42	42	0
72	18	18	0
73	12	12	0
74	9	9	0
75	19	19	0
76	8	8	0

TABLE 6-7: RESTRICTED PARKING
(continued)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
77	6	4	-2
79	36	36	0
80	16	16	0
81	27	21	-6
82	12	4	-8
83	9	8	-1
84	3	2	-1
85	12	12	0
86	6	2	-4
87	8	7	-1
88	4	4	0
89	6	6	0
90	20	20	0
91	6	4	-2
92	6	5	-1
93	34	32	-2
94	2	2	0
95	15	14	-1
96	5	5	0
97	8	6	-2
98	<u>15</u>	<u>13</u>	<u>-2</u>
TOTAL	718	679	-39

TABLE 6-8: VISITOR ONLY PARKING
(no permanent registration ID or permit)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
1	0	34	+34
5	0	3	+3
12	0	1	+1
22	-	1	+1
26	23	0	-23
40	-	2	+2
51	10	10	0
64	0	1	+1
81	0	4	+4
86	0	3	+3
94	2	2	0
96	<u>0</u>	<u>2</u>	<u>+2</u>
TOTAL	35	63	+28

TABLE 6-9: HANDICAPPED ONLY PARKING
(special permit)

<u>Lot Number</u>	<u>Existing</u>	<u>Proposed</u>	<u>Change</u>
1	2	4	+2
2	-	4	+4
5	-	2	+2
12	1	3	+2
13	-	1	+1
14	-	1	+1
18	-	2	+2
21	-	2	+2
22	-	1	+1
23	-	1	+1
24	-	2	+2
27	-	1	+1
33	-	1	+1
36	-	1	+1
40	-	2	+2
41	1	1	0
42	2	6	+4
45	-	4	+4
52	3	3	0
61	-	24	+24
63	-	1	+1
64	-	1	+1
65	-	2	+2
68	-	1	+1
71	-	1	+1
73	-	1	+1
77	-	2	+2
78	-	1	+1
81	2	2	0
83	-	1	+1
84	-	1	+1
86	-	1	+1
87	-	1	+1
91	-	1	+1
92	2	1	-1
93	-	2	+2
94	-	1	+1
95	-	1	+1
96	-	1	+1
97	-	2	+2
98	<u>1</u>	<u>2</u>	<u>+1</u>
TOTAL	14	93	+79

APPENDIX C: PARKING GARAGE FUNCTION, OPERATION, AND DESIGN

Self-Parking

Self-parking is the most prevalent type of parking on university campuses. The patron parks and unparks his own car. In this type of parking there is little or no supervision or attendant control, and the driver himself does most of the work involved. The parking space is accessible to the internal and external garage accessways at all times, and it does not block any other car space. Accordingly, where drivers must go, and what they must do to park and unpark their cars should be made clear to them.

Stall Widths and Angle of Parking

An important consideration in the design of self-parking facilities is the width of the car space and the driving lane. Useful guidelines can be derived from observations of uncontrolled driver behavior. A study made by Ricker showed that "the natural spacing; that is, the average stall width used by customers parking in commercial parking lots without lane markings or other restrictions" ranged between 8 and $8\frac{1}{2}$ feet.¹⁴ It was found that a minimum of 24 inches between vehicles is necessary to permit getting in and out of cars without undo restriction. Assuming a design vehicle width of 80 inches, and adding the necessary clearance of 24 inches, a desirable stall width of $8\frac{1}{2}$ feet is produced.

Previous investigations have shown that stall dimensions of $7\frac{1}{2}$ feet by 15 feet will accommodate many imported cars and some of the smallest American made compacts. Since these cars are capturing a significant portion of the new car market, it is becoming increasingly practical to designate separate stalls for them. However, special stalls should be provided only for those lots likely to attract enough compact cars to insure their efficient utilization.¹⁵

Bay parking at 60° angles, as shown in Fig. 6-1, is not as efficient in terms of space usage as 90 degree parking, but greater operational efficiency of vehicle movement with 60 degree parking outweighs the loss in space.¹⁶

Access Points

Self-parking facilities on college campuses are generally operated with the minimum of supervision necessary to provide adequate security and control. At vehicular access points, the attendant supervises the entrance and/or exit lanes. It is also desirable to arrange the design so that the elevators and stairs are close to such a location where the attendant can readily see any person using them. More access points than are necessary will increase the security problem needlessly, with the resulting increase in number of attendants required. Consequently, access points should be limited to those deemed most necessary.

In order to support the construction, operational, and maintenance costs of the parking garage, a fee must be charged on a daily or per hour basis. It is generally necessary to issue tickets to incoming patrons. These tickets are time and date stamped, and are most conveniently issued from an automatic ticket machine which usually operates in conjunction with an automatic entrance gate. When the driver leaves he stops at the attendant's booth where the current time is stamped and a fee proportional to the time parked is collected. Fig. 6-2 shows the layout of a controlled access point with three lanes.¹⁷

The attendant booth should be comfortable so an attendant will not object to sitting in it for long periods of time. It should be well heated, with visibility on all sides. The door should be of the sliding type with a sliding window above. There should be electrical outlets and other required items such as a time-clock, cash drawer, telephone, etc.

Stairs and Elevators

Stairs are generally located in accordance with building code requirements. Open stairs are permitted under building codes in open parking structures. However, weather protection for the upper level is suggested so that rain and snow during freezing weather doesn't settle on steps. Weather protection can be simply attained by means of a curtain wall at the outside face of the stairs, which should be located in corners where the least number of car spaces are lost.¹⁸

Elevators should be installed to accommodate elderly and handicapped patrons. They should be located close to the principle pedestrian traffic flows. It is preferred to use them in banks of two or more. Elevator speeds can be as low as 100 to 150 feet per minute.

Lighting

Lighting in campus self-parking facilities should be designed for minimum long-range maintenance problems and maximum ease of operational efficiency. Self-contained mercury vapor lamps are suggested due to their long life (24,000 hours) compared to fluorescent lamps (12,000 hours). Control of all lighting should be in one electrical panel, preferably near an attendant location. Intensity of illumination on parking floors should average 15 foot-candles in driving areas, 25 foot-candles where turns are negotiated, and 50 foot-candles at stair and elevator locations.¹⁹

Maintenance

Parking facilities are large, relatively unsupervised structures. They present a perfect invitation for the thoughtless patron to discard trash, cigarettes, wrappers, etc. Sweeping is regularly required to prevent build-ups and clogged drainage systems. Concrete columns or other vertical surfaces, such as stair walls or exterior elevator shaft surfaces, are often painted to brighten up the structure. Periodic maintenance is also necessary for signs which may be vandalized or damaged.²⁰

