
West Campus Plan



West Campus Plan

Arizona State University

The Arizona State University West Campus Plan consists of two separately bound documents:

ASU West Campus Plan Planning Background

The first document details the Campus Plan and the second document provides more detailed information and analyses of the planning process.

The NBBJ Group
Cella Barr Associates
August, 1985

PREFACE

In April, 1985 the Arizona State Legislature affirmed their support of the ASU West Campus Plan, described in this document, by appropriating \$9.5 million for year one design and construction. Site and infrastructure improvements will begin the physical preparations for the campus. The library will be the first major building to be designed and developed. Expectations, commitment and enthusiasm continue to be high because a vision is soon to become a reality.

The ASU West Campus Plan will provide order to physical improvements in the future. It is intended as a flexible framework to guide campus development consistent with a conceptual idea. The plan is an expression of all the people who participated in its preparation. The wants, needs and dreams debated during a series of intensive work sessions directed and nurtured the Campus Plan. No buildings have been designed; examples shown are purely illustrative. However, building organization, the spaces and amenities around buildings and systems serving them have been patterned.

It is expected that conditions will change. Objectives, priorities, education, economics, people, the environment will never be static. The Campus Plan is purposely organized to respond to the requirement of managing change in a consistent manner. Planning goals and objectives, the plan concept and specific elements along with an implementation program are all detailed. The heart of the plan, though, is the design guidelines. These form giving principles can be applied to unique circumstances at the time when specific projects are designed, can be interpreted broadly and can focus solutions to hit the moving target.

The Campus Plan is already being refined following the completion of most planning tasks in mid-February, 1985. Work sessions with the ASU Design Review Board have resulted in constructive improvements to the concept which are included in this document. Specifically ideas matured for courtyard housing, concentrated retail uses at the secondary plazas, academic courtyard proportions, curvilinear recreation space at the southwest site corner to contrast the regular campus organization, pedestrian/bicycle circulation and community linkages. Such change is consistent with the plan's intent and it should continue as detailed designs are prepared. Strengths of the ASU West Campus Plan will increase as the process moves forward. Success will be achieved by this controlled evolution.

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INTRODUCTION

The Arizona State University West Campus Plan detailed in this document is one of a continuing series of steps to broaden higher education opportunities in the West Valley. The background preceding this campus development planning includes decisive actions by Arizona educators, legislators and community leaders.

- In May, 1976, the Arizona Legislature formally recognized the need for educational services in western Maricopa County and established a committee to study the pros and cons of an ASU branch campus.
- The Whiteman Committee Report concluded that more facilities for higher education, particularly upper division classes, were urgently needed to complement the community college system.
- In 1978, ASU extended its services by leasing space at Metro-center, Alhambra Elementary School and other locations to provide courses. Response was greater than expected.
- The Board of Regents in 1980 published Arizona University System Mission and Scope Statements specifying "the development of a modified, upper-level, primarily non-residential branch institution of Arizona State University in the urban area of western Maricopa County."
- In 1982, the Arizona Legislature set aside a 300-acre site bounded by Thunderbird Road, Sweetwater Avenue and 43rd and 51st Avenues, located within the City of Phoenix.
- In 1983, ASU confirmed West Valley residents' approval of such facilities by a public opinion poll. University officials also obtained funds for planning. The Sackton Report determined the extent and nature of higher education needs in the West side. Statutes were changed in 1984 by the State Legislature to require the Board of Regents to maintain a campus in western Maricopa County. Additional funds were appropriated.
- A flag raising ceremony and appointment of the ASU West Chief Operating Officer occurred in July 1984.
- Planning consultants were retained in October, 1984 to prepare the campus plan.

A coordinated, intensive and participative process was employed in developing the ASU West Campus Plan.

PURPOSE

The purpose of the most current planning was to prepare a Comprehensive Master Plan for a mixed-used campus development.

The problem was defined as identifying the most appropriate and cost-effective blend of academic and commercial development on the West Campus.

Specific objectives of the planning were, then, to:

- Identify the full range of alternative combinations of academic and commercial development on the West Campus based on the University's physical needs, market conditions for commercial development, and the new campus' physical constraints and potentials.
- Quantify the benefits, costs (capital, operating and life cycle) and revenues of each of those combinations.
- Compare the alternatives in order to identify what types of development are most appropriate and feasible for the new campus.
- Develop a Campus Growth Management Plan with appropriate development guidelines.

PROCESS

The process was based on four primary determinants of academic campus development:

- The institution's goals and objectives that include not only its educational role and mission, but also environmental desires and impacts as well as economic soundness.
- The absolute near and longer term numbers of students, faculty and staff members who must be accommodated on the campus.
- The campus site's potentials and constraints as they impact the desired built and natural environments.
- The existing infrastructure, current capacity and incremental enhancements necessary to accommodate the campus's growth and development.

In addition, a fifth determinant was necessary to respond to the idea of a mixed used development:

- The financial feasibility and the need to consider revenue streams related to commercial development on the site to offset the cost of academic facilities.

The process is summarized in the graphic on the following page. It includes:

- Seven Major Tasks
- An initial three-day "Charrette" Workshop
- Four Milestone Presentations/Discussion Forums
- A Final Report with:
 - Summary
 - Detailed description of Process and Findings
 - An Implementation Plan
 - An accompanying Mass Model

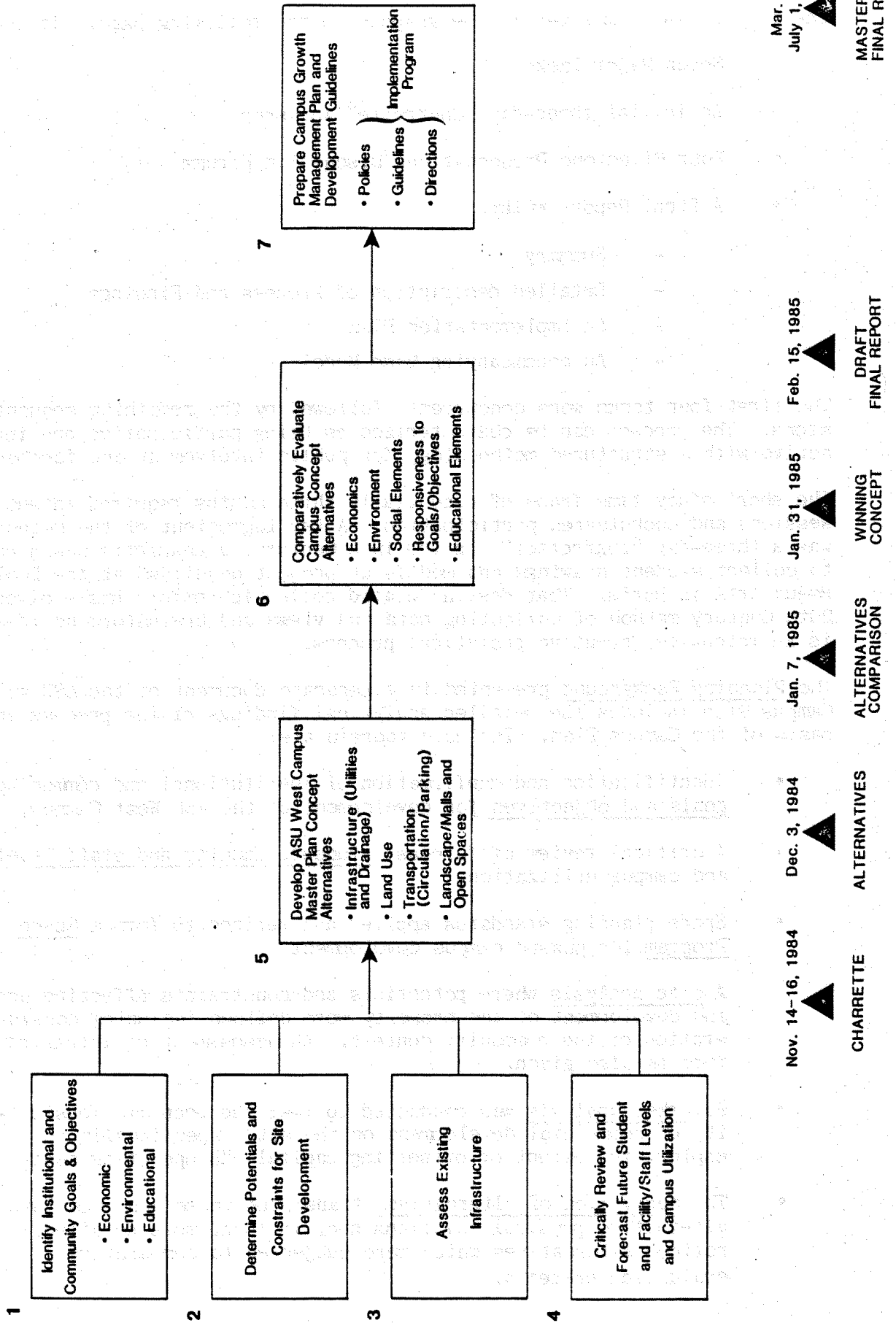
The first four tasks were concurrent, followed by the remaining sequential steps. The process can be characterized as being participative and interactive with a structured methodology for public involvement and feedback.

The short study time frame of essentially three months required intensive work sessions and coordinated participation. A key ingredient of the methodology was a three-day "charrette." In the 19th Century, a charrette was a cart used to collect student drawings and models at project deadlines at the Ecole des Beaux Arts in Paris. That design-related collection effort has evolved into a 20th Century method of collecting data and views and brainstorming ideas. It is an intensive, creative analytical process.

The Planning Background presented in a separate document of the ASU West Campus Plan includes the detailed analytical findings of the process and the basis of the Campus Plan. Included therein are:

- Identification and confirmation of institutional and community goals and objectives for development of the ASU West Campus.
- A critical review of forecast student, faculty and staff levels and campus utilization.
- Space planning standards applied and refined to form a Space Program for phased campus development.
- A site analysis where potentials and constraints affecting use and development of the property were defined including consideration of the community context. An assessment of infrastructure is also given.
- A market analysis was conducted to test the economic feasibility of commercial development on the site, specifically to explore the extent of offsetting capital and operating costs.
- The derivation of alternatives translated those analyses into alternative physical solutions and, in turn, more detailed, refined alternatives which were subjected to comparative evaluation criteria.

Figure 1
ARIZONA STATE UNIVERSITY WEST CAMPUS
COMPREHENSIVE MASTER PLANNING AND SCHEDULE



RESULTS

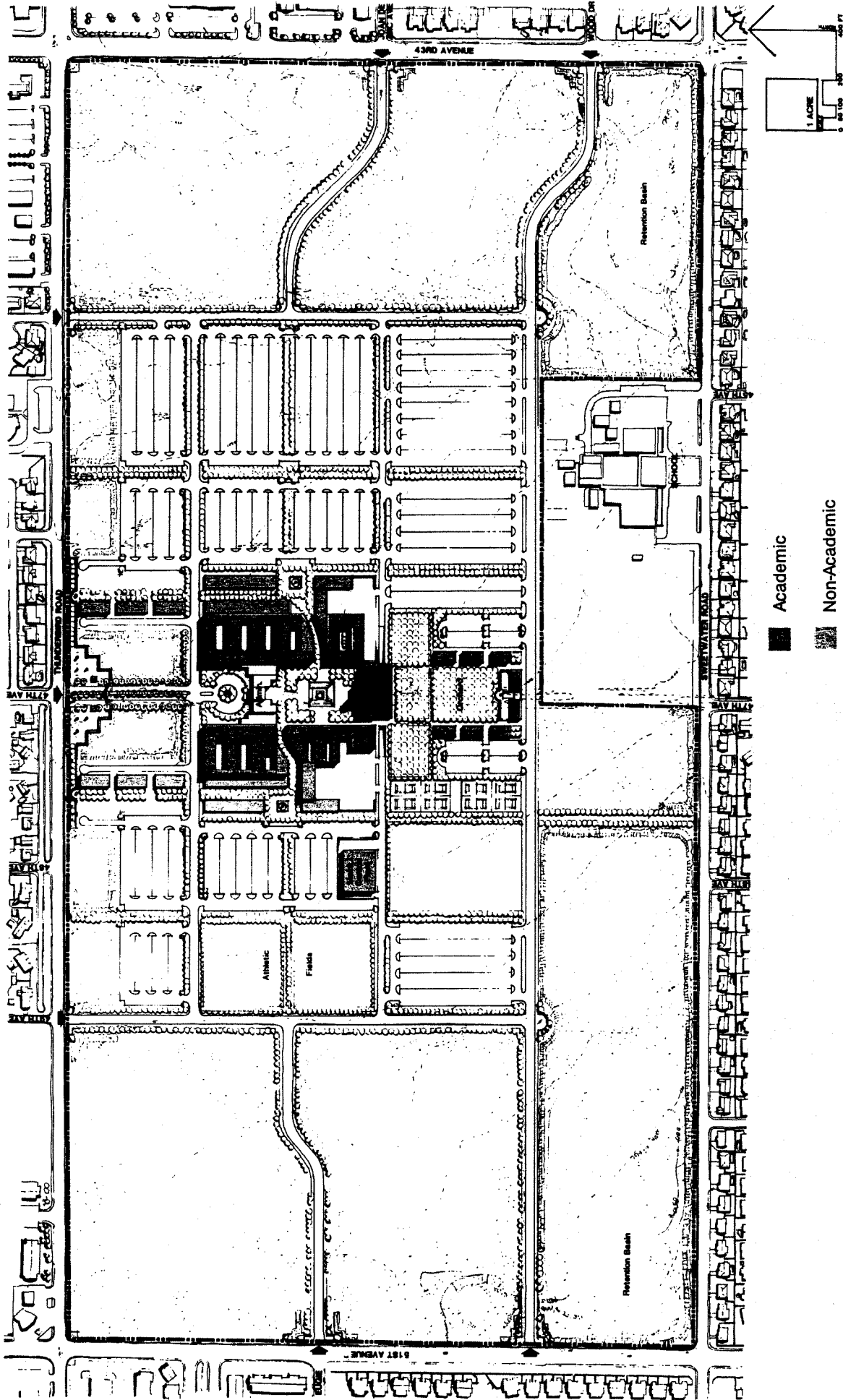
The result of the planning is the ASU West Campus Plan. A result is also an expressed general acceptance of the plan concept by university and community leaders. The plan is a growth management tool providing a framework for physical development consistent with the expressed aspirations. An illustrative site plan of the concept is given for the initial development phase [5,000 Full-Time Equivalent (FTE) students] and for campus build-out (10,000 FTE students). The character and scale of development are described by sketches and a general massing model. The following site plans, sketches and photos highlight one interpretation of the campus plan concept.

The plan concept is one of mixed-use (academic and non-academic) development serving the commuting, non-traditional student (older age group seeking upper level and graduate programs), in addition to traditional students transferring from community colleges. Plan elements are defined in terms of land use and scale, circulation (vehicular, pedestrian, bicycle, service), parking, open space, landscaping, water features, utilities and drainage. The conceptual idea is to create a "marketplace/main street" blend of activity where the juxtaposition of contrast offers an abundance of choices and educational stimulation all unified by an organizing framework.

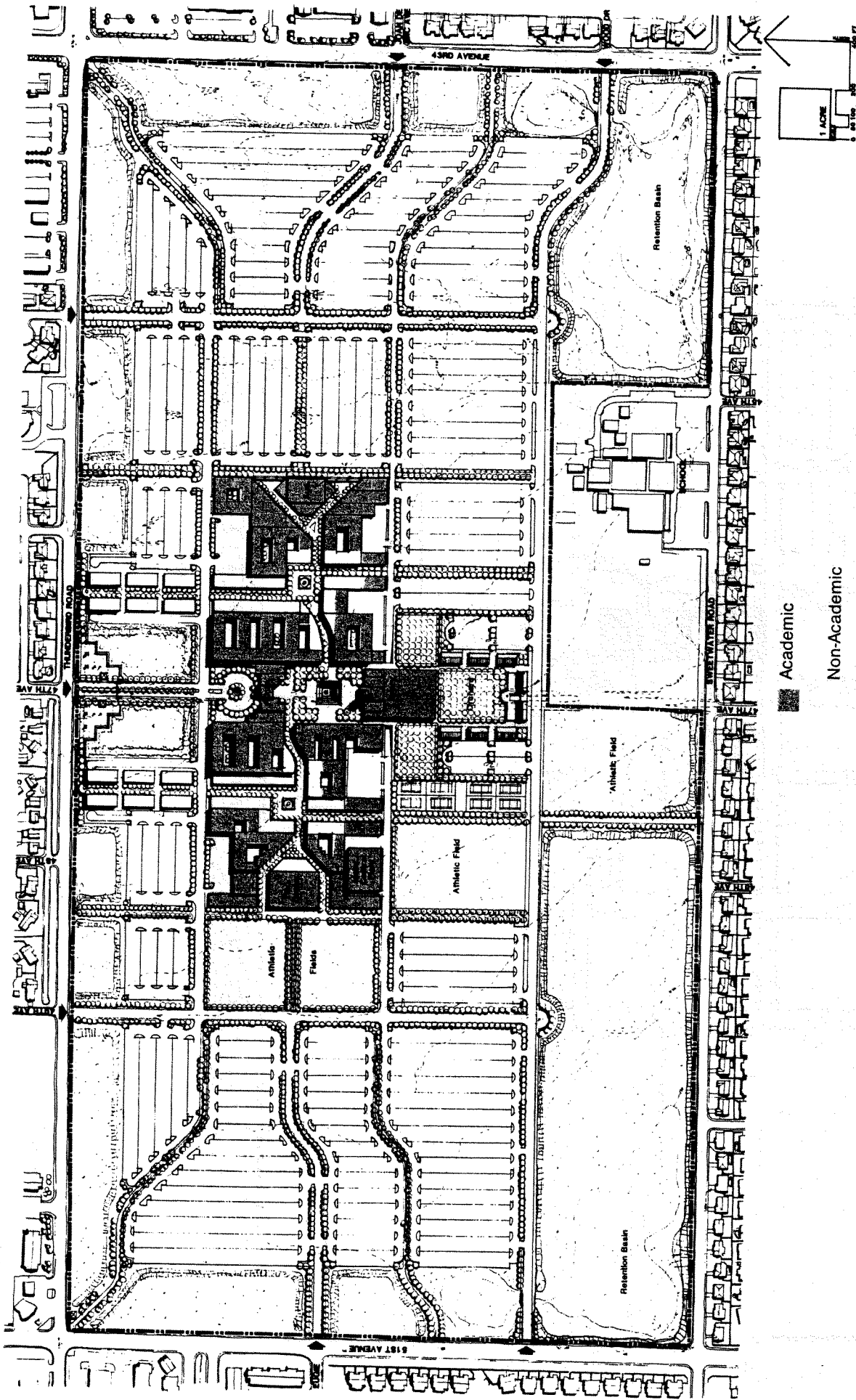
The flexible plan responds to changing conditions over time through a series of design guidelines. Both detailed prescriptive and performance standards are given for campus sectors, vehicular systems, parking zones, pedestrian systems, landscape networks, campus edges, signage and lighting, architectural design and utilities and drainage systems.

Implementation of the campus plan is in two major increments: facilities to accommodate 5,000 FTE students and then an additional 5,000 FTE students to reach "total build-out." The initial increment of development is further detailed on an annual basis to assure the proper allocation and expenditure of resources, to most effectively establish the needed facilities and to create a functional campus "critical mass." Capital costs, operating costs and revenues from ground leases are estimated. An action outline assigns responsibilities, defines a schedule and lists the necessary steps in terms of what, when, how and by whom.