SPACE WIDTH - 8'6" PARKING ANGLE - 60°
 AREA PER CAR SPACE - 275 FT²

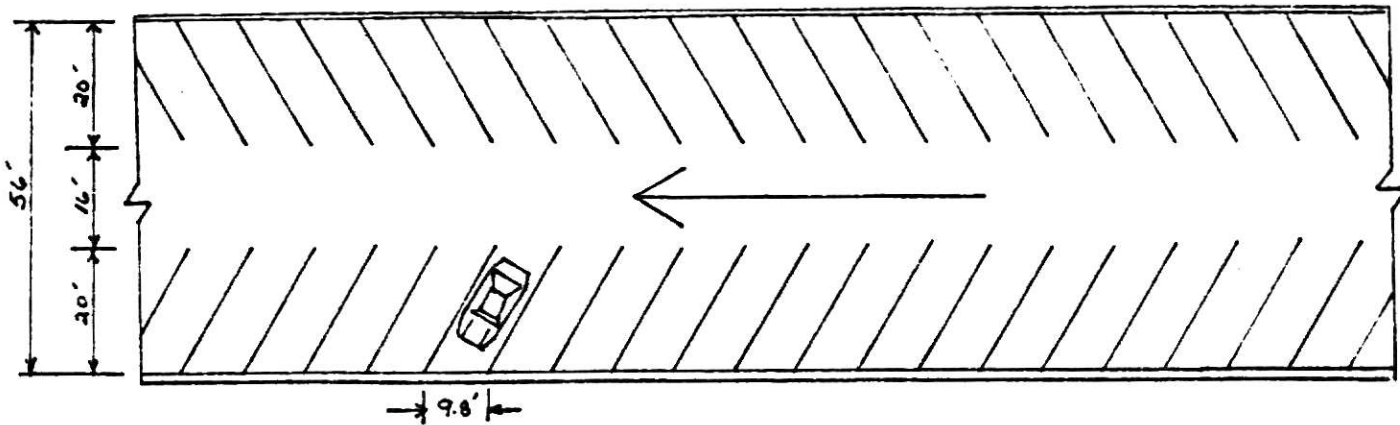


FIGURE 6-1: 60° ANGLED PARKING

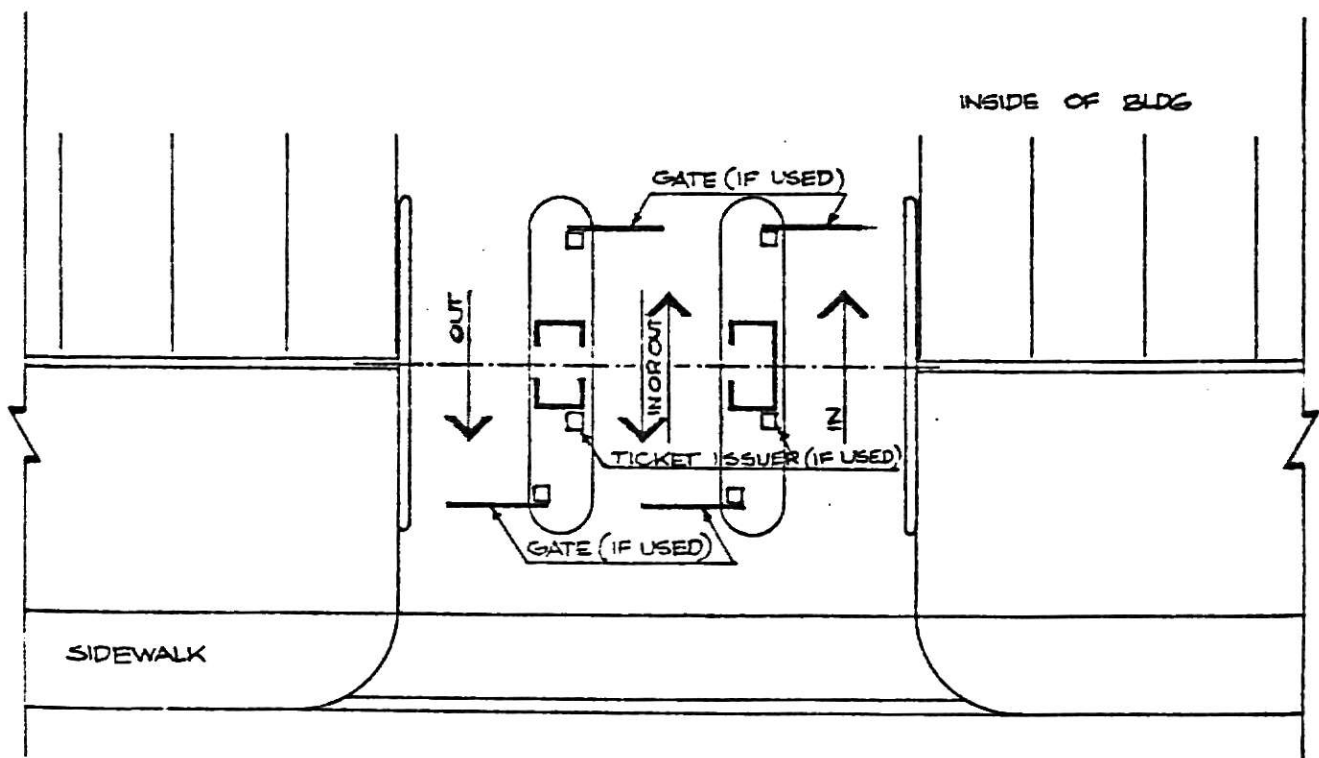


FIGURE 6-2: CONTROLLED ACCESS POINT

APPENDIX D: PARKING LOT LANDSCAPING

Screening

The view of a "sea of cars" is often unsightly and a nuisance. While one car may look good, several cars tend to distract or obscure the view of buildings or natural features of the environment. Also, a large number of cars makes it difficult to read signs, to find specific buildings, or entrances and exits to streets. Therefore, some type of screening is advisable surrounding any lot. It is also desirable to provide screening inside a large lot so as to delineate the interior. The view of a parking lot is no less dismal from above ground level. Therefore, there exists a need to screen the lot from the vertical view of tall buildings around it.

Fig. 6-3 shows different types of screening with a view point outside the parking area. Fig. 6-4 shows screening separations between parking areas. Vegetation, earth, and structures are the three basic materials which can be used to screen parking areas. The character of the area, adjacent land use, depth of available setback, and cost are all determinants of an appropriate solution.

Rapid growing vines or climbing shrubs can be planted on fencing where no setback is possible. Boston Ivy or Virginia Creeper would give the most rapid coverage, though they lose their leaves in winter. Fire-thorn or varieties of *Euonymus* are evergreen plants which would provide year-round screening. Hedge may be used to good advantage where a narrow setback is possible. California Privet is a very successful deciduous hedge plant, but requires more trimming than evergreen such as Japanese Holly or Upright Yew. The height should be a minimum of six feet. Flowering trees can be used in conjunction with a low hedge where the depth allows. Trees such as Crabapple, Magnolia, and Hawthorn would also provide screening. Planted screening is illustrated in Fig. 6-5.

By combining earth mounding with a low retaining wall, screening can be achieved in a limited space where it would not be desirable to cut off the distant view. Rip-rap, sloped paving, or a battered dry wall are alternatives where the setback is deeper. Earth mounds alone may be used if a depth of 40 feet is available. Lawn can be easily maintained on slopes up to 3:1, although ground-covers such as Ivy or *Pachysandra* on steeper slopes up to 2:1 would cut down on maintenance. Earth mounding is illustrated in Fig. 6-6.

Another positive solution to parking lot screening is the construction of a brick or other suitable masonry wall. The minimum height should be six feet. Periodic openings with panels of wrought iron fencing would allow surveillance from the outside. Pedestrian greenways and small sitting areas could be provided where the street right-of-way width permits. Structural screening is illustrated in Fig. 6-7.

Shading

On a hot day, the interior of a parked car can reach very high temperatures. Thus, when the driver returns to it, the hot reception may

lessen the pleasure of attending the air-conditioned conference, shopping in the store, or visiting a professor. Shade provided by landscaping can keep the automobiles cooler, and it can also reduce the amount of glare and heat given off by the cars and the lot. When walking through a lot, shading can provide a cool pathway to and from the car, thus making the walk more pleasant. Shading of parking areas is illustrated in Fig. 6-8.

Separation

The pedestrian and vehicular circulation systems may become confusingly indistinguishable in a parking lot. In order to delineate these routes, landscape development may be used both to protect the pedestrian and to allow the driver to move through the lot without fear of hitting anyone. Landscaping can also be used to further separate parking areas beyond that of striping. For example, overly large lots should be broken down into smaller units. Also, landscaping can provide a buffer zone between the lot and a building, thus limiting heat and glare from entering the building from the parking lot. Parking separation techniques are illustrated in Fig. 6-9 and Fig. 6-10.

Seepage

With ever increasing land area being paved over, the tendency for rainwater to percolate into the ground is severely hampered. Thus, a method to allow more water to soak into the ground is needed. Again, careful landscape development is a solution. Plantings will allow most of the water to enter the ground and reduce, to an extent, the cost of drainage systems for the lot. Where feasible, it is suggested to replace concrete paving with planters, islands, and brick sidewalks with sand grout.

Standards

The following standards are recommended for landscape development.²¹

1. All parking lot landscaping shall be of such quality as to improve and enhance the site and its surrounding areas.
2. The primary landscaping materials used in parking lots shall be trees which provide shade or are capable of providing shade at maturity. Shrubbery, hedges, and other planting material may be used to complement the tree landscaping, but shall not be the sole contribution to the landscaping. Effective use of earth berms and existing topography is also encouraged as a component of the landscape plan.
3. The landscaping and planting areas shall be reasonably dispersed throughout the parking lots.
4. The interior dimensions of any planting area or planting median shall be sufficient to protect the landscaping materials planted therein, and to insure proper growth.
5. In those instances where plant material exists on a parking lot site prior to its development, such landscape material should be used to maximum advantage.

6. Peripheral Coverage Requirements:

- a. Peripheral landscaping shall be required along any side of a parking lot of 20 or more spaces.
- b. A landscaping strip 4 feet in width shall be located between the parking area and the abutting property lines.
- c. At least one tree for each 50 feet shall be planted in the landscaping strip.
- d. In addition to the required trees, a wall, hedge, or other durable landscape barrier shall be planted or installed. The height of any such hedge should be no less than 3 feet and no more than 7 feet. The height of any wall or other durable landscape barrier should be no less than 5 feet and no more than 7 feet.
- e. One shrub or vine for each 10 feet of non-living durable barrier should be planted between the parking lot and the barrier, and the barrier and the abutting property line.

7. Street Coverage Requirements:

- a. Street landscaping shall be required along any side of a parking lot of 20 or more spaces that abuts the right-of-way of any street, road, or highway.
- b. A landscaping strip 10 feet in depth shall be located between the abutting right-of-way and the parking lot.
- c. At least one tree shall be planted for each 40 linear feet of landscaping strip.
- d. A hedge wall or other durable landscape barrier of at least 2½ feet shall extend the entire length of the landscaping strip. The first 25 feet on both sides of any accessory driveway pavement is excluded from this requirement.
- e. One shrub or vine for each 10 feet of non-living durable barrier should be planted between the barrier and the street, and between the barrier and the parking lot.

- 8. For parking areas, water (and melting snow) should be drained in two directions from the center. A slope of 3/16 inches per foot is desirable. Pavement slopes greater than 6% should be avoided to eliminate gasoline spillage from full tanks and slippage on ice.
- 9. No matter how well conceived and executed the landscaped areas around and in a parking lot, the key to continued effectiveness is in the maintenance on a daily and yearly basis. Plants do need watering, pruning, and spraying. Turf does need aerating, mowing, and fertilizing. Trash and papers need to be kept picked up, and trash

receptacles need to be provided. The initial decision to provide landscape development in a parking lot must be followed up with a resolve to provide for continued maintenance.

10. Types of Trees: In the selection of trees to be used in parking lots, the following factors should be considered.
 - a. Hardiness--Trees must be able to withstand the climate, as well as withstand the adverse urban conditions such as air pollution, salt, and water and air deficiency caused by paving.
 - b. Rate of Growth--Rate of growth is a key factor, especially in lots which are not considered permanent. The use of inexpensive, very rapid growing trees is necessary to achieve the desired effect in the shortest time period. For permanent parking areas, the slower growing but longer lived varieties may be used.
 - c. Foliage and Branching Characteristics--Since the primary reasons for planting trees in parking lots are to provide a shady canopy and act as a screen from above, trees with fairly dense foliage should be used. It is also advisable to select those trees which do not have low branching tendencies so as to eliminate conflicts with cars and pedestrians. All shade trees to be used shall be 8 to 10 feet in overall height upon planting, and of a variety which shall attain an average mature spread greater than 20 feet.
 - d. Maintenance--Trees that are relatively resistant to disease and insect damage should be chosen to eliminate excessive maintenance operations such as pruning, spraying, and feeding.

Fig. 6-11 and Fig. 6-12 show the proper planting of trees within median areas to improve the appearance and drainage of parking lots. Trees planted in parking lots must be far enough from the curb to accommodate the overhang of parked vehicles. Three methods of tree protection in parking lots are illustrated in Fig. 6-13.

By use of existing trees, well-designed drainage, and the addition of new trees, shrubs, and ground cover, the landscaped parking area provides many benefits. Trees, shrubs and ground cover play a vital part in absorbing undesirable gases such as carbon dioxide from the air, and then returning pure oxygen to the atmosphere. In the summer, landscaping acts as a natural air-conditioner; in the fall, the contaminants trapped in the leaves are easily and safely eliminated; and in the winter it reduces the effects of wind and snow. Such a planned parking area reduces water run-off to a minimum, and instead returns it to the ground. It also reduces air turbulence and blowing dust, traps snow, and attracts bird life.

The recommended standard is a permanent parking lot that is not only well-designed functionally, but is aesthetically pleasing as well. It provides for beauty, shade, drainage, and conservation of existing trees and ground water.