A dilemma of any "master plan" is the contradictory need to show a depiction of an end development condition but at the same time create plan flexibility to respond to changing future conditions. The key to achieving both with the ASU West Campus Plan is the design guidelines. These patterns are inherently flexible to guide future campus evolution. One application of the patterns is given in the illustrative plans and sketches. It is important to note that this represents one solution and not the only solution. It is acknowledged (and expected) that changes and refinements will occur over time to make the campus even better.



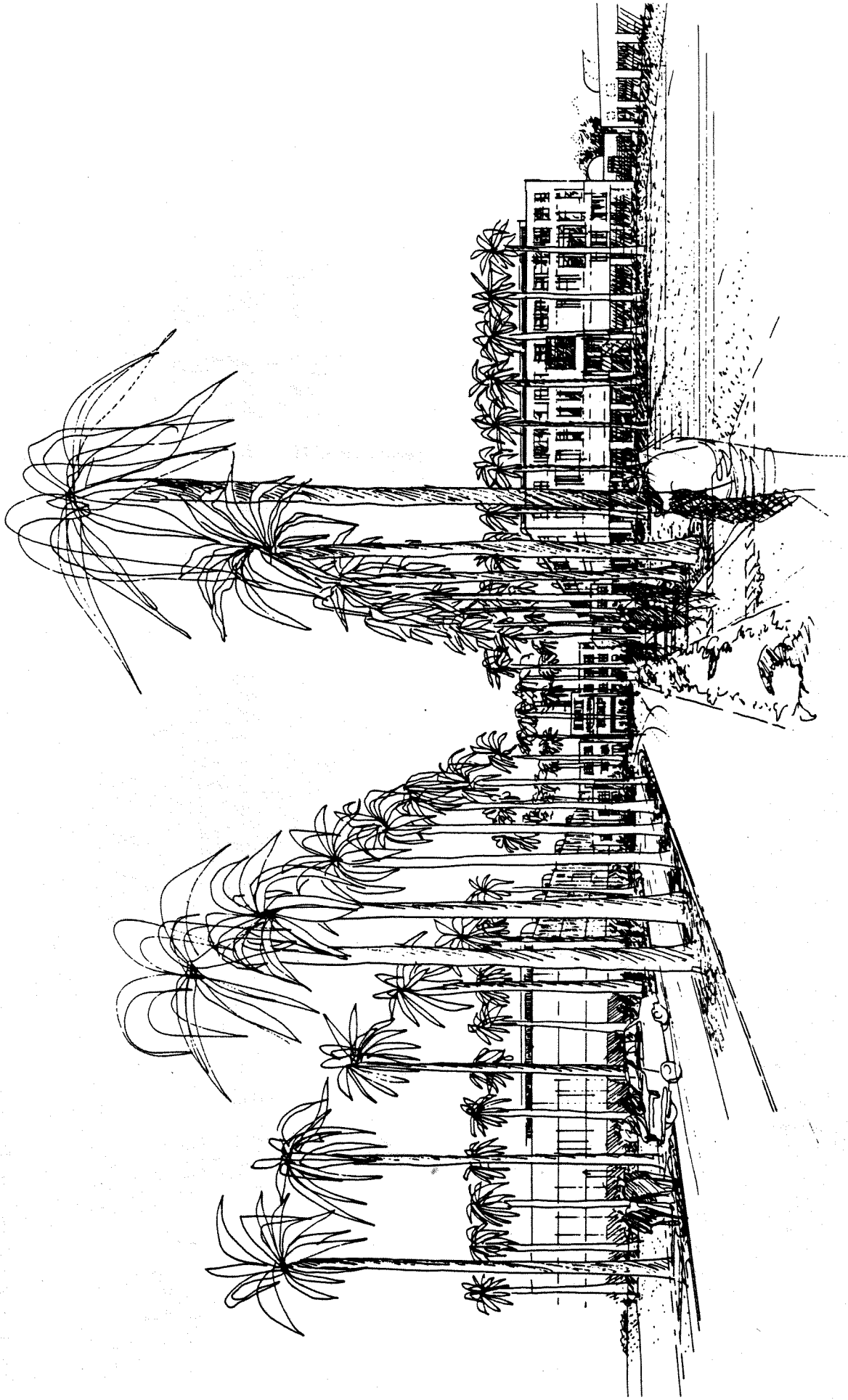
ASU West Campus Plan
Initial Phase
 Figure 2



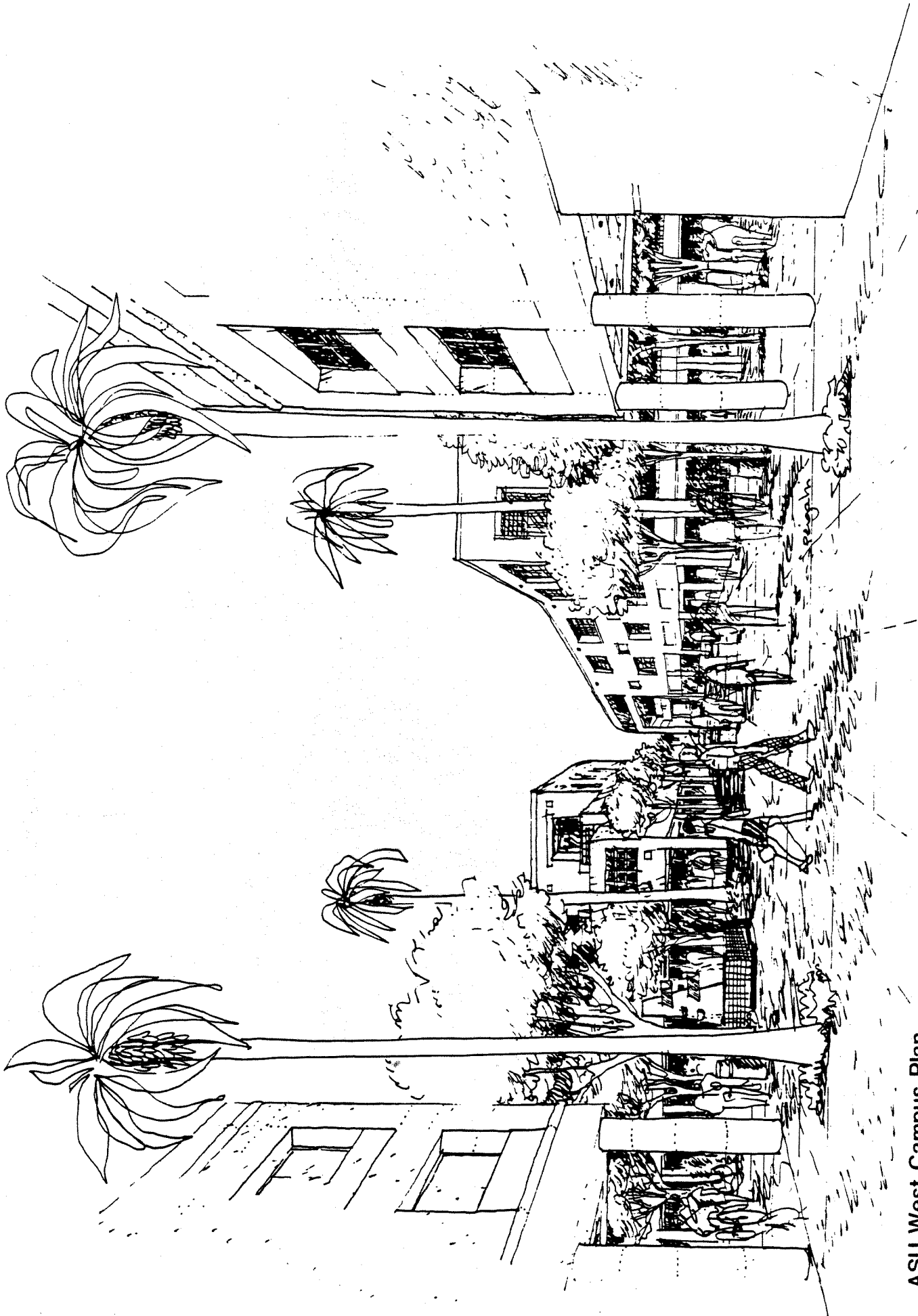
ASU West Campus Plan

Build-Out

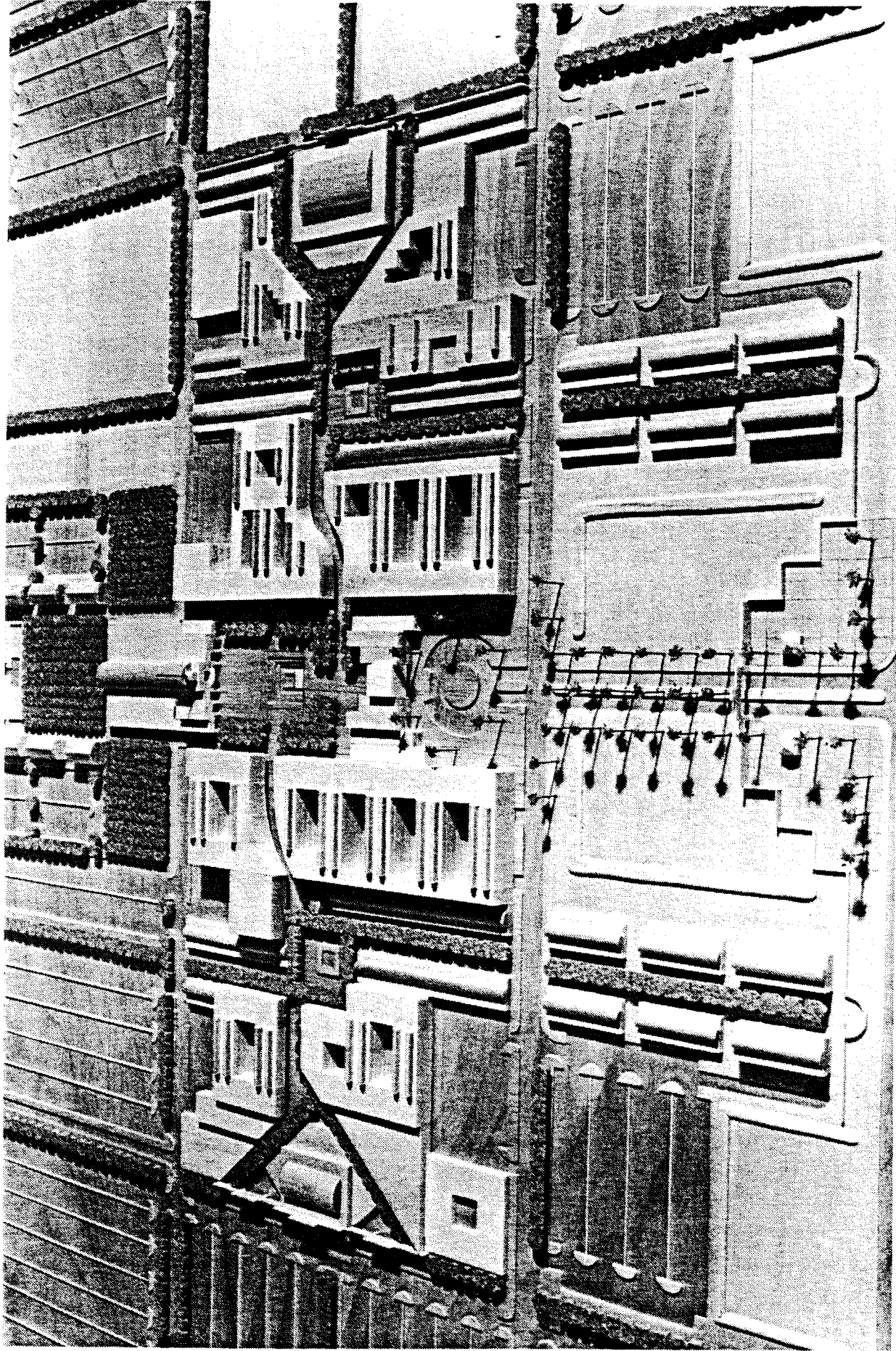
Figure 3



ASU West Campus Plan
Main Campus Entry from Thunderbird Road
Figure 4



ASU West Campus Plan
View Along "Main Street"



ASU West Campus Plan

View of Main Entry, Adjacent Commercial Offices and Campus

Figure 6

SCHEDULE

The anticipated schedule of next steps in the ASU West Campus planning and development process is as follows:

1985	Campus Master Plan prepared Requests submitted for design, operations and capital budgets
July 1986	Groundbreaking of first development of ASU West Campus
1987-1988	First building increment in use at ASU West
Early 1990's	Fully operating ASU West campus serving initial phase of estimated 5,000 students

Planning Goals
and Objectives

Five subsections describe the Arizona State University West Campus Plan:

- Planning Goals and Objectives, which express the plan's direction and intent.
- Plan Concept, which describes the planning and design ideas embodied in the plan.
- General Plan Elements, which includes specific physical components of the plan.
- Design Guidelines, which establish detailed standards for the design and development of campus areas and systems.
- Implementation, which estimates capital and operating costs and revenues by phase of development, and outlines actions and responsibilities to realize the plan.

The more detailed background and analyses supporting the plan are included in a separate document: ASU West Campus Planning Background.

Plan Concept

PLANNING GOALS AND OBJECTIVES

The goal of the West Campus development is to make higher education opportunities a reality in the West Valley. Arizona educators, legislators and community leaders have, over the years, set the direction to meet needs with development of the ASU West Campus. Accordingly, a master planning process was established for a mixed academic/non-academic campus that:

- Responds to the need to accommodate students, faculty and staff alike.
- Guides the nature, sequence and quality of development.
- Provides the basis for the improvement and development of the lands in a manner consistent with the intent of laws and regulations.
- Considers existing and future plans and designs of abutting jurisdictions.
- Protects the quality of natural and man-made environments and recognizes energy conservation concerns.
- Guides future growth in an orderly fashion and provides for a range of land uses consistent with the protection of community values.
- Provides for the greatest potential for economic return to the University.

The ASU West Campus Plan must realize Arizona State University's mission to:

- Continue to develop as a major University with special emphasis on programs needed in the State's major urban area, and
- To become competitive with the best research universities in the Nation.

The goals and objectives for the ASU West Campus were recognized as being extremely important in that they would direct the campus planning and be a basis for evaluating alternative plans. A brainstorming or "charrette" process was utilized over a period of three days so that all desires, needs and concerns were expressed by the broadest group of people possible. The resulting goals and objectives are organized in four categories and are detailed in the separate Planning Background document.

- Educational
- Branch Campus Management/Operation
- Environmental/Social/Cultural/Land Use
- Economic

The educational goals and objectives include facility and program directions, relationships with the ASU Main campus and population service expectations. The branch campus management/operations goals and objectives highlight "step child" concerns and specify management and functional topics. A broad range of more specific physical and social/cultural goals and objectives were given in the environmental category. In addition, local community planning is included as expressed in the North Mountain Village Community Plan prepared under the guidance of the City of Phoenix. Finally, economic goals and objectives are given from both the ASU and private developer perspectives.

The most prevalent guidance for the ASU West Campus was stated as the need for:

- Flexibility
- Quality
- Compatibility, and
- Responsiveness

in order to set a standard for local community improvement.

PLAN CONCEPT

The ASU West Campus Plan is a physical expression of the goals and objectives for the project. The concept is one of mixed-use (academic/non-academic) development that is cost-effective and financially feasible. The campus will serve a "non-traditional" student, typically older (25-44 age group), commuting by car and desiring upper-level and graduate-level university education. The plan optimizes the use of the property for its intended purpose and at the same time recognizes the need for compatibility within the local community. It is intended to exhibit a high standard of excellence that will set the tone for development in the campus area.

The plan provides a flexible framework for managing the growth and development of the campus responsive to evolving conditions.

The ASU West Campus Plan was derived from a combination of conceptual ideas determined to be the most appropriate by all participants in the planning process. Campus form and function determinants, tempered by economic factors and needs for flexibility in implementation, all provide the basis of the concept. Key aspects of the selected plan are:

- It includes forms of the "marketplace" where the use/activity mix and hierarchy of pedestrian circulation and spaces enhance the opportunity for social encounter and exchange among students, faculty and staff.
- The "meandering main street" is a central, organizing pedestrian path and is allowed to be more compact because there are secondary cross routes fronted by retail shops.
- The concentration of the "clustered" concept is expressed in courtyard massing of buildings improving solar response and by the organized groupings of uses.
- The sense of the "oasis" is provided in the plazas, system of arcades, courtyards and enclosure from the surrounding exposure to vast, open space and drying winds within buildings enhanced by a limited use of water features.
- A campus "heart", or "town square", is created by key building elements -- library, student services and administration along with classroom, lab and academic office spaces -- which enclose a large, central courtyard.
- A linear growth system is established allowing incremental change within a structured framework.
- The significant requirement of accommodating all parking demands for the commuter campus is met by conveniently distributed and segmented parking areas.
- Vacant land is envisioned as a re-created "desertscape" preserve to buffer the campus and allow for future flexibility.
- A phasing plan is included to direct development of a "critical mass" of buildings presenting an image of completeness even at interim phases. Timing of development is related to population-based space needs.

General Plan Elements

GENERAL PLAN ELEMENTS

Land Use and Scale

The organization of academic and non-academic uses is shown for each phase in Figures 7 and 8. These drawings are illustrative site plans showing one possible configuration of buildings consistent with the campus concept. The overall scale and massing of the campus are depicted in the photographs of the model shown in Figures 9 and 10. Key academic facilities are highlighted in Figure 11. The series of sketches shown in Figures 12 through 14 depict the general character of development.

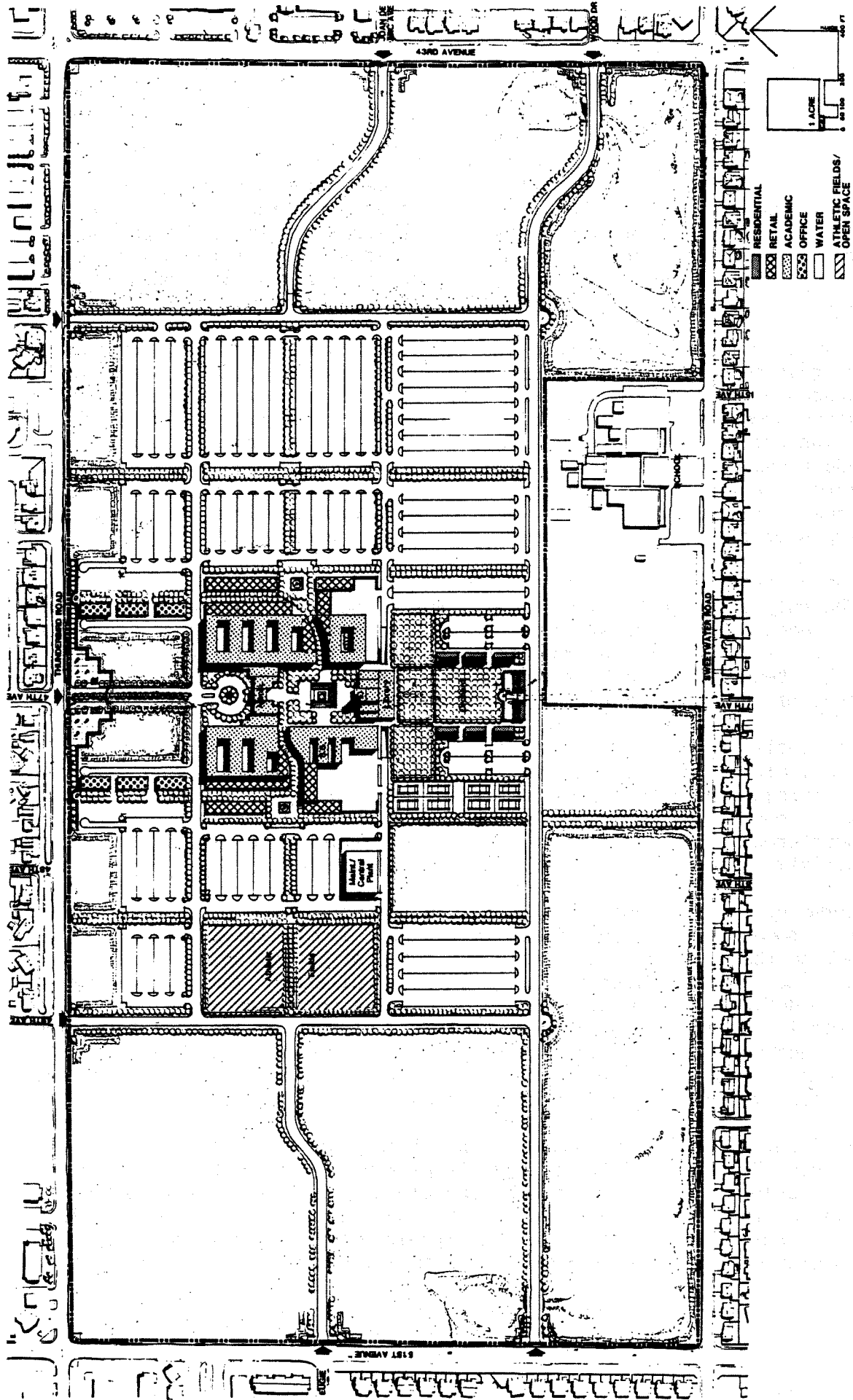
All academic uses, including the library, student services, administration, recreation center, auditorium, maintenance/central plant, classrooms, labs and academic offices, are located within a central development zone. Building structures are oriented along a central east/west and two north/south pedestrian corridors. There is a main plaza with the landmark library and two additional, smaller plazas. The recreation center and its adjacent athletic fields terminate the west end of the campus spine while the auditorium is located at the eastern end. Service functions are from the north and south edges of the rectangular campus development zone.