Screening from outside the parking area

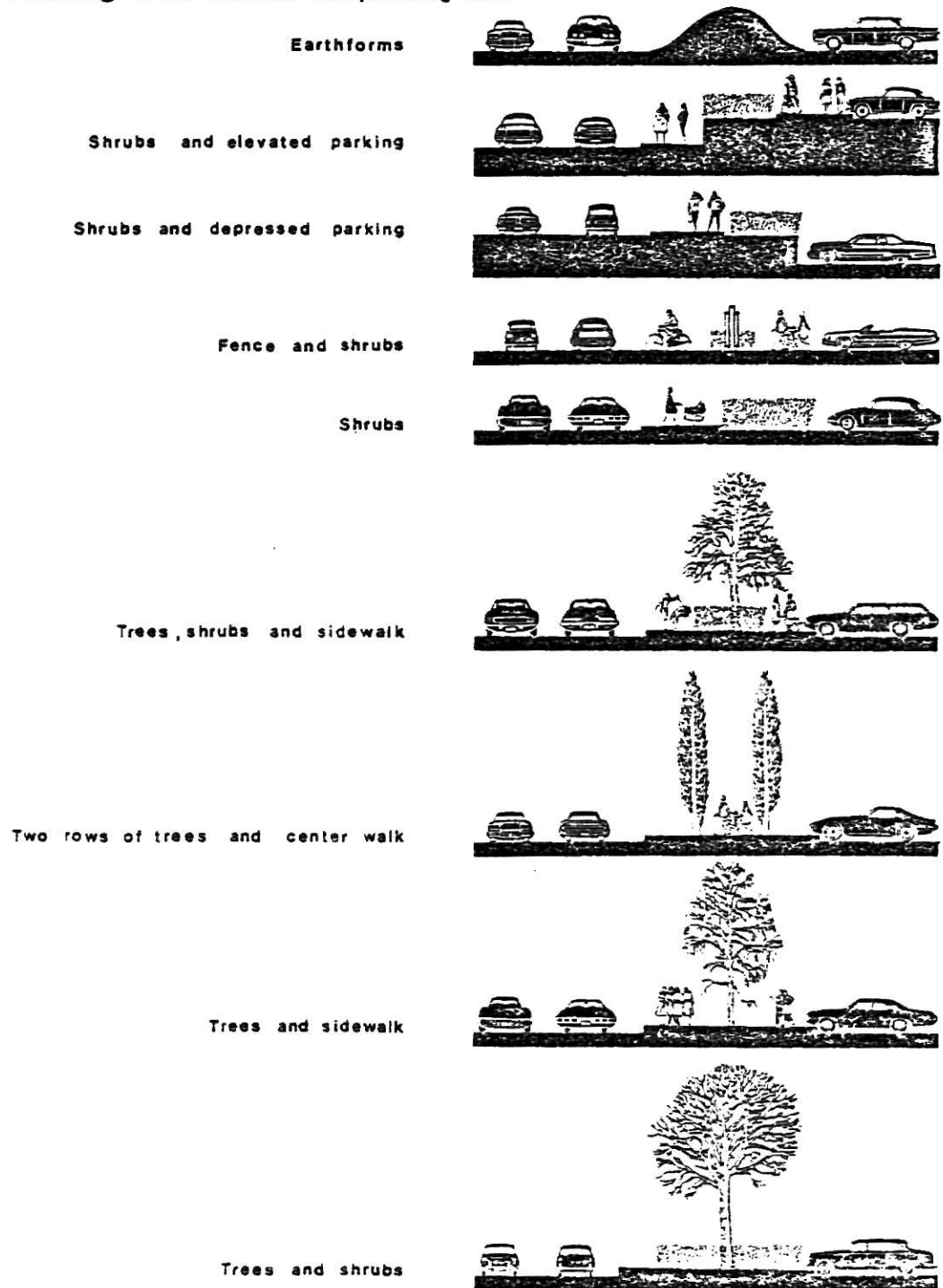


FIGURE 6-3: SCREENING FROM OUTSIDE THE PARKING AREA

Screening-Separation · between parking areas

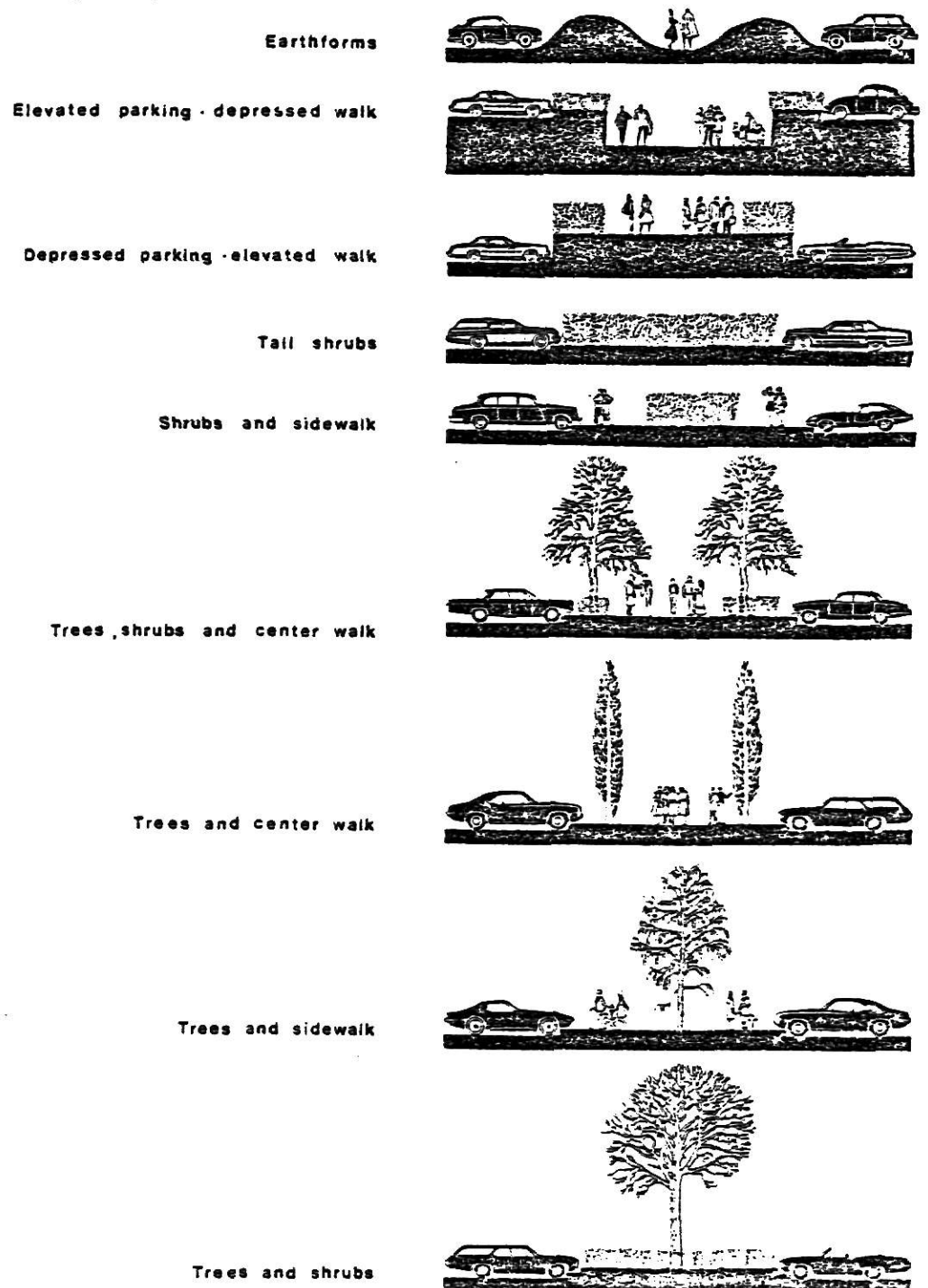


FIGURE 6-4: SCREENING/SEPARATION BETWEEN PARKING AREAS

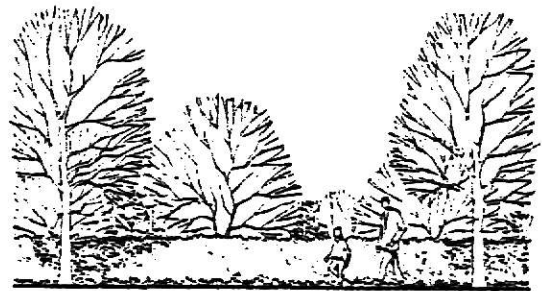
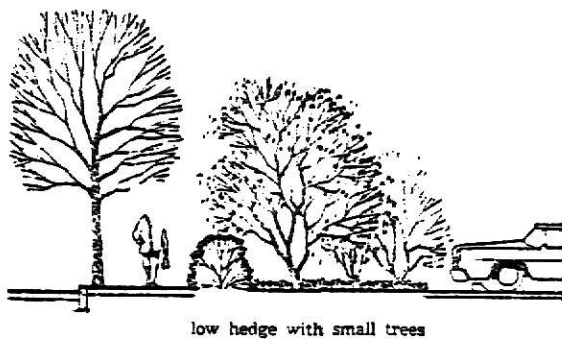
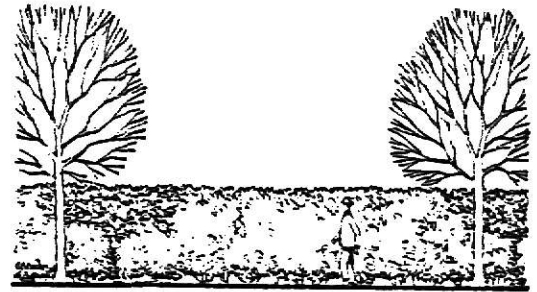