The vertical scale of all academic buildings ranges from one to four stories. The only exception is the library, where the front facade extends higher and includes a tower, possibly for electronic communication purposes. The central plaza is defined by the most massive and tallest buildings. The scale generally steps down from this four-story area to one story at the east and west ends of the development, as can be seen in the model photographs.

Commercial retail uses (restaurants, day care, cleaners, convenience shops, etc.) are clustered along the two north/south pedestrian corridors. All building structures are one story in height and establish a continuous frontage along the street edges. Phased development is to be contiguous and not scattered. The intent is to include the variety and vitality of the retail activity immediately within the campus environment.

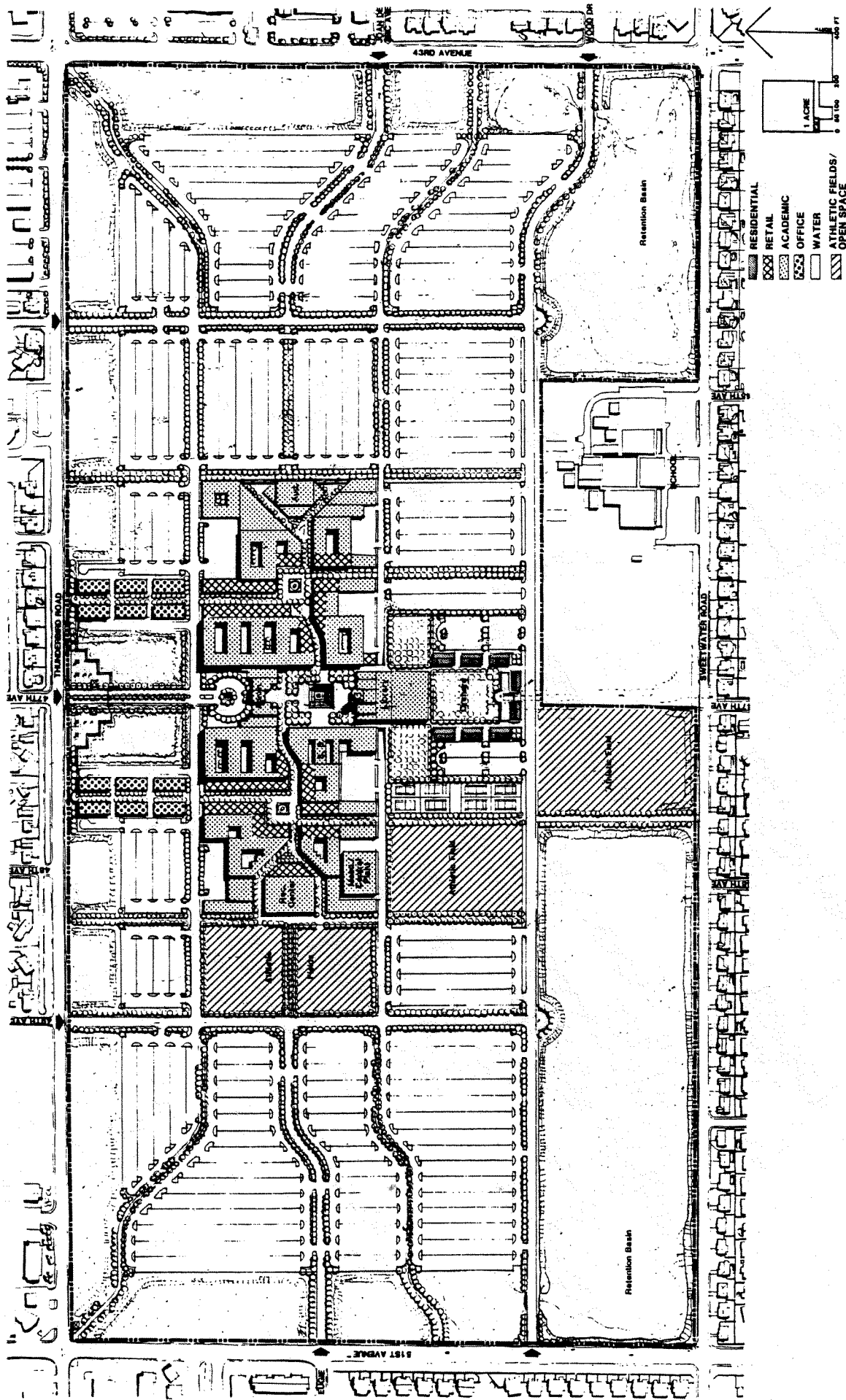
Commercial office uses are located to the north of the academic and retail with some frontage upon Thunderbird Road. Two building clusters serve to define the edges of the main campus entry with open space which terminates in a circular drop-off/drive at the gateway building. The office development also defines the two north/south pedestrian corridors which continue to the retail area within the campus. Building structures are one-story except for the northernmost buildings along Thunderbird Road which are two stories. The location responds to expressed needs for high visibility and functional separation yet proximity to academic uses.

Residential uses occur south of the library and are buffered by a regularly planted "orchard" of trees. Buildings are envisioned to be rental apartments available to the general public and are all three stories in height. The site plan of the residential development shown in Figures 7 and 8 is illustrative; it is anticipated that instead of linear buildings, a less rigid system of housing courts would be developed within a similar linear configuration.

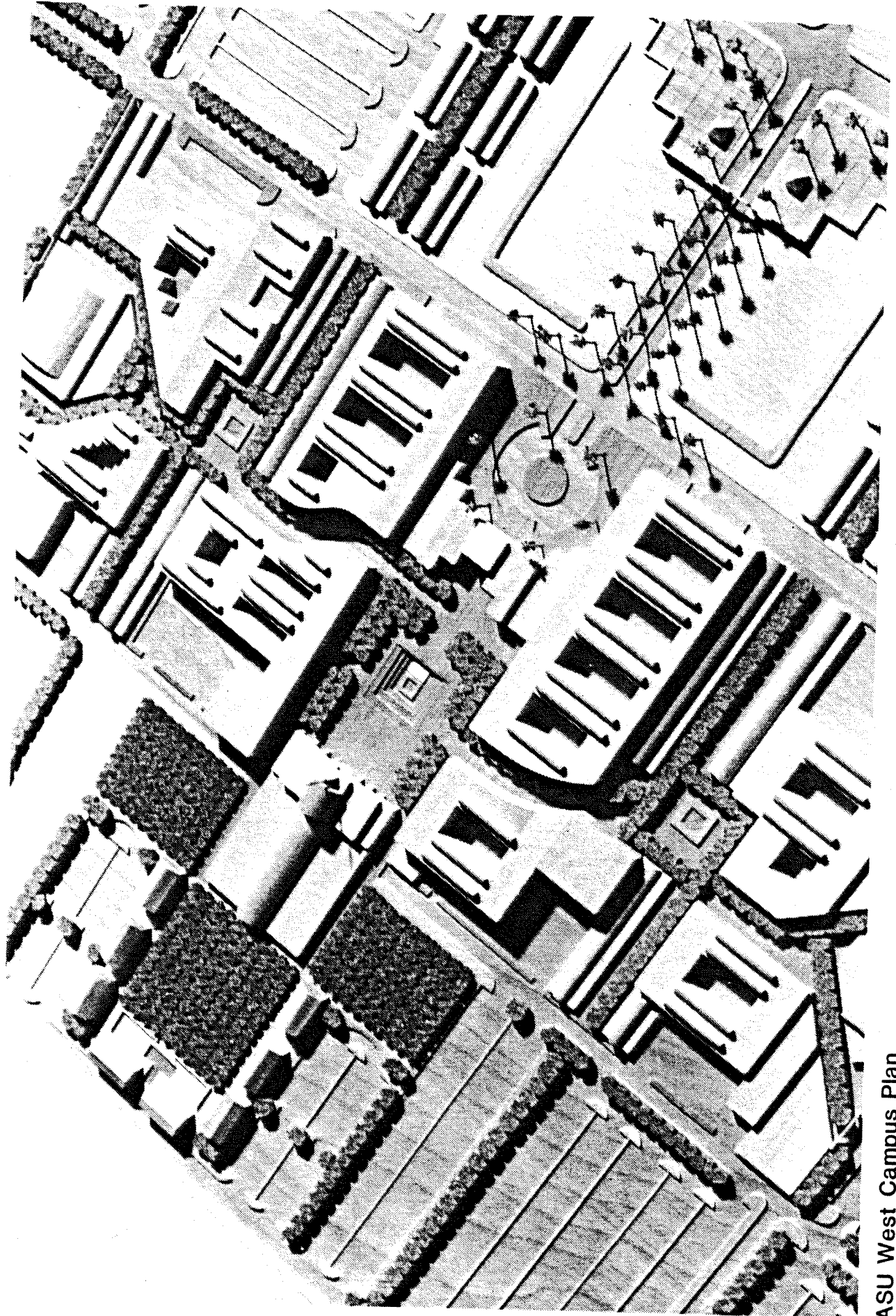


ASU West Campus Plan
 Land Use: Initial Phase

Figure 7



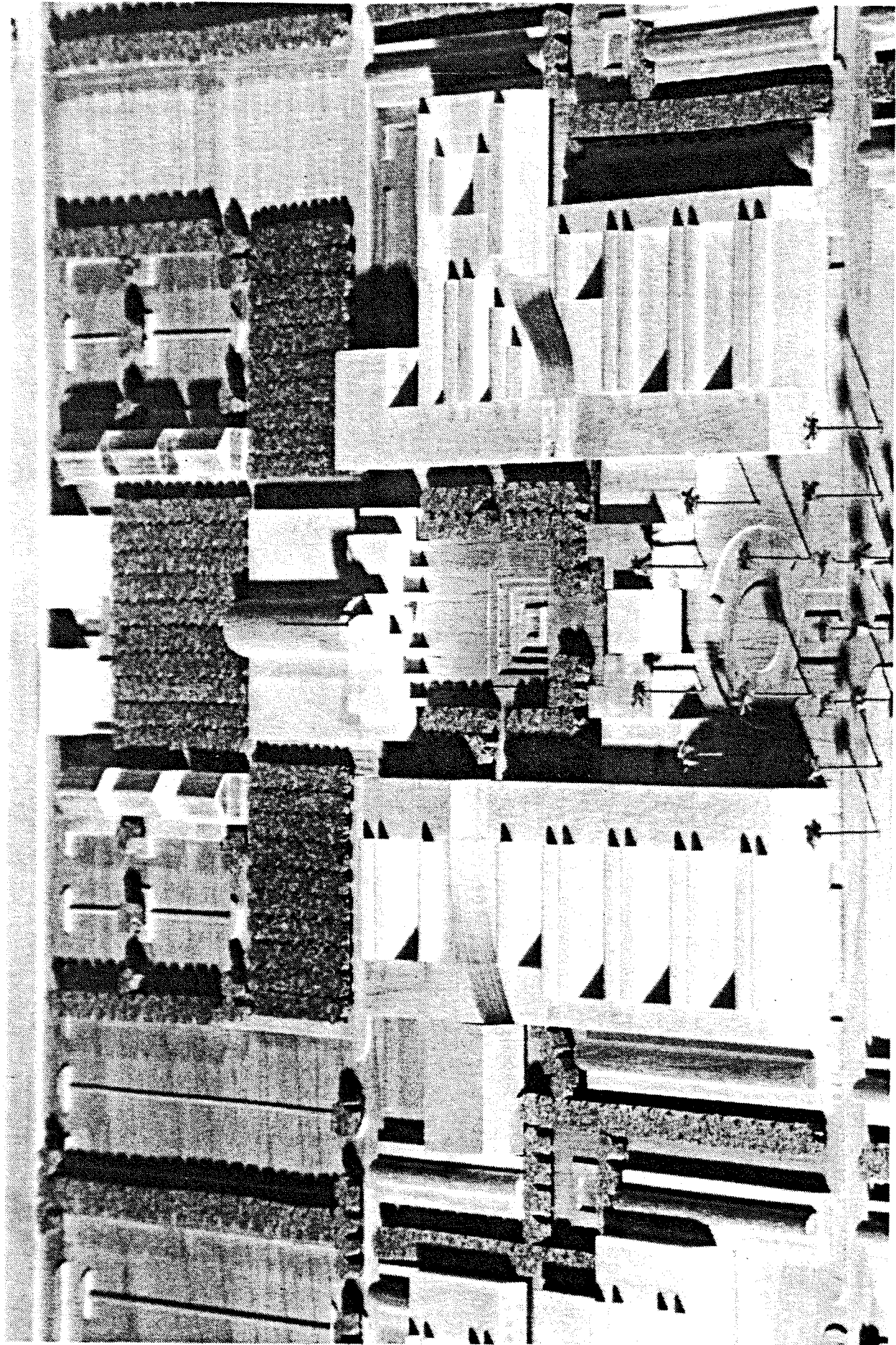
ASU West Campus Plan
Land Use: Build Out
 Figure 8



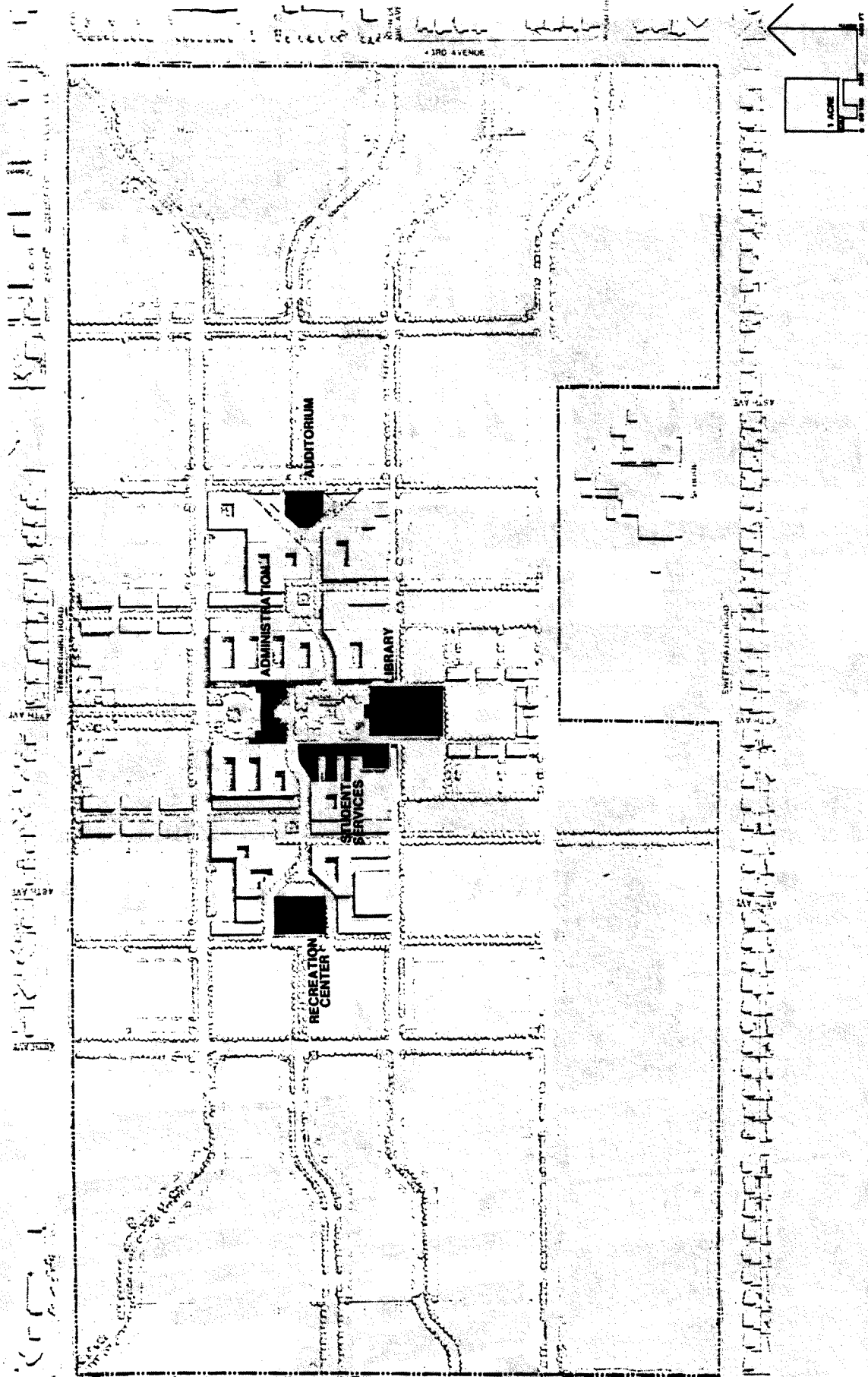
ASU West Campus Plan

View of Campus Core with "Main Street"