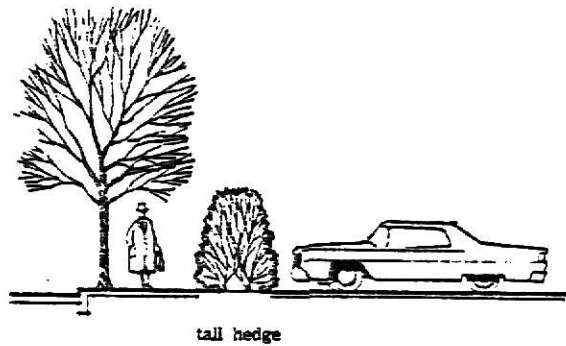
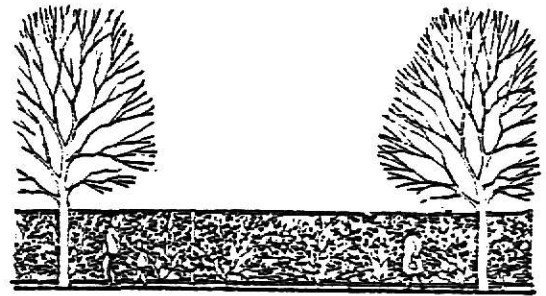
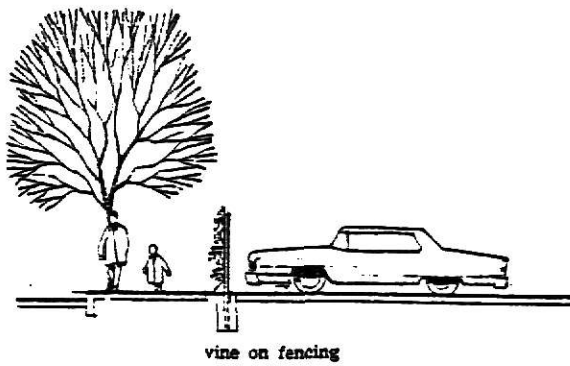
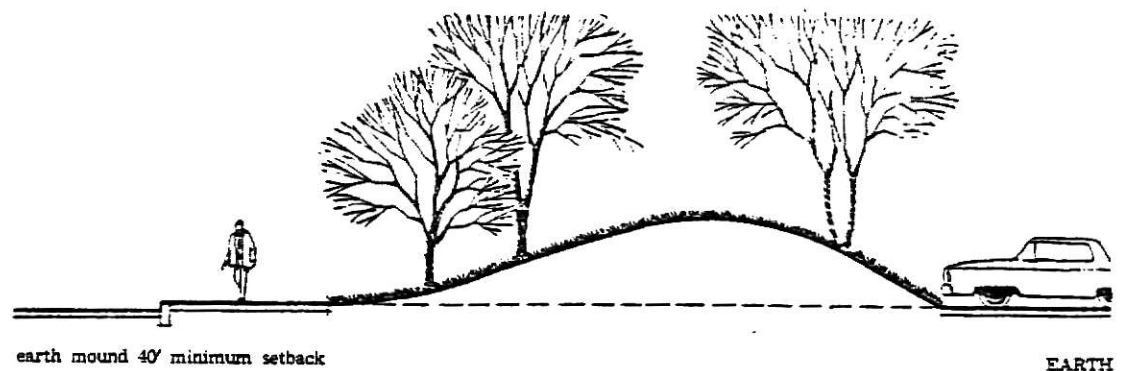
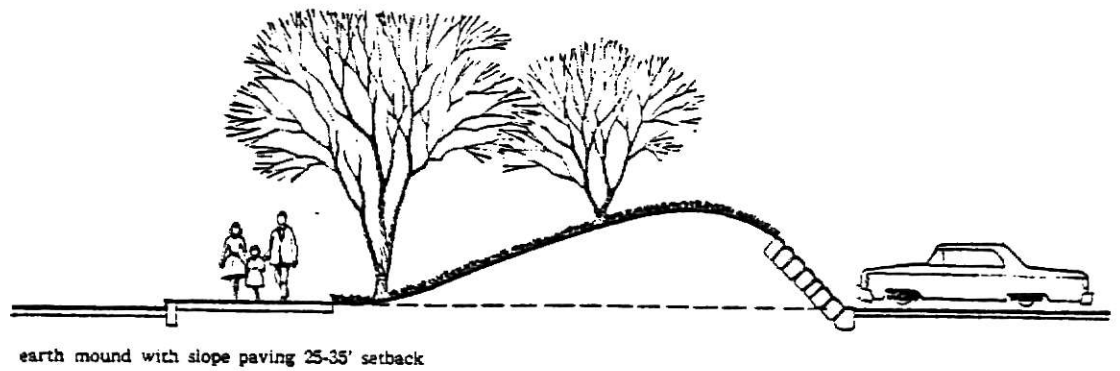
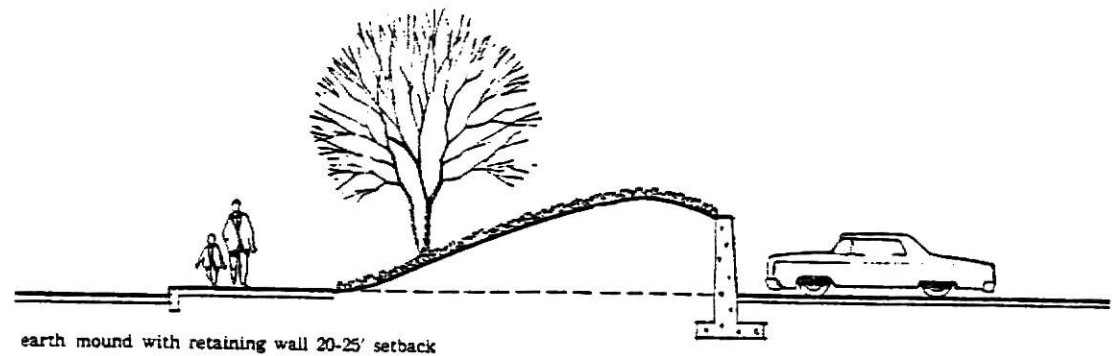
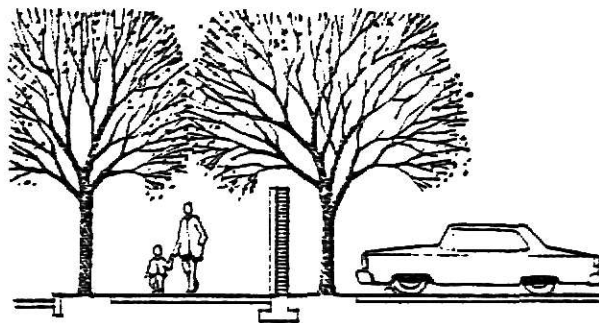


FIGURE 6-5: PLANTED SCREENING

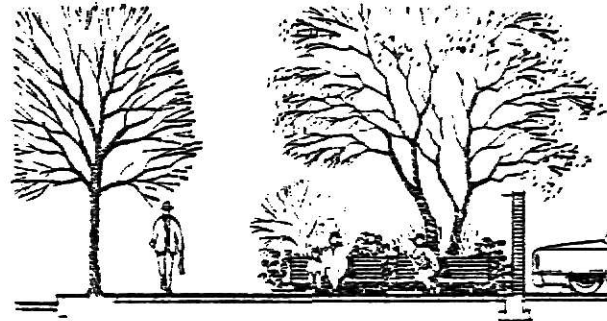
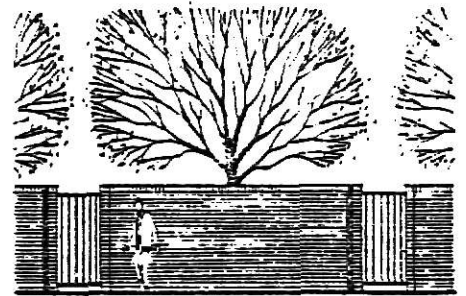