Figure 9

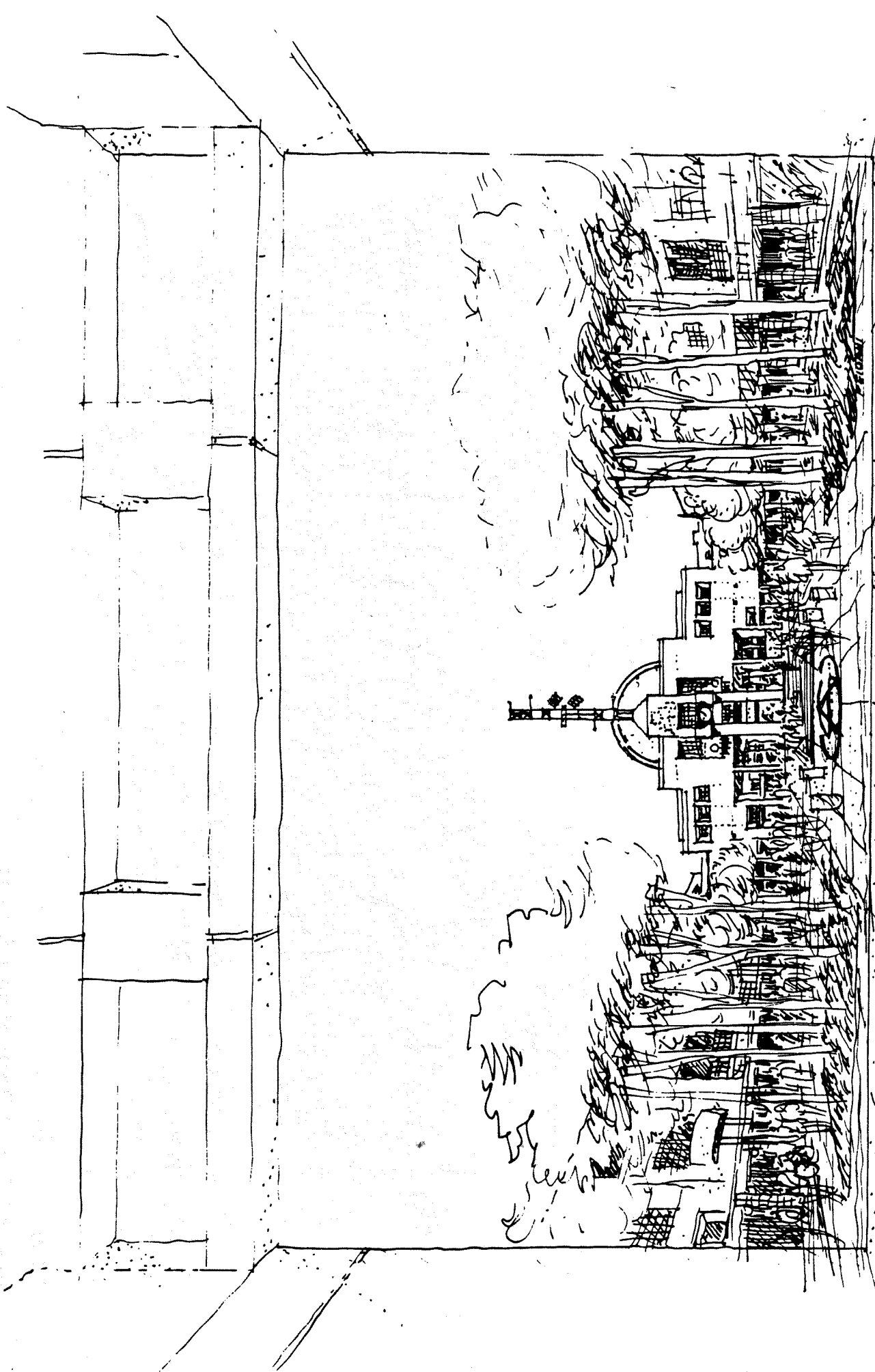


ASU West Campus Plan
View of Library, Main Plaza and Campus Core
Figure 10



ASU West Campus Plan
Key Academic Elements

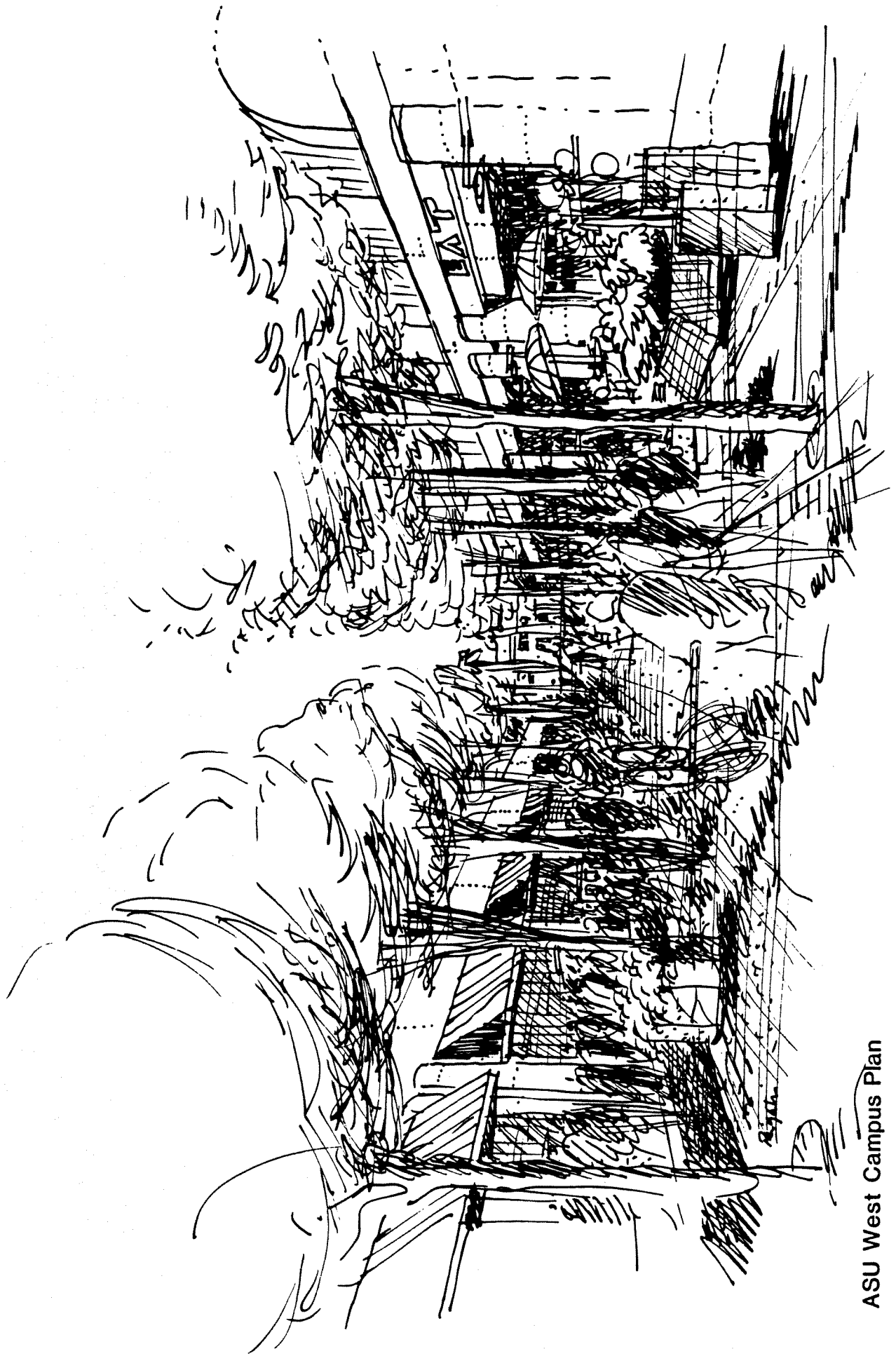
Figure 11



ASU West Campus Plan

View of Library and Central Plaza

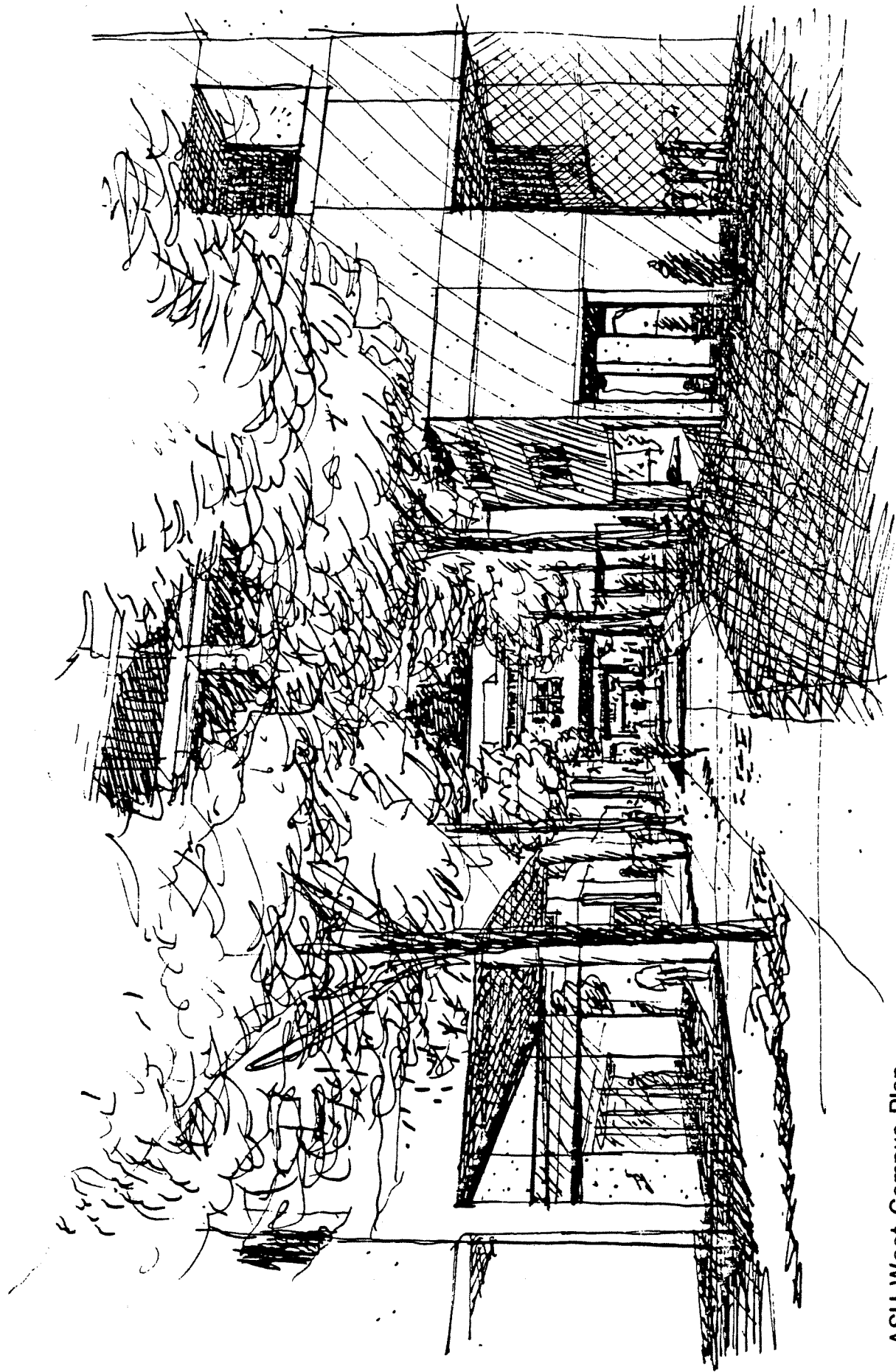
Figure 12



ASU West Campus Plan

View of Retail Pedestrian Street

Figure 13



ASU West Campus Plan
View of Academic Core

Figure 14

Surface parking consumes a large land area and is provided to accommodate all demands of the commuter student, faculty and staff as well as the non-academic uses. The build-out plan illustrates the projected ultimate parking capacity. It is likely that this maximum will not be reached and the plan responds to small incremental parking additions as they are needed.

Another significant area is recreated desert landscape open space around the periphery of the site. Storm water drainage is accommodated in retention basins at the southwest and southeast corners of the property.

Table 1 summarizes the total campus land use allocation. The building space program to be developed is given in Table 2. A more detailed specification of land use is given in the Design Guidelines section.

TABLE 1
LAND USE AREAS: CAMPUS BUILD-OUT

<u>Use</u>	<u>Approximate Area (Acres)</u>	<u>% of Total Site</u>
Academic	15.0 acres	5.0%
Commercial Office	2.0	0.6
Residential	2.0	0.6
Retail	2.5	0.8
Athletic Fields/Recreation	17.5	0.6
Desert landscape/Open Space/Vacant	94.0	31.0
Vehicular Circulation/Access (ROW)	27.0	9.0
Parking/Service Areas & Landscaping	118.5	40.0
Pedestrian Circulation/Malls	<u>21.5</u>	<u>7.0</u>
Total Site	<u><u>300.0 acres</u></u>	<u><u>100.0%</u></u>

TABLE 2

DETAILED ACADEMIC SPACE PROGRAM

<u>Space</u>	<u>Net Assignable Square Feet</u>	
	<u>Initial (5,000 FTE)</u>	<u>Total Build-Out (10,000 FTE)</u>
Classroom	39,000	78,000
Class Lab	29,000	58,000
Research Lab	45,000	90,000
Faculty Office	53,500	107,000
Administration & Support Staff Office	52,000	104,000
Library:		
Stacks	20,500	41,000
Reading Area	30,000	60,000
Administration & Service	10,000	20,000
Computer Lab and Support	7,500	10,000
Student Services	60,000	100,000
Student Personal Storage	7,500	15,000
Plant Operation and Maintenance	15,000	25,000
Assembly Space (auditorium/theatre)	0	14,000
Gymnasium	0	26,000
Total Net Assignable Square Feet	<u>369,000</u>	<u>748,000</u>
ESTIMATED GROSS SQUARE FEET REQUIRED	<u>570,000</u>	<u>1,140,000</u>
Parking	6,500 spaces	10,500 spaces

DETAILED NON-ACADEMIC SPACE PROGRAM

<u>Commercial Space</u>	<u>Gross Square Feet</u>	
	<u>Initial</u>	<u>Total Build-Out</u>
Retail	50,000	100,000
Restaurant	5,000	10,000
Office	50,000	100,000
Housing (150 units)	<u>92,500</u>	<u>92,500</u>
ESTIMATED GROSS SQUARE FEET	<u>197,500</u>	<u>302,500</u>
Parking	659 spaces	1,150 spaces

Circulation

The ASU West Campus Plan includes a circulation hierarchy of vehicular and separated pedestrian and bicycle systems. Site access/egress points are defined as are secondary access and service/delivery routes.

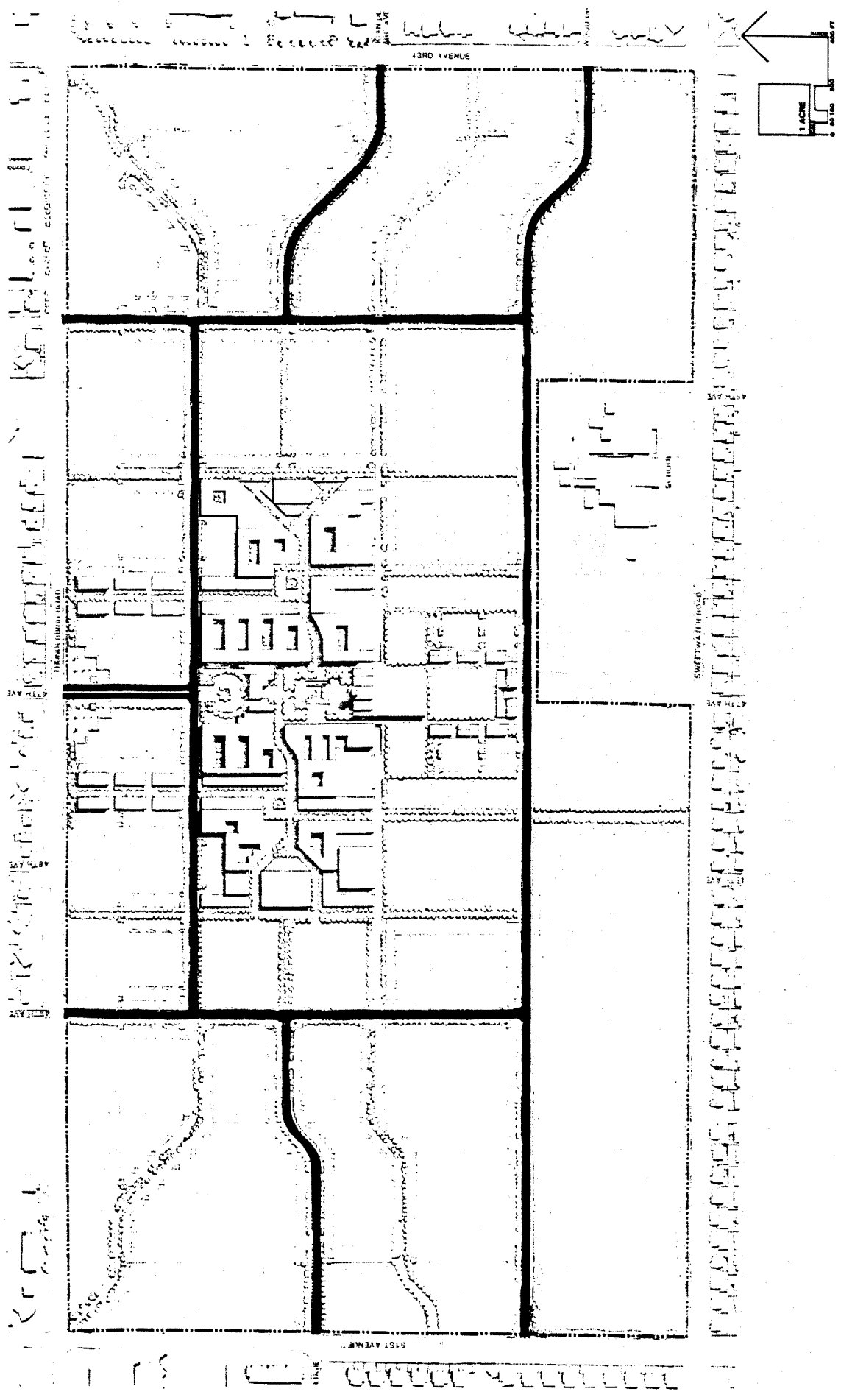
The primary vehicular circulation concept is shown in Figure 15. The primary loop road is to be a minimum of four lanes. The secondary access/service east/west road is three lanes -- one lane in each direction and a center left-turn lane. The central main entrance is a boulevard with two lanes in and two lanes out. Provisions for left-turn movements must also be accommodated at intersections. Three vehicular access/egress points are located along Thunderbird Road, all potentially signalized. There are two additional access/egress points along both 43rd and 51st Avenues. The circulation system consists of a central loop with frontage along the north edge of the campus buildings and the seven linkages to the adjoining public streets. No vehicular access is permitted from Sweetwater Avenue.

The evenly spaced campus entrances provide the basis for a uniform grid pattern of major access roads. These roads provide at least one major collector road on each perimeter of the campus on the east and west ends of the site, where the majority of parking occurs, additional major collector roads have been added to improve circulation on the campus.