EARTH

FIGURE 6-6: EARTH MOUNDING



masonry wall at sidewalk line with periodic openings



pedestrian greenway with a masonry wall at R. O. W. line



FIGURE 6-7: STRUCTURAL SCREENING

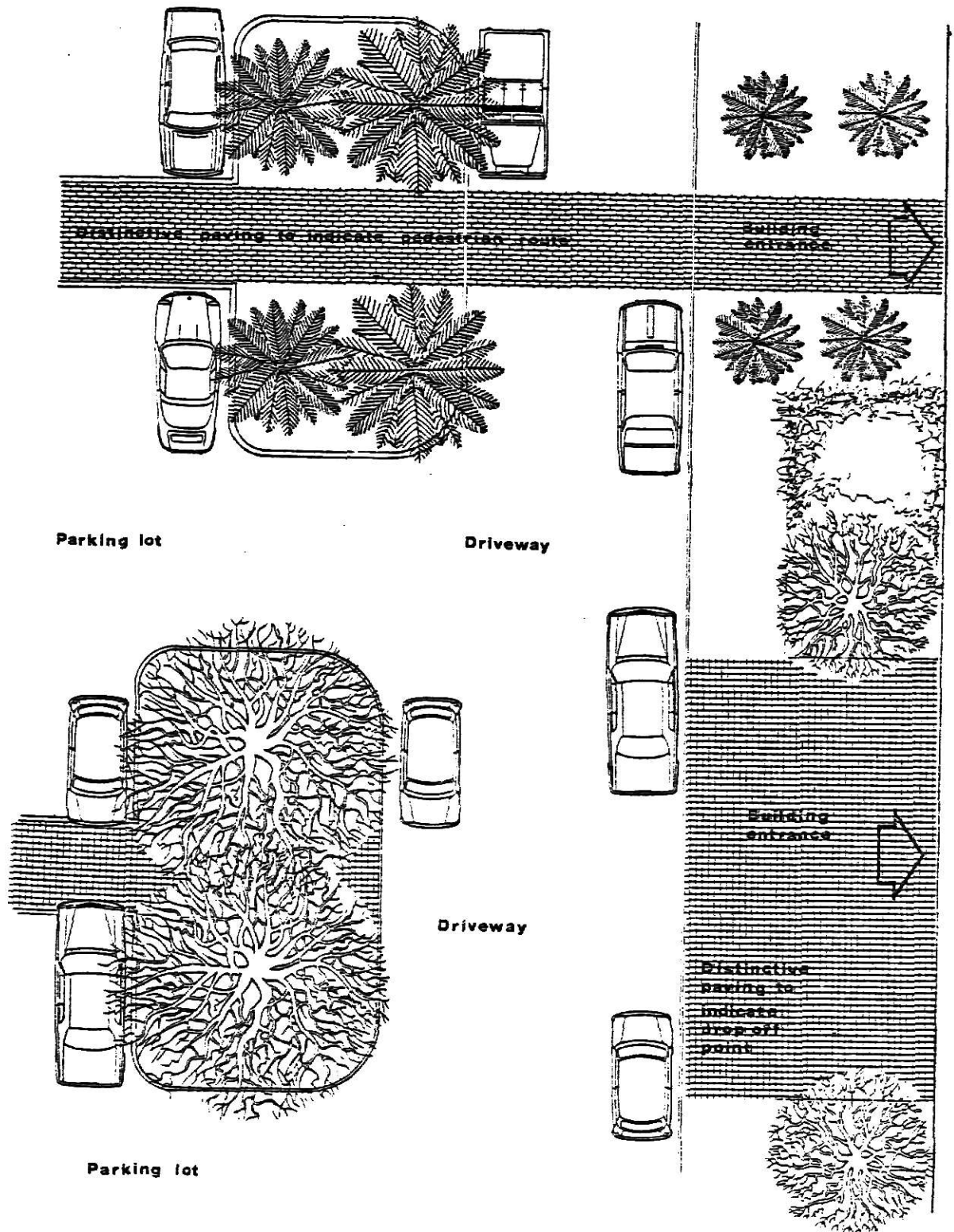


FIGURE 6-8: PARKING LOT SHADING

DIVIDERS — 30°/60° parking

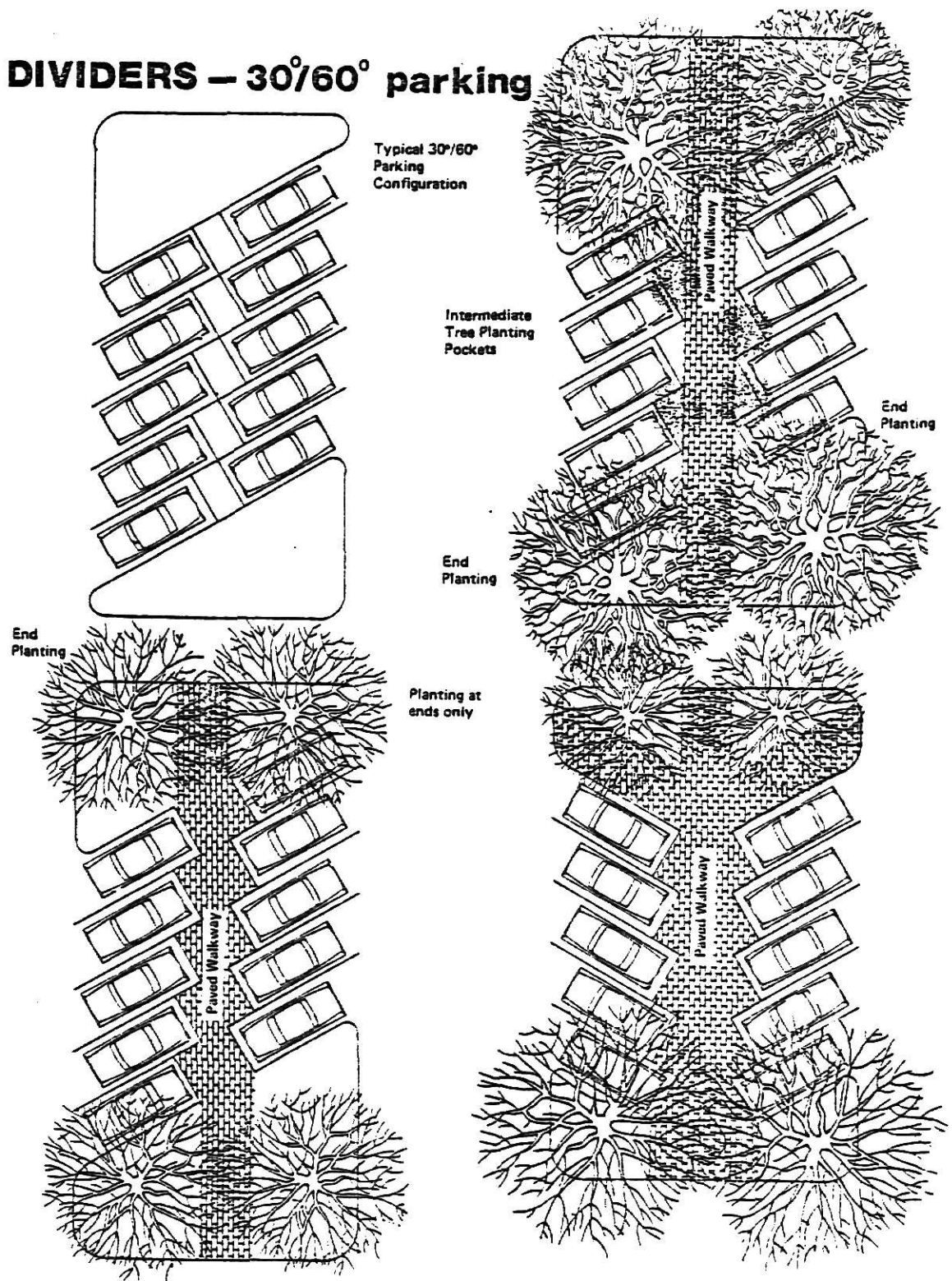
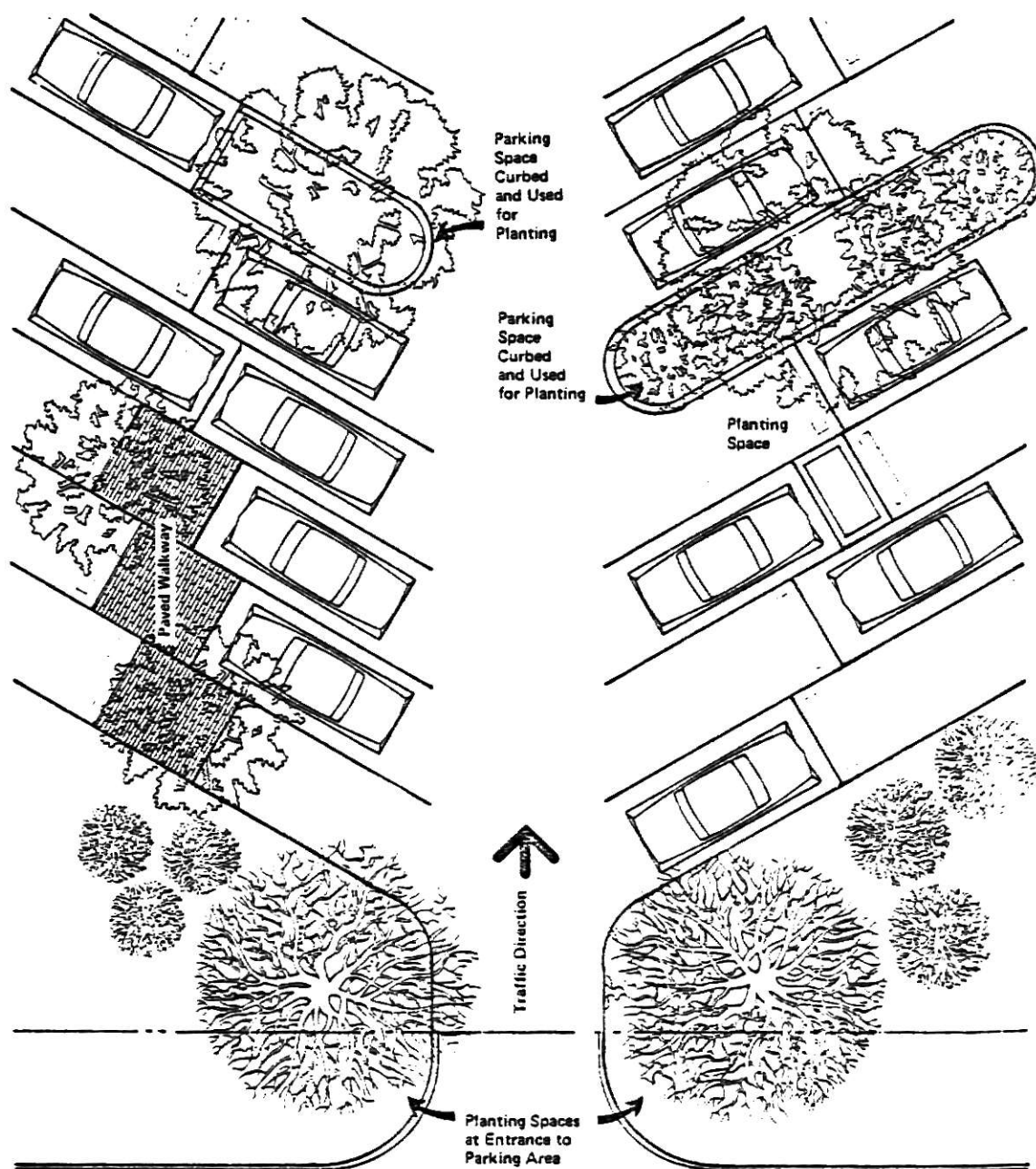


FIGURE 6-9: PARKING DIVIDERS



This illustration indicates conceptually some of the places in which landscape development may be introduced into a parking lot in this particular configuration. A number of areas and techniques are shown in this one drawing which would not be used in this particular relationship in one actual location.