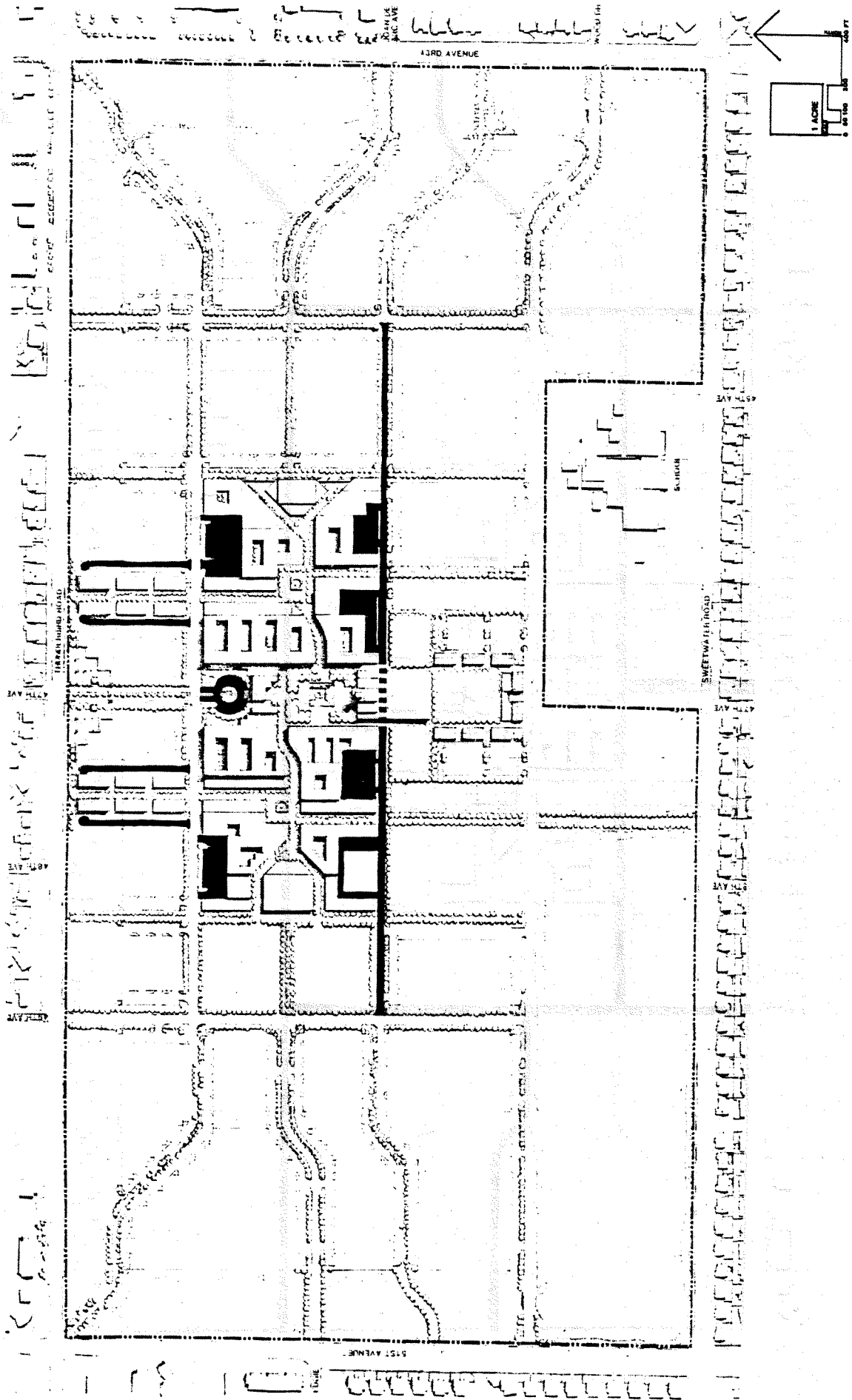
Secondary access and service are shown in Figure 16. These roadways are two lanes. An east/west route is located along the southern edge of campus buildings and slopes down to pass below grade under the library. This building's critical service/delivery/loading functions occur at the lower level. This service concept is to be supportive of the library design and not a restriction. Other academic and retail servicing occurs along the northern and southern campus edges through screened service yards or service courts. A grand circular drive allows drop-off and short-term parking at the gateway building and allows central campus access. The commercial office development near Thunderbird Road is serviced by four cul-de-sac drives.

The pedestrian and bicycle circulation concept is given in Figure 17. The primary pedestrian spaces consist of the central plaza, two secondary plazas and the interconnecting pedestrian "main street" mall which extends from the campus development to the east and west along landscaped walkways. Similarly, two north-south pedestrian malls link the commercial office with retail frontages within the campus core and continue as landscaped walkways to the south. Additional landscaped pedestrian walkways extend to the site edges and provide convenient access from parking areas to the campus. Sidewalks are developed along internal streets as well as along the site periphery. A separated bicycle lane is provided along the pedestrian walkways and sidewalks. Bicycle riding is prohibited within the two secondary plazas, central plaza and the connecting portions of the central mall.

More detailed descriptions and standards are included in the Design Guidelines section under Campus Vehicular and Pedestrian Systems.

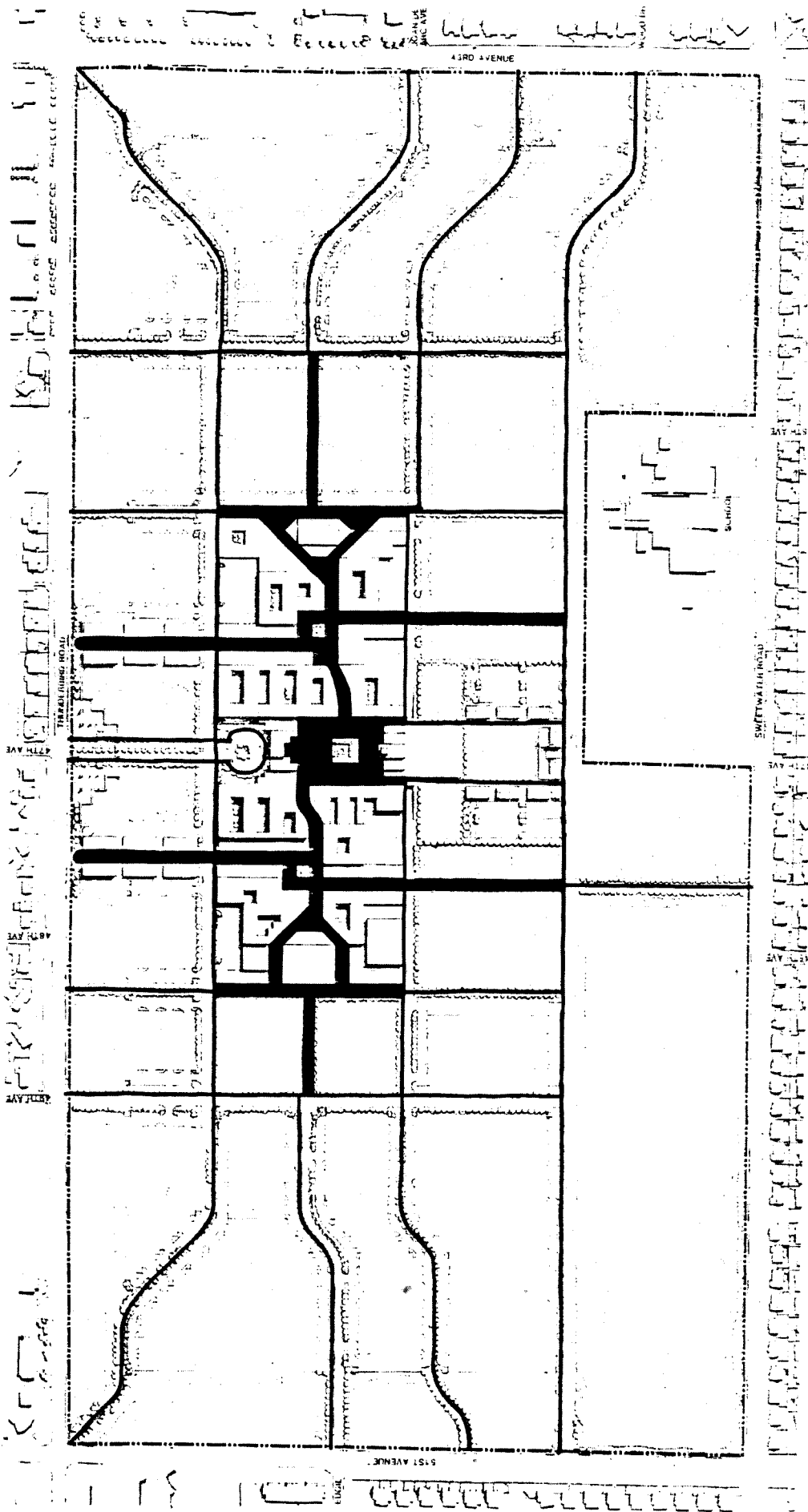


ASU West Campus Plan
Primary Vehicular Circulation
 Figure 15



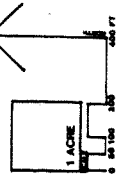
ASU West Campus Plan
 Secondary Access/Service

Figure 16

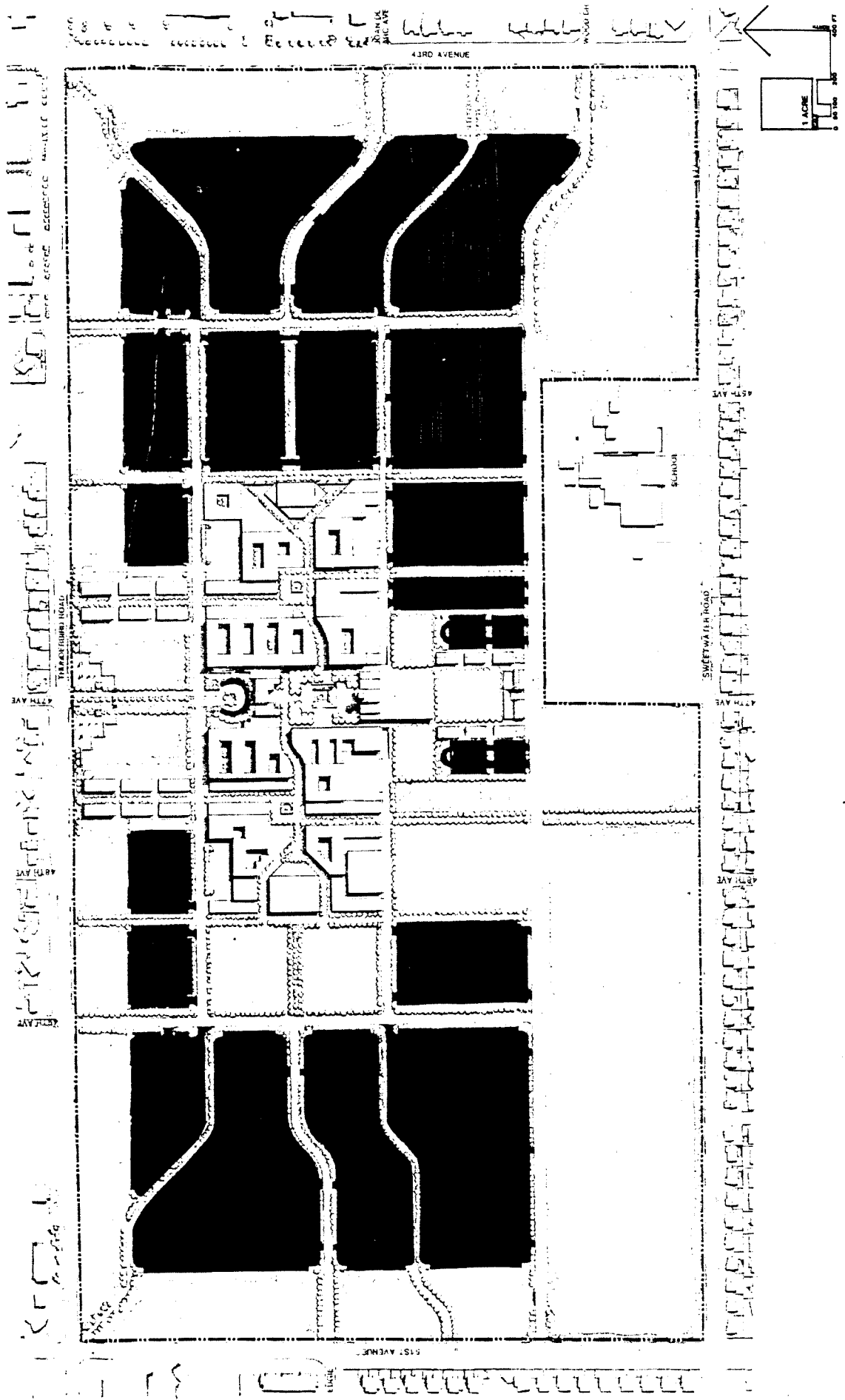


NOTES:

- Bicycle lanes separated from pedestrian walkways
- Bicycles excluded from Main Street pedestrian mall



ASU West Campus Plan
Pedestrian and Bicycle Circulation
 Figure 17



ASU West Campus Plan
Parking
 Figure 18

Parking

The total build-out campus development is envisioned to require parking for some 11,600 cars. The organizational concept for providing the parking is given in Figure 18. The plan's intent is to satisfy all campus (academic and non-academic) parking demands on-site, locate the parking conveniently, safely, in easily developable units and in a visually acceptable manner.

Parking areas are defined and accessed by both vehicular roads and pedestrian/bicycle ways. Mode conflicts are minimized by separation and limited crossings. The primary parking areas are clustered around the central campus development zone. This area bounded by the north/south roads at the site's quarter-mile access points from Thunderbird Road provides for about 5,000 spaces at build-out. The expansive parking areas to the west and east will accommodate the remaining parking supply but should be developed only if and when necessary.

The specific parking allocation by use and development standards are given in the Design Guidelines section.

Open Space/Landscaping/Water Features

The campus open space concept is depicted in Figure 19. Different types of areas range from passive to active, and recreational to desertscape to the formally landscaped.

Generally, the north, east and west site edges have recreated natural desertscape landscaping and contouring extending some 200 to 250 feet deep from the streets. Earth berms are setback to screen parking. The half-mile point along Thunderbird Road is distinguished as the main campus gateway by a more hard-surfaced form of space. A paved plaza with a wall screen is a forecourt to a desertscape space along either side of the boulevard entry drive. The use of "earthscaping" and natural desert plant material will create a refreshing approach to the circular drive at the gateway building.

The large areas at the southwest and southeast site corners are also improved as desertscape, but include provisions for storm water retention. These landscaped, bermed basins would normally be dry and only hold water during heavy rains and flooding. One possibility is to utilize these areas for recreational activities. The idea of contrasting a regularly organized campus with a free-form open space to the southwest could be considered.

Athletic fields are located at the west end of the campus development, adjacent to the future recreational center and in areas stepping to the southeast. The southernmost field is adjacent to the fields of Sweetwater Elementary School. Tennis courts are developed immediately north of this field.

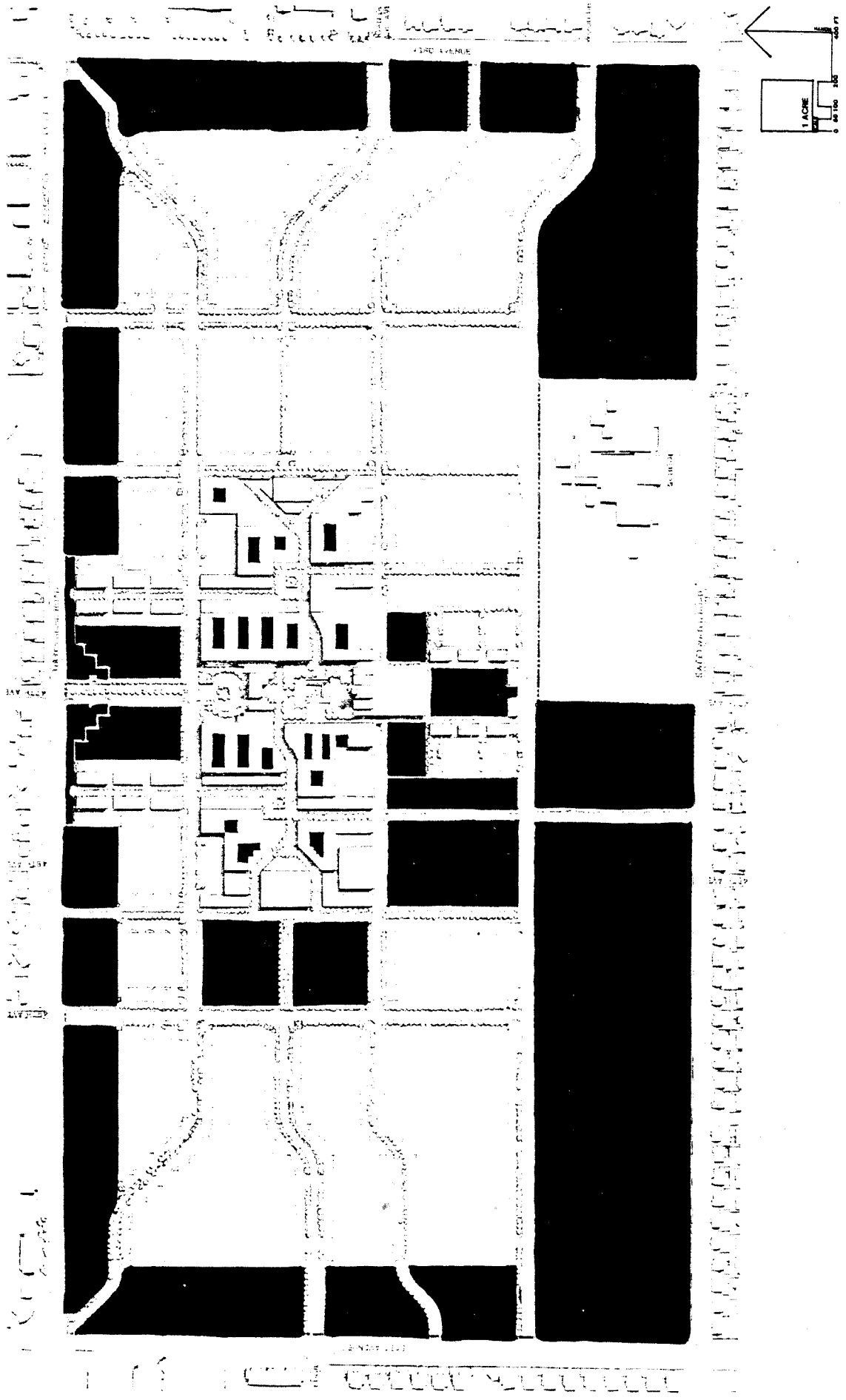
Another type of open space is the "orchard" in three areas around and south of the library. A regularly planted pattern of trees that forms a shade canopy is intended to provide a contemplative and noise buffer zone. It will also complement the residential area. Irrigation must be accomplished without "flooding" the area which would prevent use of the open space. A transition to more informal spaces will occur at the residential area.

A pattern of building courtyards create an "internal" open space and allow an east/west axis of buildings for proper solar exposure. The most appropriate scale of these courtyards must be determined with the design of academic buildings. The central plaza, two secondary plazas, the pedestrian "main street" and circular entry drive are also primary open spaces but are discussed as part of pedestrian circulation. The landscaping is organized by its relationship to circulation corridors, campus areas and functional needs. This network as well as the pallet of materials are provided in the Design Guidelines section.

The use of water is restricted, recognizing its scarceness (see Figure 20). There are three water features located within the central "main street" pedestrian mall -- one in the main plaza and one in each of the secondary plazas. No elaborate water displays or sculptures are envisioned; rather, bubbling ponds that create the refreshment of an oasis are planned.