30°/60° PARKING CONFIGURATION

Possible Area for Including
Landscape Development

FIGURE 6-10: LANDSCAPED PARKING SEPARATION

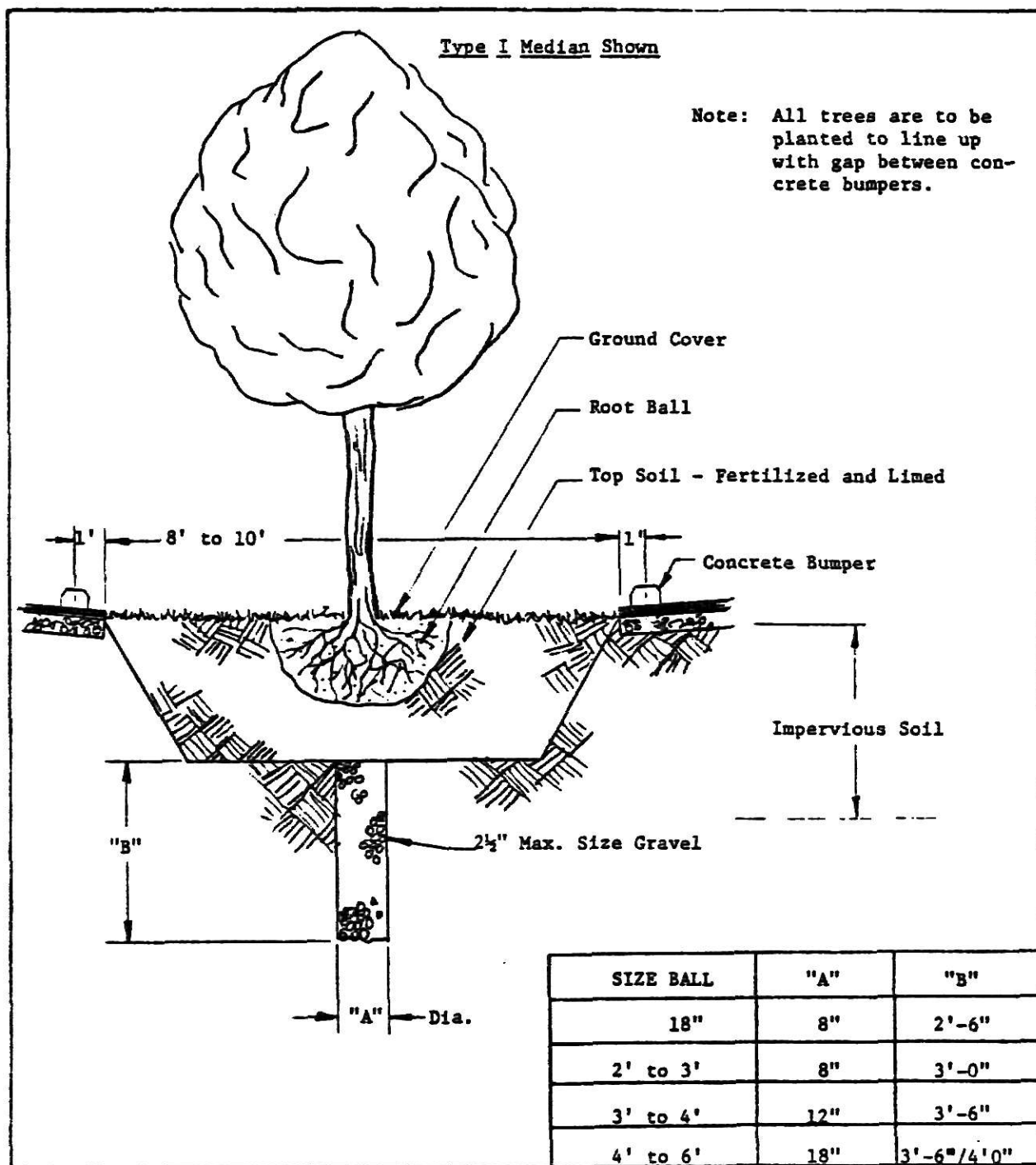


FIGURE 6-11: BALLED STOCK TREE PLANTING

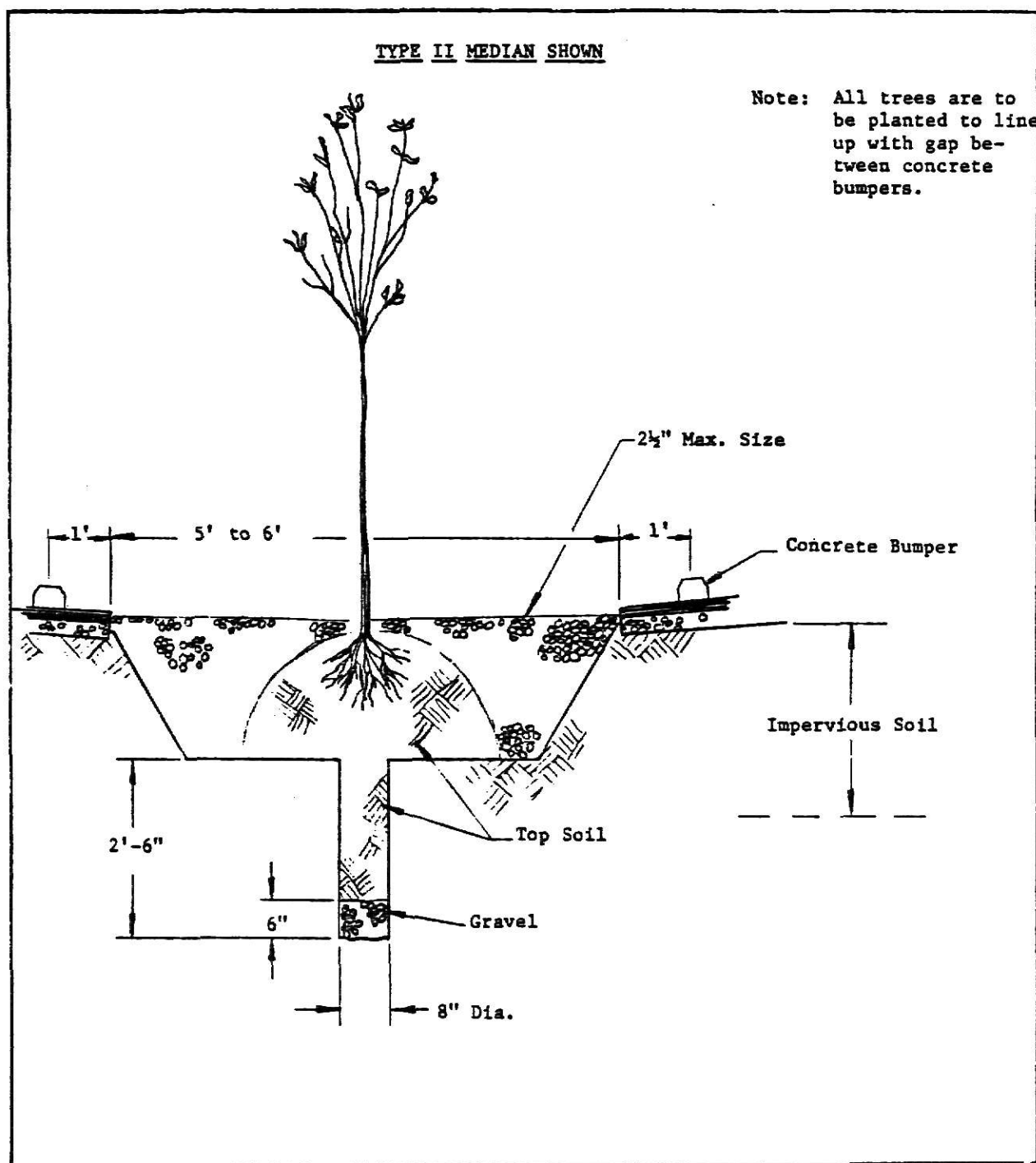
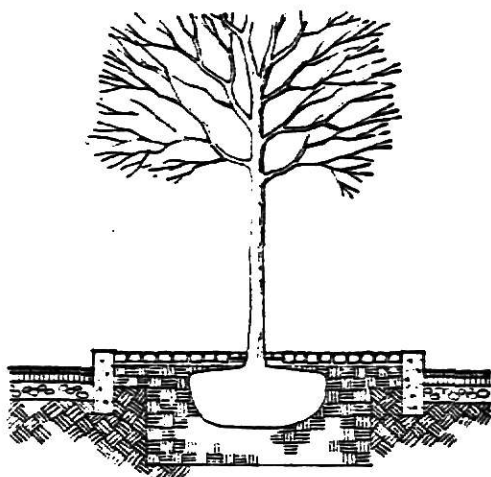
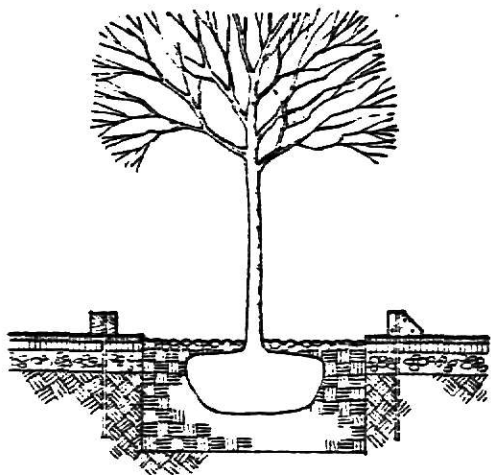


FIGURE 6-12: WHIP STOCK TREE PLANTING

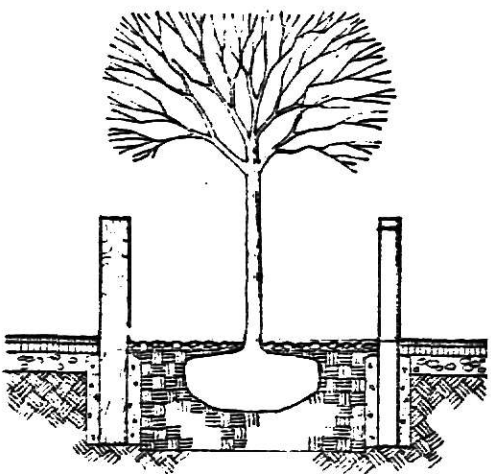
METHODS OF TREE PROTECTION

1. *Curbing*

A curbed planting strip, with a minimum width of 8', paved in brick or block allows pedestrian use, eliminates maintenance of grass, and allows penetration of water and air necessary for tree growth.

2. *Wheelstops*

Precast concrete or railroad ties placed 4' from the tree provides inexpensive protection.

3. *Bollards*

4" concrete filled pipe, or railroad tie bollards may be used, placed 4' from tree.

FIGURE 6-13: METHODS OF TREE PROTECTION

APPENDIX E: KSU CIRCULATION PLAN SUMMARY

Goals and Objectives

1. Reduce vehicle traffic in Main Campus.
2. Restrict parking in Core Campus to emergency, service, and handicap vehicles only.
3. Encourage bicycle usage.
4. Improve pedestrian circulation through adequate sidewalks and reduction of conflict points.
5. Provide adequate parking for all vehicles.

Plan

1. Develop an interior loop encompassing the Core Campus to be used only by "non-personal" vehicles and bicycles during peak periods of pedestrian traffic.
2. Construct a parking structure at the location of the existing greenhouses on Mid-Campus Drive.
3. Provide additional parking behind Justin Hall.
4. Convert College Heights Road, between Denison and 17th Street, from a vehicular to a pedestrian/bicycle corridor during peak hours.
5. Install green plaza areas between the buildings of the Derby residence hall complex and the three older residence halls. Replace the parking to the open area west of the Derby complex.
6. Develop a central street through the North Campus, connecting Denison Avenue and North Manhattan Avenue.
7. Remove Core Campus parking lots #14, #22, #42, #45, and #81.
8. Pave unimproved areas of parking lots #2, #23, #27, and #30.
9. Provide visual screening of parking lots by installing plant materials, earth mounding, and fencing.
10. Develop a new parking area between the old Dairy Barn and Dykstra.

Financing

1. Pay-as-you-go results in improvements lagging behind the need.
2. Fair-share cost distributes the cost of a project among present and future users, and usually results in higher overall costs.
3. Combination of pay-as-you-go and bonding is the recommended funding strategy.

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KSU TRANSPORTATION PLAN

by

DANIEL WESLEY GIBSON

B. Arch., Kansas State University, 1976

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF REGIONAL AND COMMUNITY PLANNING

Department of Regional and Community Planning

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1979

ABSTRACT

This study, which is intended as an actual aid for future campus planning at Kansas State University, concentrates primarily on the vehicular circulation and parking needs of the campus over the next ten years. Several specific areas warrant special consideration. The current lack of public access to McCain Auditorium is studied and the resulting solution consists of an access drive and loop on the south side of the building. Considerable effort is devoted to analyzing the feasibility of constructing a parking garage to be located near the Student Union. Since a facility such as that would require a relatively large initial investment, there would have to be definite assurances that it could pay for itself. The probable success (intensity and frequency of use) of a parking structure, at the Union or elsewhere on campus, is very difficult to predict on the basis of parking demand. The conclusion is that such a structure is not financially feasible for K-State at this time, and that much of the current parking problems are a result, not so much of a lack of parking spaces, but primarily because people are unwilling to walk from a campus perimeter lot or else they simply aren't aware of the plentiful availability of spaces in the large but more distant lots. To illustrate how existing parking lots could be upgraded and designed more efficiently, two different example layouts are proposed for the West Stadium parking lot. Also, special attention is given to the existing inadequacy of appropriate visitor parking facilities near major destination points on campus, the lack of sufficient on-campus residence hall parking, and the need for a consistent system of campus information, identification, and traffic control graphics.

As a result of inventorying and evaluating the current conflicts and deficiencies in the transportation facilities at Kansas State University, a plan for future development and improvement of these facilities is proposed. It is designed to combine the most desirable elements of three alternative concepts into a single physically feasible and financially realistic final proposal. The three preliminary alternatives are:

- (1) Leave the campus as it is, and make only short-range modifications as the need arises;
- (2) Close all main-campus streets and ban all vehicular circulation; and
- (3) The "KSU Circulation Plan" by the Oblinger-Smith Corporation.

The final proposal bans all parking--except for the handicapped and service access--within the university's core-campus, closes several streets, and recommends the construction of several access loops from the perimeter of the main campus. In addition, a new, large parking lot is proposed to be built in the area east of the old dairy barn for any registered auto with a paid permit or a free ID sticker. Included are written policy guidelines for future planning, parking and circulation maps, and a sequence of implementation steps to be phased over the next ten years.

A comparative evaluation of the three alternatives and the final proposed circulation concept based on ten different criteria shows that, based on a quantitative system of measurement, the KSU TRANSPORTATION PLAN being proposed is indeed the preferable choice. Although "degree of adequacy" is difficult to determine, especially for a concept which has not yet been implemented, perhaps this plan can be said to be the "most adequate" of any presented thus far in terms of quantifiable "advantages" and "disadvantages"--cost, amount of access, elimination of conflicts and deficiencies, etc. It is probably impossible to satisfy all the criteria to the fullest degree at one time. This plan certainly doesn't. However, it represents an optimization of the various alternative features by maximizing the advantages while minimizing disadvantages as much as possible within the scope of this study.