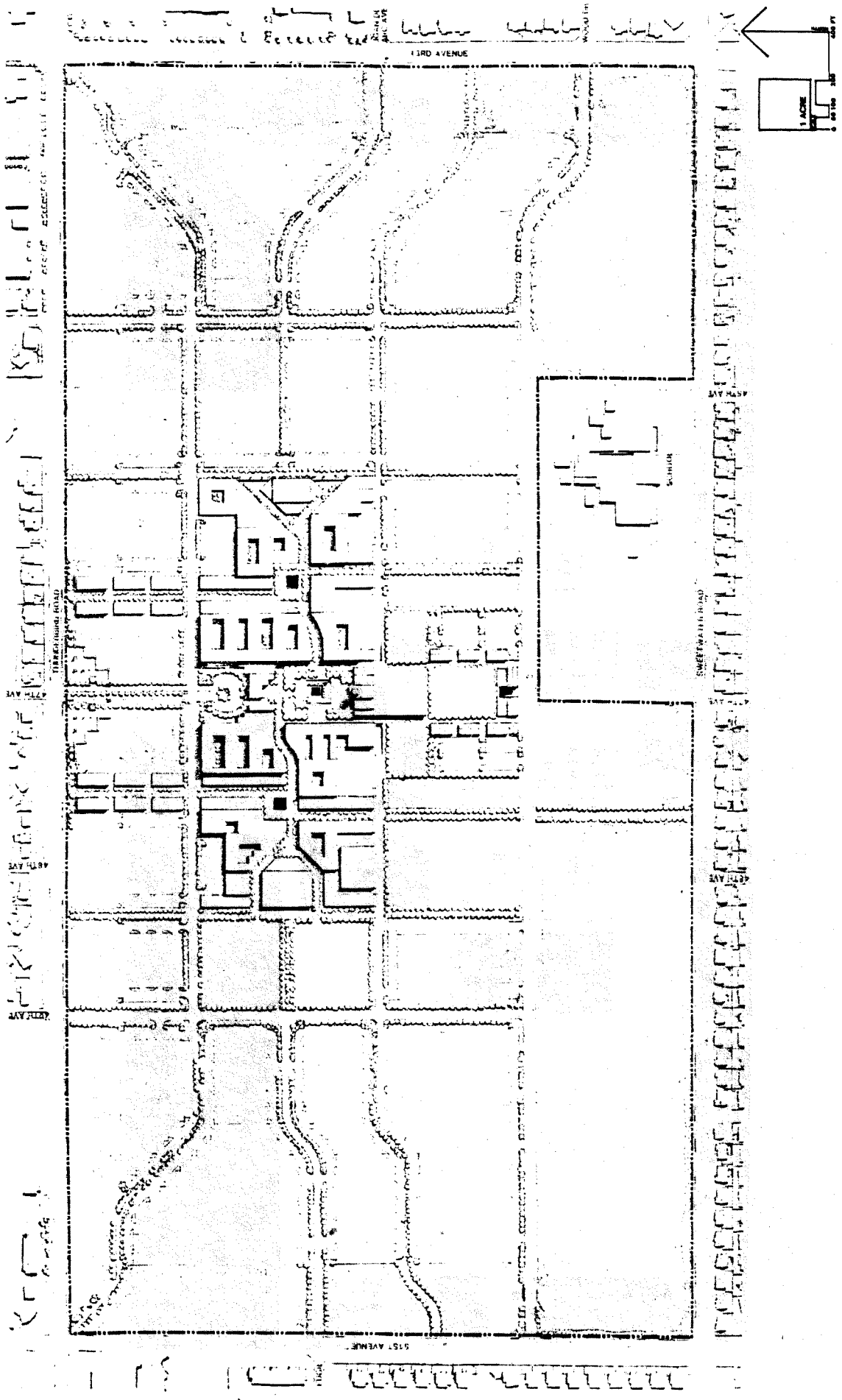
The fourth water element is a swimming pool developed as part of the housing. The pool is located central to the residential units and south of the "orchard."

Open spaces are also further detailed in the Design Guidelines section under Landscape Network, Pedestrian Systems and Campus Edges.



ASU West Campus Plan
Open Space

Figure 19



ASU West Campus Plan

Water

Figure 20

Utilities

Gas

Natural gas will be supplied to the main gas meters at the central plant located in the southwest corner of the campus core. The main gas usage will be for the production of steam for distribution to produce domestic and heating hot water in each building. Other uses of gas will be to laboratories and a smaller line will be routed by direct burial to various lab uses as they occur.

Telephone

It is anticipated that ASU will purchase a mainframe and that interconnection with the Tempe Main Campus will be accomplished via microwave. The possibility of using Mountain Bell "T-1" computer-quality land lines is a consideration that can be implemented.

Electric

Off-Site

The location of the campus is fortunate because of the proximity to an existing 12.5 kV distribution substation 1/8 of a mile west of the center of the campus site. Parallel feeders will be brought underground on the south side of Thunderbird from the substation to the Central Plant Building for further distribution.

An additional APS 12.5 kV substation will be in service when the campus begins development. Parallel feeders will be routed to the campus along 43rd Avenue and parallel an access road and be routed to the switchgear in the central plant.

On-Site

The reliability of electrical power supply directs the design of the on-site electrical distribution system to be a double-ended primary switchgear system with a normally open tie breaker. The feeders for the two halves should ideally be provided from two locations. The distribution feeders will each feed switching systems that will be located in the tunnel. The branch feeders will have overcurrent protection and be routed to switchgear on the ground floor of the various buildings.

Emergency Power

Owing to the proposed extended night-time use of the campus, an emergency generator will be provided to ensure the functioning of emergency lights for egress, exit signs, alarm horns, etc., and power for elevators and other critical services. The emergency power will be distributed through the common utility tunnel system.

Central Plant

It was determined that a centralized plant would result in less annual operating costs for the campus. There were only marginal differences in the initial capital costs with a relatively short payback period. It may be appropriate to study the question of centralized versus decentralized in more detail, particularly in terms of energy conservation and management during the preliminary programming and design of buildings.

The location of the central plant is such that it is clustered closely to the load to be served, accessible for equipment deliveries and is adjacent to the tunnel system. The general slope of the ground is also such that the steam condensate would be able to return to the central plant by gravity and avoid the need of pumping the condensate back to the central plant.

Tunnel System

The tunnel system will serve as the main conduit for the utilities and permit expansion of the systems without disturbing campus traffic patterns. In addition, the tunnel will provide an effective corridor for the distribution of the primary feeder cables. At major campuses like this one, the telephone distribution network is extensive and will take advantage of the tunnel as will the computer cabling between mainframes and remote terminals.

Water

Domestic water service will be interconnected to the City of Phoenix water system at three locations (Thunderbird Road - 12"; 43rd Avenue - 12"; and Sweetwater Avenue - 8"). This means of connection will provide ample pressure and flow for the campus as well as provide the fire protection required.

The mains directly connecting to the off-site mains will be either 10" or 12" diameter, with 8" diameter mains interconnecting on a grid to provide the necessary fire hydrant spacing and building service connections.

Metering can be accomplished at the right of ways to reduce the number of meters required for the site.

Irrigation Water

The site contains a well which was utilized to irrigate fields. This well and the Grandfathered Water Rights are available to the site for irrigation. With these rights the site can be adequately landscaped to provide an aesthetically pleasing campus at a reduced cost. The amount of water used will have to be metered and limited to an established maximum per year.

Sanitary Sewer

The site sanitary sewer will be connected to the existing City of Phoenix sanitary sewer system near the Sweetwater Avenue and 47th Avenue intersection. That sewer is a 21 inch diameter service.

One site mains will be extended from the existing main north to the campus with a 12" main. As lines branch off the sanitary sewer will be reduced to 10" and 8" diameter mains.

Exact locations and flow direction of sewers will depend to a large extent on the final grading plan established for the campus. If portions near the center of the campus are raised above existing grade the sewer can be kept around the perimeter of the site and outside the major pedestrian paths and mainstreet. This would be most desirable because if repairs are required or new taps are required there will be less impact on the campus.

If sewers are extended through the campus sufficient taps will be made to minimize future disturbance.

Drainage

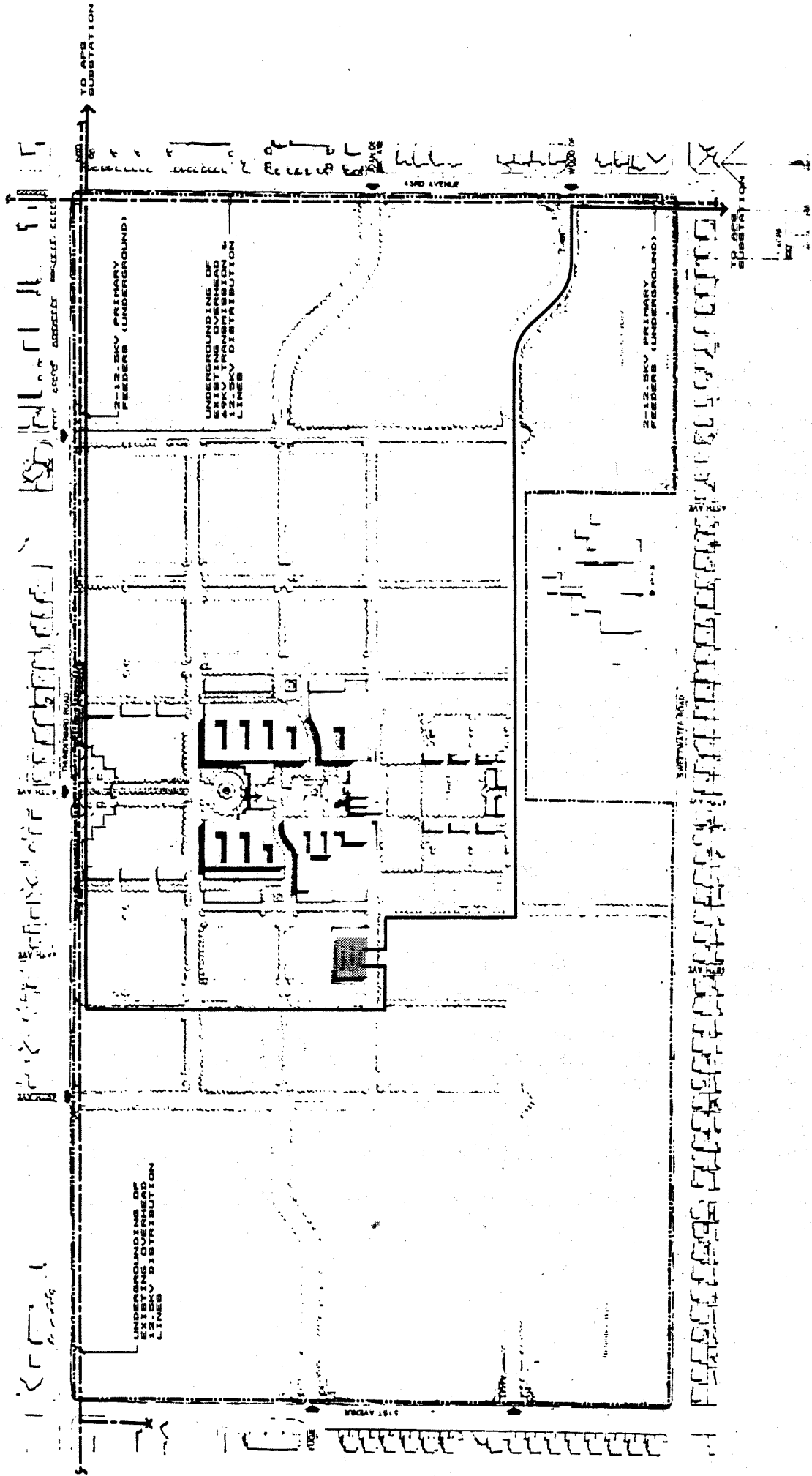
The Campus Plan has provided very adequately for necessary on-site retention basins. Large open areas have been provided in both the southeast and southwest corners of the property for these basins. In its present condition the entire site drains to these areas and it is anticipated the final grading design will direct the runoff to these locations.

A limited amount of subsurface drainage system will be utilized to allow the runoff from courtyards and protected walkways a path to the campus perimeter. From the campus perimeter a combination of dry crossings, meandering swales, and culverts will be utilized to transmit the surface runoff to the retention basins.

The parking lots around the perimeter will be designed to direct flow to the southeast and southwest and into the basins.

Each of the larger basin areas will contain drywells as the primary method of discharge. This will reduce the impact on adjacent neighborhoods as well as provide some recharge of the water table. In addition to the drywells each basin will contain a controlled overflow. This overflow will either be connected to a storm system or be directed to a street. No storm water runoff from this site will be directed toward or adversely impact the neighborhood.

Design of the basins will meet or exceed the current City of Phoenix standards.

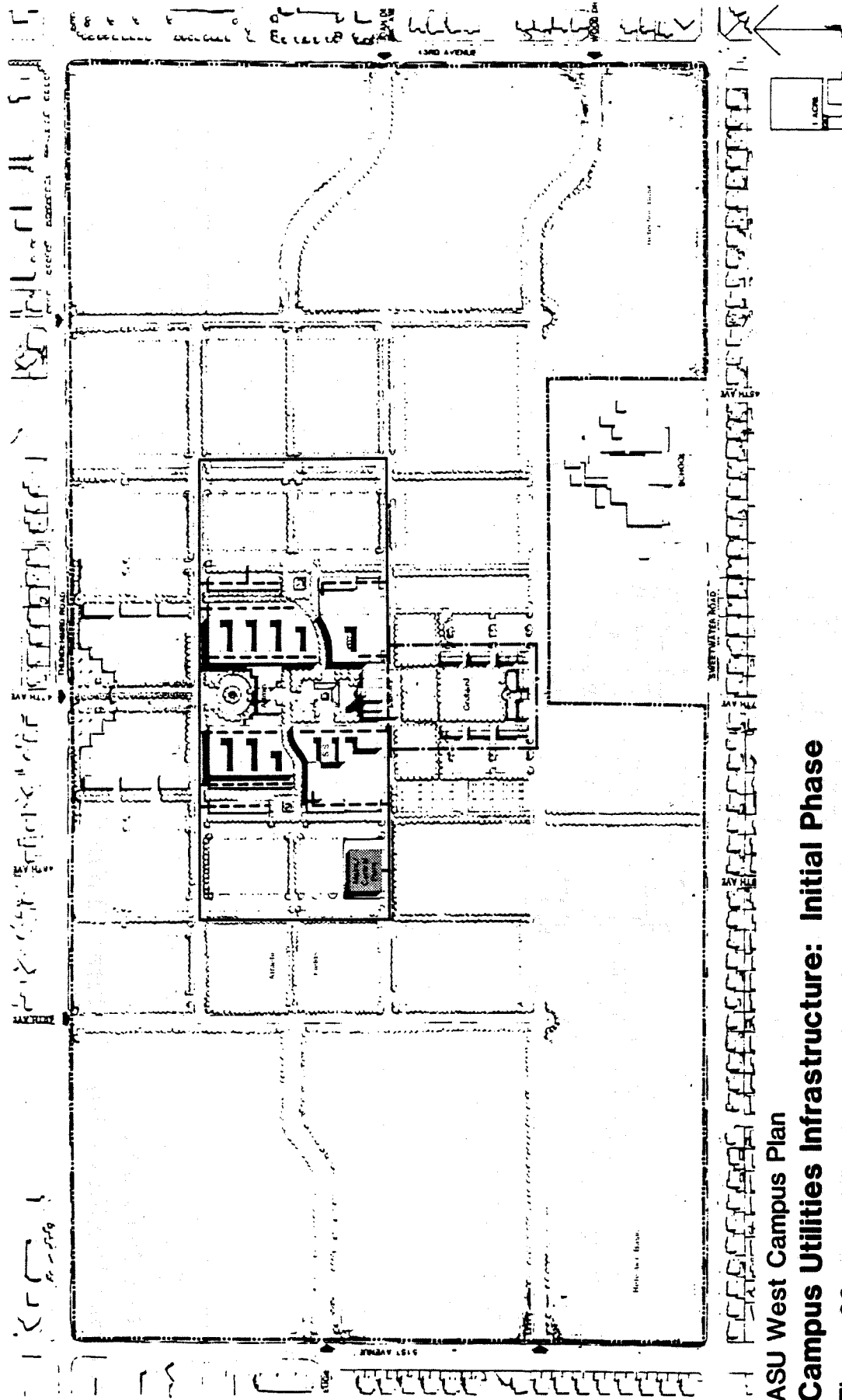


PRIMARY ELECTRICAL DISTRIBUTION

— OFF-ON SITE PRIMARY FEEDER

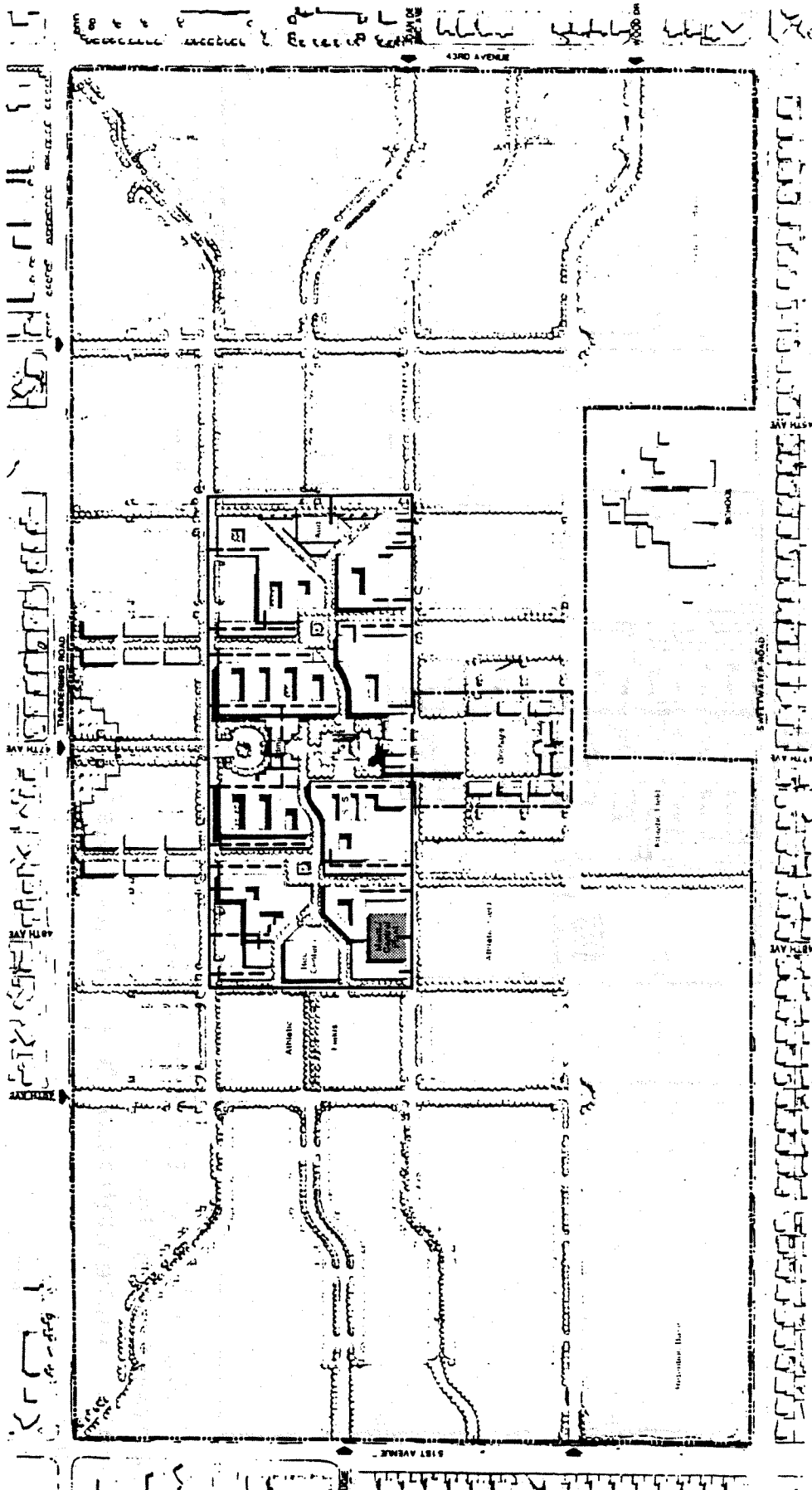
- - - UNDERGROUNDING OF EXISTING OVERHEAD ELECTRICAL SERVICE

ASU West Campus Plan
Primary Electrical Distribution: Initial Phase and Build-Out
 Figure 21



ASU West Campus Plan
Campus Utilities Infrastructure: Initial Phase
 Figure 22

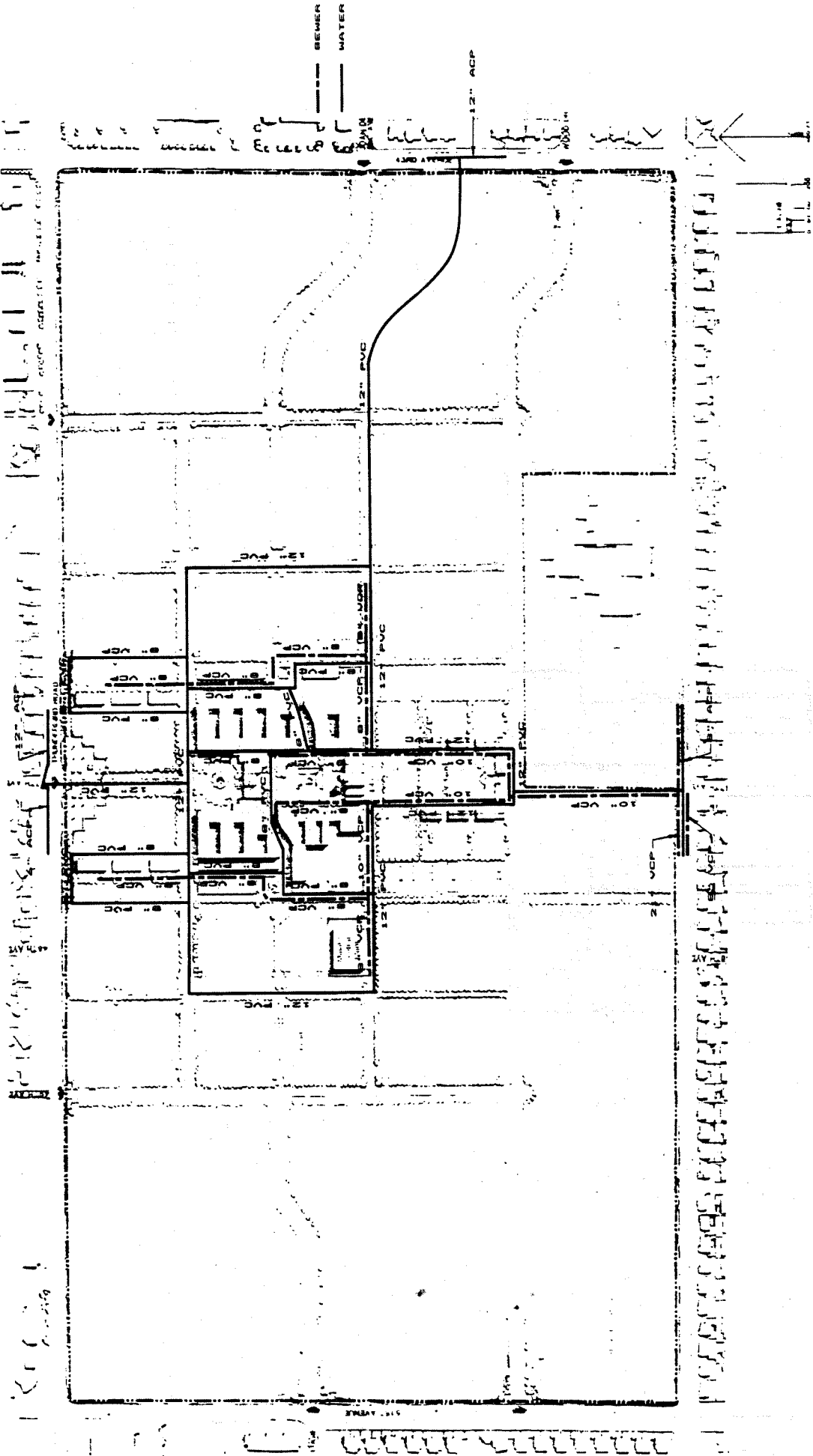
- | | | |
|--|---|--|
| <p>CAMPUS UTILITIES INFRASTRUCTURE</p> <ul style="list-style-type: none"> — PRIMARY UTILITY TUNNEL (BELOW STREET) - - - SECONDARY UTILITY TUNNEL (BELOW STRUCTURE) - - - SECONDARY UTILITY TUNNEL (BELOW OPEN AREA AND STREET) ■ CENTRAL PLANT | <p>PRIMARY UTILITY TUNNEL, INCLUDES DISTRIBUTION OF:</p> <ul style="list-style-type: none"> -CHILLED WATER -HIGH PRESSURE STEAM -DOMESTIC WATER -COMPUTER POWER -TELEPHONE -SYSTEM MANAGEMENT CONTROL -FIRE ALARM -SECURITY | <p>SECONDARY UTILITY TUNNEL, INCLUDES DISTRIBUTION OF:</p> <ul style="list-style-type: none"> -CHILLED WATER -STEAM -HIGH PRESSURE -DOMESTIC COLD WATER -DOMESTIC HOT WATER -TELEPHONE |
|--|---|--|



**ASU West Campus Plan
Campus Utilities Infrastructure: Build-Out**

Figure 23

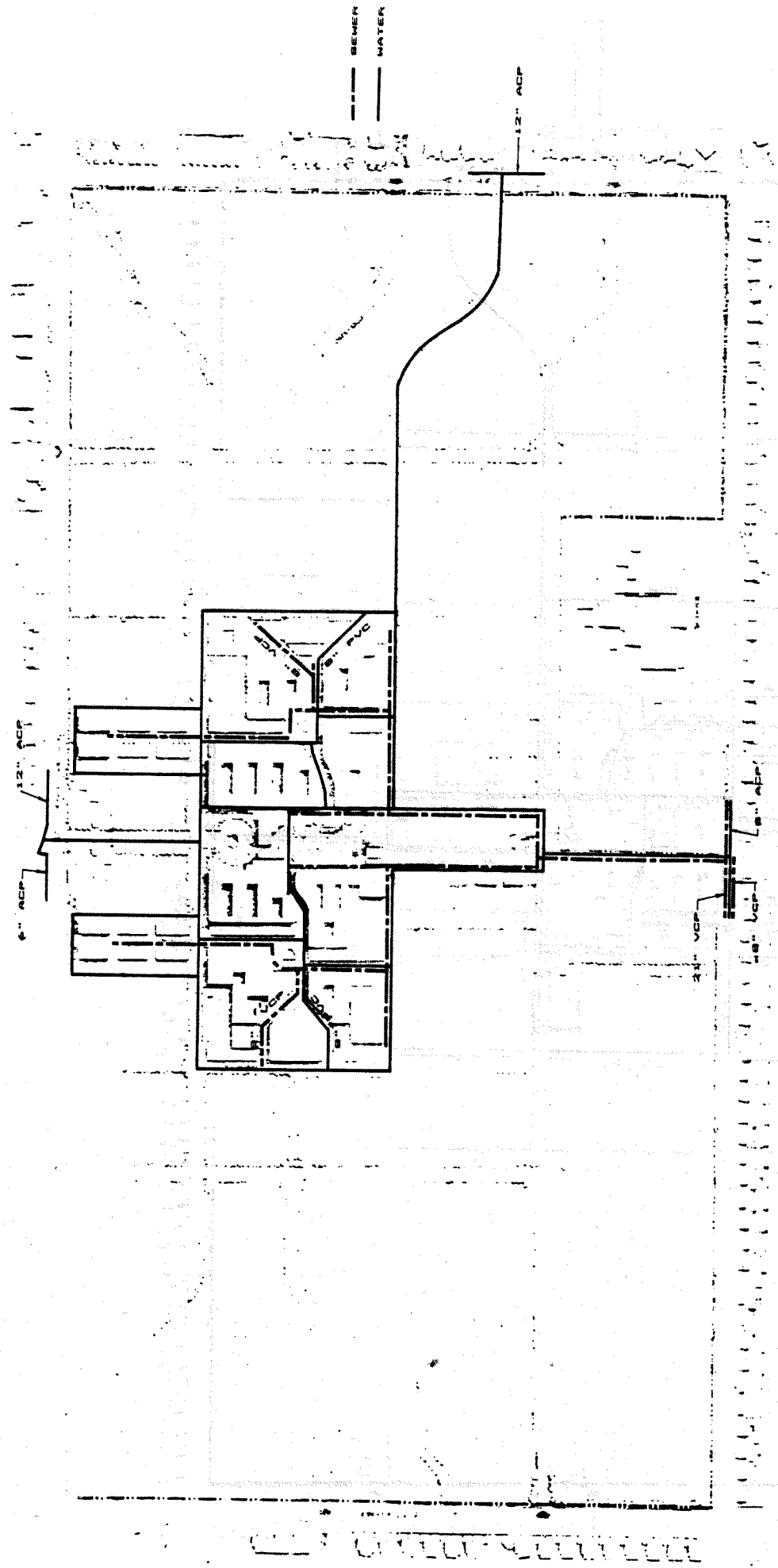
- CAMPUS UTILITIES INFRASTRUCTURE**
- PRIMARY UTILITY TUNNEL (BELOW STREET)
 - - - PRIMARY UTILITY TUNNEL (BELOW STRUCTURE)
 - · · SECONDARY UTILITY TUNNEL (BELOW OPEN AREA AND STREET)
 - CENTRAL PLANT
- PRIMARY UTILITY TUNNEL, INCLUDES DISTRIBUTION OF:**
- CHILLED WATER
 - HIGH PRESSURE STEAM
 - LOW PRESSURE STEAM
 - ELECTRICAL POWER
 - COMPUTER
 - ENERGY MANAGEMENT CONTROL SYSTEM (EMCS)
 - SECURITY
- SECONDARY UTILITY TUNNEL, INCLUDES DISTRIBUTION OF:**
- CHILLED WATER
 - HIGH PRESSURE STEAM
 - LOW PRESSURE STEAM
 - ELECTRICAL POWER
 - TELEPHONE



ASU West Campus Plan
Proposed Water and Sewer Layout: Initial Phase

Figure 24

ASU West Campus Plan
Proposed Water and Sewer Layout: Build-Out
ASU West Campus Plan



ASU West Campus Plan
Proposed Water and Sewer Layout: Build-Out
Figure 25

DESIGN GUIDELINES

Intent

The purpose of the West Campus Design Guidelines is to provide detailed direction to development thereby assuring the overall plan is achieved as envisioned. The design of individual campus elements or systems requires unification by a "common thread." This comprehensive framework imposes requirements upon each campus element for continuity and consistency, yet must also allow for flexibility in making many detailed design decisions not possible at this time. Thus the guidelines given in this section seek to strike a balance between reinforcement of the total campus concept and recognizing that conditions will change and all details cannot possibly be accounted for now.

It is the intent of the guidelines to be consistent with the ASU Facilities Development Guidelines. The need for consistency between the two campuses is recognized yet opportunities for the new ASU West development are unique and are appropriately highlighted by the following standards.

Nine elements of the campus are identified and described in the following material:

- Campus Sectors
- Campus Vehicular Systems
- Parking Zones
- Campus Pedestrian Systems
- Landscape Network
- Campus Edges
- Signage and Lighting
- Architectural Design
- Utilities and Drainage Systems

The Design Guidelines include a combination of prescriptive standards and more general performance standards. Selective illustrative examples are provided as explanatory details. These illustrations are to be interpreted broadly as a possible design concept, and not as a required design.

Performance Standards

Campus Sectors

Ten different campus sectors or land use zones are a key ingredient of the plan. Both academic and non-academic uses are specified by location and scale of development to define a campus building envelope. In addition, more specific design characteristics of the campus sectors are described. The purpose is to generalize the different development zones of the campus concept from the building siting shown in the illustrative ASU West Campus Plan drawing. Figure 26 defines the campus sectors. Descriptions of design guidelines for each sector follow.

Library

The location and scale of building development in this sector is intended to establish the most prominent landmark of the campus. The library with information storage, retrieval and exchange, communications and support functions is a campus-wide resource. Its development should reflect its importance.

The northerly frontage on the central plaza is to be continuous and four levels in height. The building facade could rise higher, particularly for a landmark tower feature. The building also could feature grand stairs leading to the main entrance. The building could step down to the south so that the majority of the structure is one-level. The facade also could step down to the east and west to distinguish the building from the adjacent campus core. There will be a physical separation of the library along the east and west sides to allow pedestrian movement.

The initial phase of development will likely be at the northern portion of the sector with later expansion to the south. The landmark status must be achieved in the initial phase.

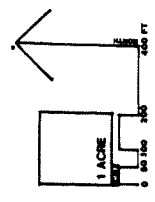
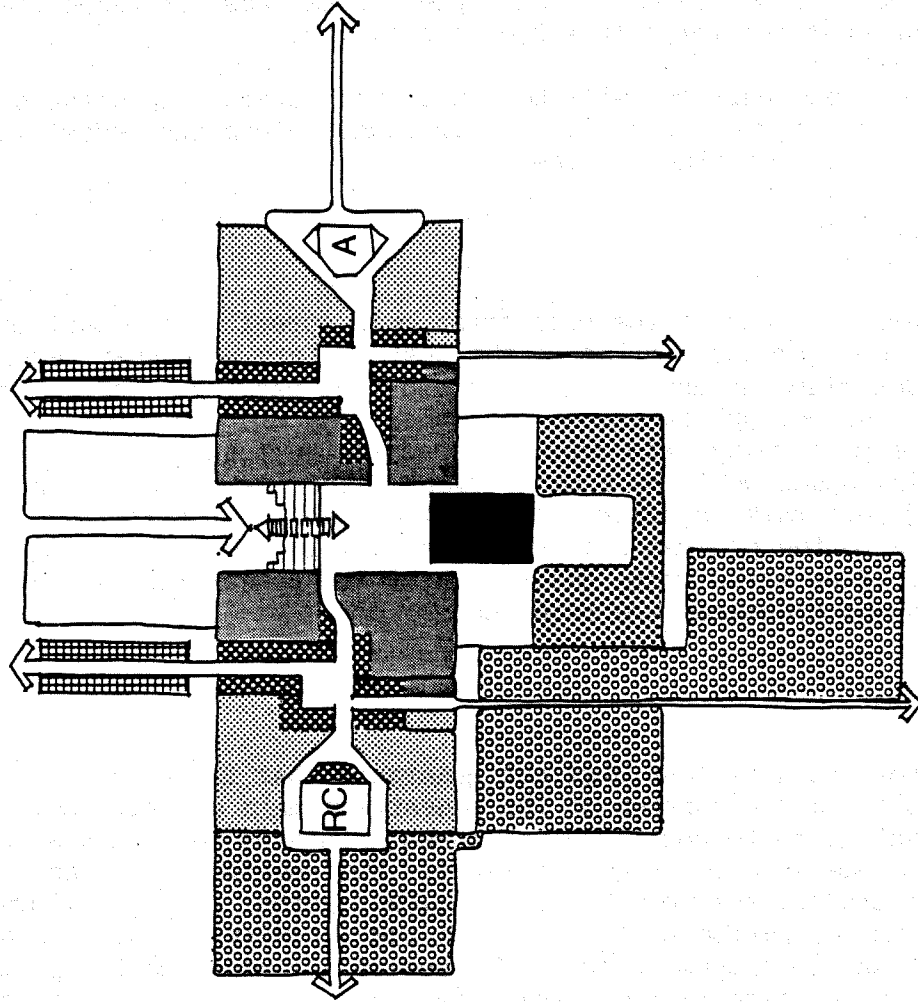
The secondary access and service road will slope down below grade to allow servicing functions at a lower building elevation. The service concept is to be supportive of the library design (not a determinant) and allow flexibility for changing future conditions while maintaining operations.

Gateway/Administration

Development will establish the northern edge and spatial closure of the central plaza and include a "portal" that visually and functionally links the main campus entry and circular drop-off drive with the heart of the campus. The through, at grade passageway is intended to be open to the air at each end and in alignment with the central axis.

The use is intended to be primarily administrative, although other academic functions could be included.

The vertical scale of the building is four levels although both vertical and horizontal modulation is desirable to distinguish the structure from the abutting academic buildings. The southern frontage of the building on the plaza is to be continuous (except for the portal).



- KEY**
- LIBRARY
 - RECREATION CENTER
 - CAMPUS CORE
 - COMMERCIAL OFFICE
 - RECREATION
 - ADMIN
 - AUDITORIUM
 - CAMPUS/RETAIL EXPANSION
 - RETAIL
 - HOUSING

ASU West Campus Plan
Campus Sectors
 Figure 26

Recreation Center

This sector is the western terminus of the pedestrian main street which divides to two routes around the facility. The use could be a gymnasium or health/fitness center. Since facility development is in future phases, the sector guidelines must be flexible but are intended to accommodate a recreation-oriented use. Any building must also recognize the exposure of the western edge of development, particularly in defining pedestrian access from parking areas to the campus. The western frontage is also on the open recreation fields and multiple "crossroads" of pedestrian routes. The design must reinforce this hub of activity.

The scale of the building will be one to two levels, depending on the specific program requirements. All frontages along the pedestrian mall must establish a continuous edge.

Auditorium

The eastern terminus of the pedestrian main street is the auditorium sector. Development, similar to the western terminus, must recognize the major pedestrian hub and movement to and from parking areas. The pedestrian main street splits around the site. The use could be an auditorium, theatre or performing arts center, depending on future program requirements. The space would be a major event gathering place making convenient, adjacent parking desirable. Vertical scale of buildings would be responsive to the program and one to two levels plus stagehouse if required. Strong street edge definition of the pedestrian mall is important so continuous frontages are required.

Campus Core

This sector includes four distinct quadrants that front on and define the central plaza and a portion of the pedestrian main street. Building development is to be continuous on these frontages to form distinct edges and to include arcades at ground level. The southwest quadrant is to include the student services facility which together with the library and gateway/administration building create the activity and balance necessary to establish the campus center. The use of all other buildings within this sector is academic including classrooms, labs, faculty offices and other support uses. The scale of all buildings is four levels to enclose the plaza space and form the most dense campus area.

All major building entrances must be oriented to the pedestrian main street or the central plaza. A courtyard or "ladder" building form is suggested to allow the long axis to be in an east/west orientation for optimum solar exposure to the north and south. Actual courtyard proportions will deserve special design consideration. One possible prototype is the creation of an "interior light machine" where the courtyards are engineered and controlled for light and heat. A second prototype is an exterior courtyard with natural exposure. Service functions would occur from the northern and southern vehicular street frontages of the four quadrants and from service courts. Secondary pedestrian movement between the courtyards could occur with an "openness" at grade level. However, this movement/open space must be clearly subordinate to the pedestrian main street, central plaza and two north/south pedestrian retail corridors.

Completion of the initial phase of campus development would also complete the buildings of the campus core sector.

(The envisioned form of the core academic buildings and adjacent library and gateway/administration buildings is depicted in Figure 34 with the description of Campus Pedestrian Systems.)

Campus/Retail Expansion

This sector also includes four quadrants located at the western and eastern ends of the campus. Development will occur here after the initial phase to reach build-out. Thus greater flexibility is necessary to accommodate the mix of academic and retail uses in the sector. The campus central physical plant and maintenance facility is located in the southwest quadrant. A portion of this facility will be developed in the initial phase.

The vertical scale of buildings ranges from three levels adjacent to the retail corridors to one level, stepping down to the eastern and western extremities. The courtyard building form is suggested to maintain an appropriate solar exposure. Each quadrant must also accommodate service yards and parking located and screened along the northern and southern frontage roads. Building "backdoors" must be clearly subordinate and utilized only for support purposes thereby not detracting from the overall pedestrian access system.

Frontages of the development must be continuous with arcades along the pedestrian main street. All major building entrances will be along this frontage or from the secondary plazas.

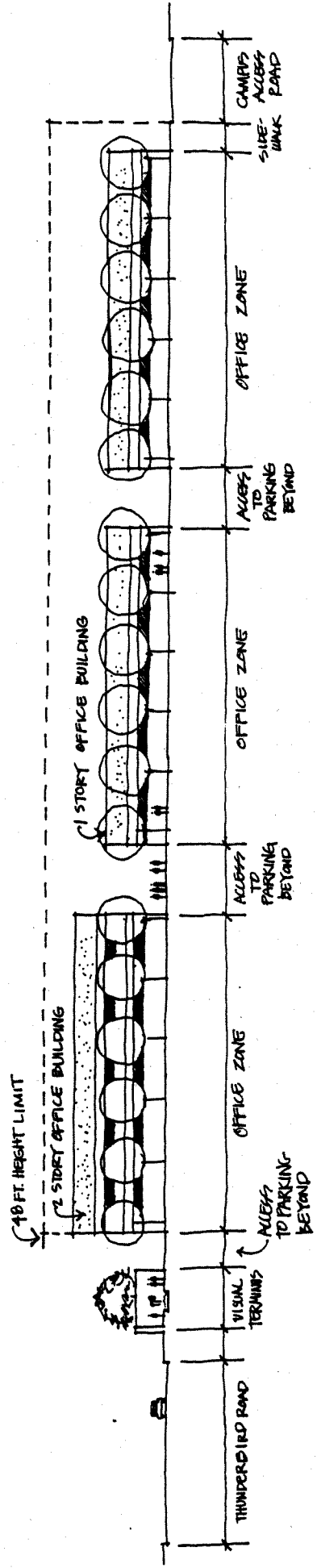
Commercial Office

This sector is for commercial office use and is located near Thunderbird Road at the northern edge and adjacent to the academic development. There is exposure to the major arterial and also proximity to the academic campus. Development will serve to create a garden-wall like edge to both sides of the major campus entry as well as to define a portion of the two north/south pedestrian corridors. All major building access will be from this pedestrian street. The pedestrian street could terminate at Thunderbird Road with a frontal portal plane to announce the zones presence to Thunderbird.

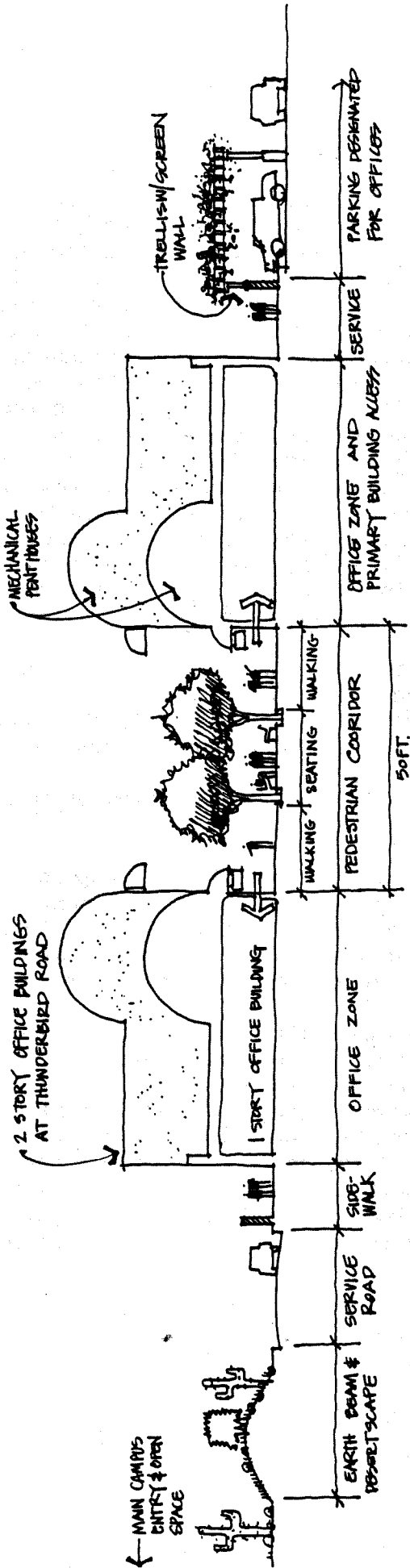
The scale of buildings is two levels for the northernmost structures at Thunderbird Road and one level for all remaining buildings. The materials, quality of construction, permanence and general character of the buildings must be the same as that of the academic campus. Signage should be restricted to small, pedestrian scale identification of businesses. Any private developer proposals should be subject to review and approval by the ASU West administration to assure consistency with the overall campus concept.

The initial phase of development will develop the two linear edges defining the campus entry space. The build-out phase will parallel this to the east and west and form the pedestrian corridors.

Figures 27 and 28 show the expected relationship of the commercial office development with the main campus entry, pedestrian corridor and necessary parking and service.



ASU West Campus Plan
North/South Section Through Office Corridor
 Figure 27



ASU West Campus Plan
East/West Section Through Office Corridor
 Figure 28

Retail

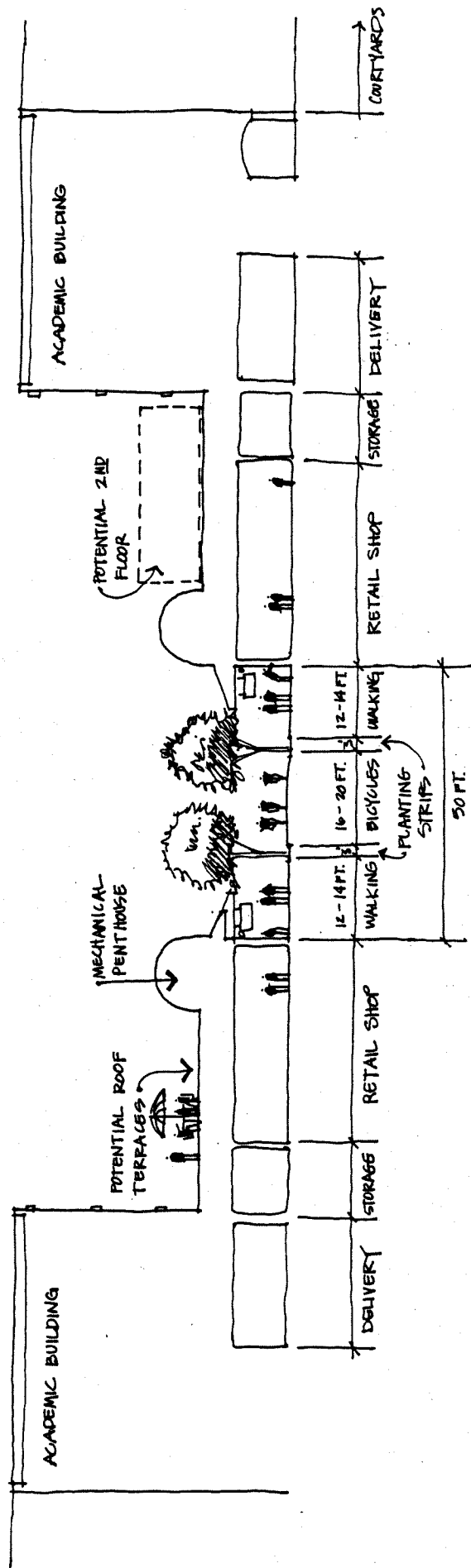
Commercial retail uses are located along the two north/south pedestrian corridors in one-level structures with a clustering of retail activity at the two secondary plazas. In some cases, retail uses could occupy the ground floor level of academic buildings. A continuous building frontage and all primary access is required along the pedestrian corridors. No building arcades along the frontage are to be developed, overhangs may be created by awnings or canopies to be coordinated in design. The specific types of retail uses are those important to campus occupants, i.e. restaurants, convenience shops, day care, cleaners, coffee shops, copy/printers, etc. Extended hours of operation should be encouraged. Construction materials, quality, permanence and the general character must be consistent with the adjacent academic campus. Only small scale identification signage will be permitted. Signs of a larger scale than the rest of the campus may be used as long as they positively contribute to the vitality of the retail zone. Backlit plastic face signs would not be permitted. Shops will be encouraged to have their particular services or sales present a "sign" in itself, such as a cafe having outdoor tables or a fruit stand having fruit displays. All development should be subject to review and approval by ASU West administration.

The intent is to integrate a variety of urban activities within the academic campus. Inclusion of office uses (or shifting of the commercial office with the retail areas) must only be considered if the extended hour vitality of a "marketplace" is not compromised.

Figure 29 shows the desired organization of the retail uses of the two north/south pedestrian streets.

The initial phase of development will respond to market conditions but should be contiguous in development. Segments of the retail frontage should be developed to avoid vacant "holes" in the streetscape that would cause disruption in the short- and long-terms. The retail structures should also begin to define the space of the secondary plazas.

In subsequent years, retail uses will be developed within the campus/retail expansion sector. (See this Sector's Standards) Highly visible and high pedestrian volume areas could be desirable from a retail exposure and convenience standpoint. The degree of mix in these areas is dependent on future requirements. All retail structures are envisioned as being one level in height. A second area, the perimeter of the campus, could in the longer term, be developed with retail uses to complement the surrounding urbanized area. However, compatibility (physical and visual) with the campus and community must be carefully controlled.



ASU West Campus Plan
Section Through Retail Street
 Figure 29

Recreation

The recreation sector consists of improved athletic fields and tennis courts. Three large rectangular areas in a "stepped" pattern are located at the western end of the campus development. The northernmost area is immediately adjacent to the Recreation Center and it is divided in half by a landscaped pedestrian walkway. Improvements of the athletic fields could include provisions for baseball, soccer, field hockey, a running track or other sports functions depending on specific program needs. The southernmost field is adjacent to Sweetwater Elementary School to encourage complementary and potentially shared community use of the area. Parking convenience is sacrificed for the close campus proximity of recreation uses which will contribute to activity and landscaped open space environment.

The northernmost field is recommended for initial phase improvement.

One further option is the use of drainage basins, particularly the one at the southwest site corner, for recreational purposes. Designs could consider flexibility for multiple use.

Housing

The housing sector is positioned to the south of the library and landscaped orchard open space. The residential development is not intended as dormitories but as rental apartments available to the general public. Private development of the housing would be subject to the same standards of construction quality and character consistent with the overall campus and subject to design review and approval, by ASU West administration.

Scale of development could vary from one to three levels. A townhouse-type unit is shown on the illustrative site plan, but courtyard housing is also appropriate. The actual design has not yet been determined -- only the location and a character compatible with the academic campus is defined. The sector should accommodate the housing units, necessary parking and a recreation facility including a swimming pool. The library's orchard open space is an amenity to be shared with residential use and intended as a quiet, passive buffer. Access is from the southern east/west road.

All residential development is expected to occur in the initial phase. About 150 housing units are included in the development program.

Campus Vehicular Systems

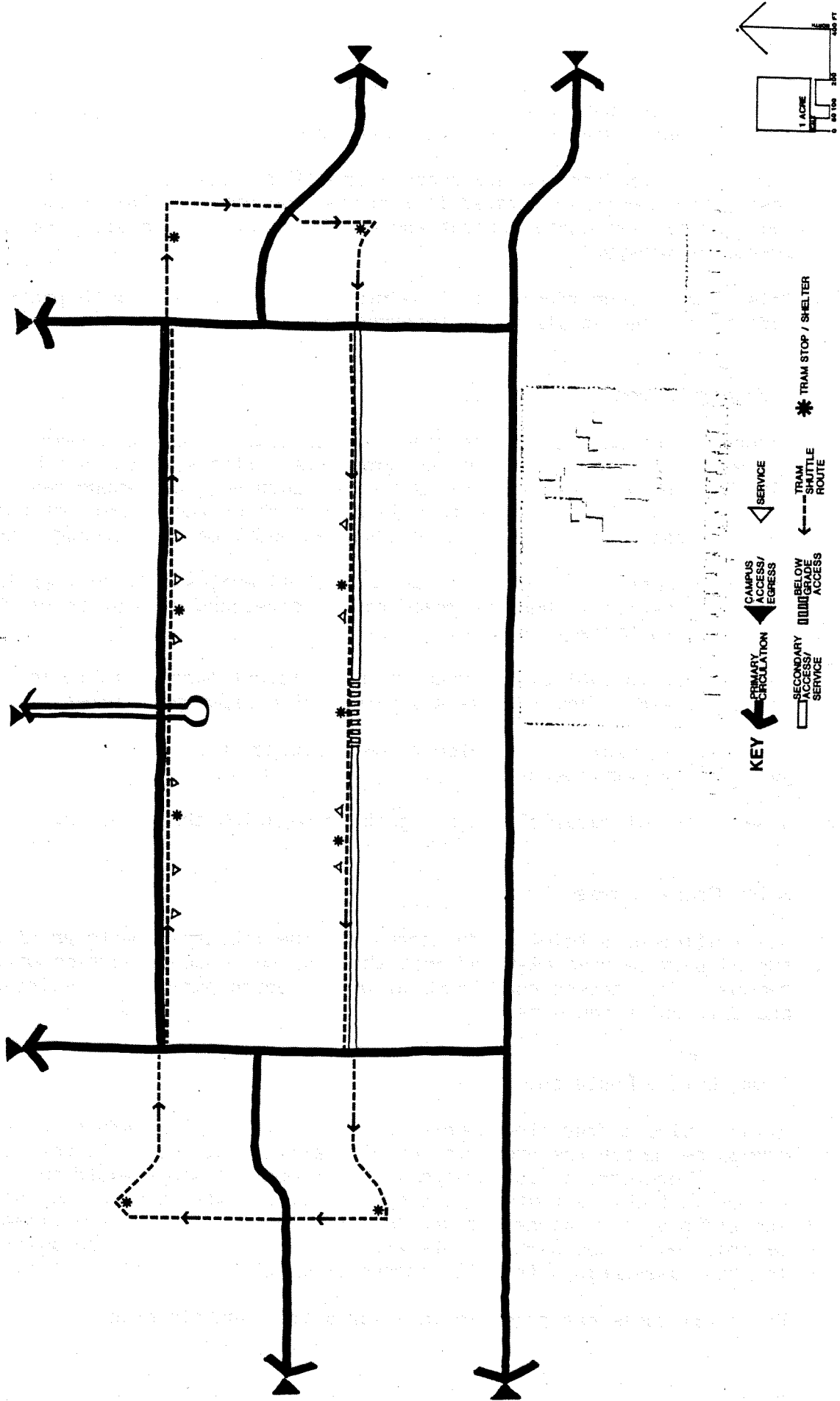
The orientation of ASU West to serve commuter students makes circulation and parking systems of prime importance. The design guidelines for campus vehicular systems address the sites ingress/egress points, the hierarchy of primary and secondary roads, building service access and provisions for a future tram shuttle. Figure 30 depicts the planned circulation system.

Campus Access/Egress

Seven vehicular entrances/exits are specified in the campus plan. No access is allowed along Sweetwater Avenue. There are two access points from 51st Avenue, one in alignment with Eugie Street and another further to the south. There are two access points along 43rd Avenue, one of which aligns with Wood Drive. Three access points occur along Thunderbird Road corresponding approximately to the half mile and quarter mile points along the property frontage.

The campus ingress and egress roads will be a minimum of four lanes with curb and gutter. A minimum pavement width would be 44 feet, face of curb to face of curb. Additional left turn lanes will be provided at the intersections to allow proper stacking and free flow.

Initially it is anticipated that at least one entrance (the main entrance) will be signalized to provide controlled access.



ASU West Campus Plan
Campus Vehicular Systems
 Figure 30

Primary Circulation

The primary circulation road surrounding the campus provides the focal point for the on-site traffic. It has been set back from the major roads a sufficient distance to prevent back-up on the surrounding road grid.

The circulation road should contain free flow right turns to allow an unrestricted counter-clockwise flow around the campus. This primary access loop should also contain right angle intersections with all parking lot access driveways.

This primary loop road is to be a minimum of four lanes with protected left turn lanes at all major intersections.

Secondary Access and Service

Secondary access and service roads are separate from the primary road system and include drives to the commercial offices at the north of the site and an east/west road along the southern edge of campus development. The northern service road is also part of the primary circulation loop so that this section must contain an additional eastbound lane.

All other service roads are to be maintained exclusively for service and emergency vehicles thus the roads can be developed at a width of 28 feet, face of curb to face of curb.

Service courts must be designed with sufficient turning radii to allow truck deliveries and ingress and egress of emergency vehicles.

Internal circulation must also allow emergency vehicles access to courtyards and the main streets.

A separate but parallel bicycle path accompanies these routes.

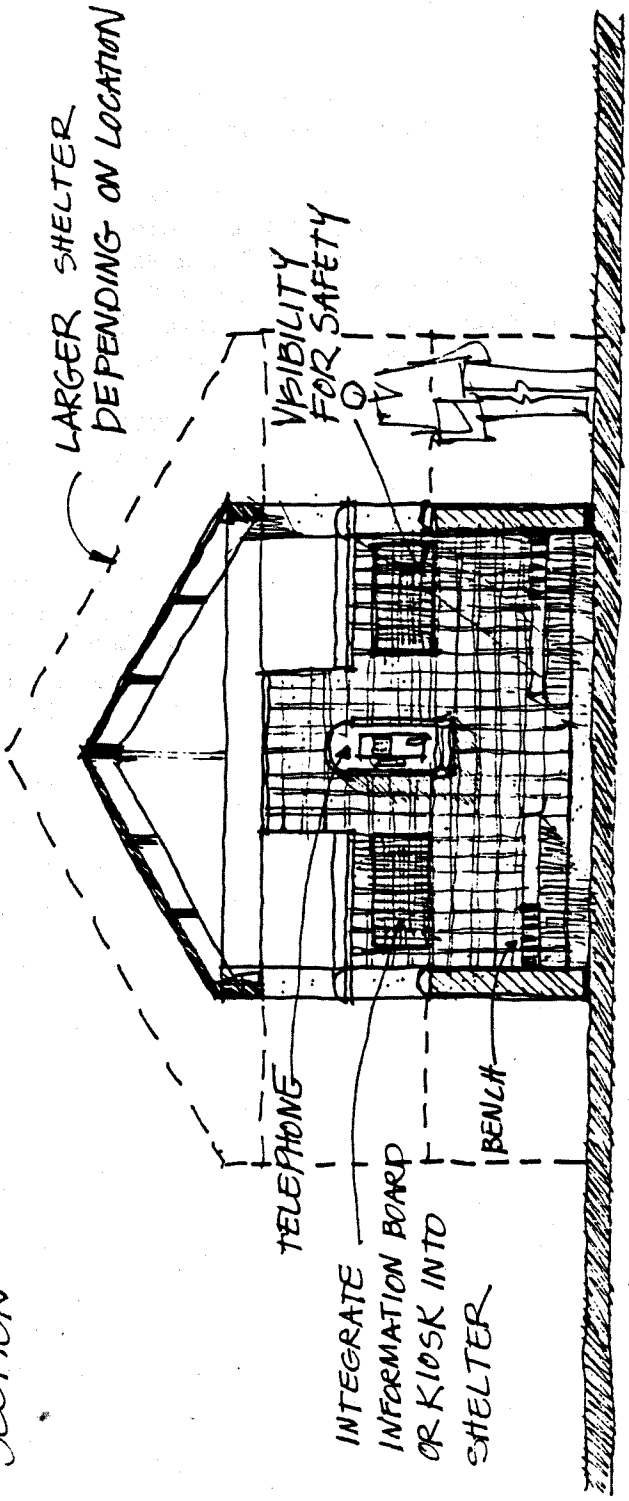
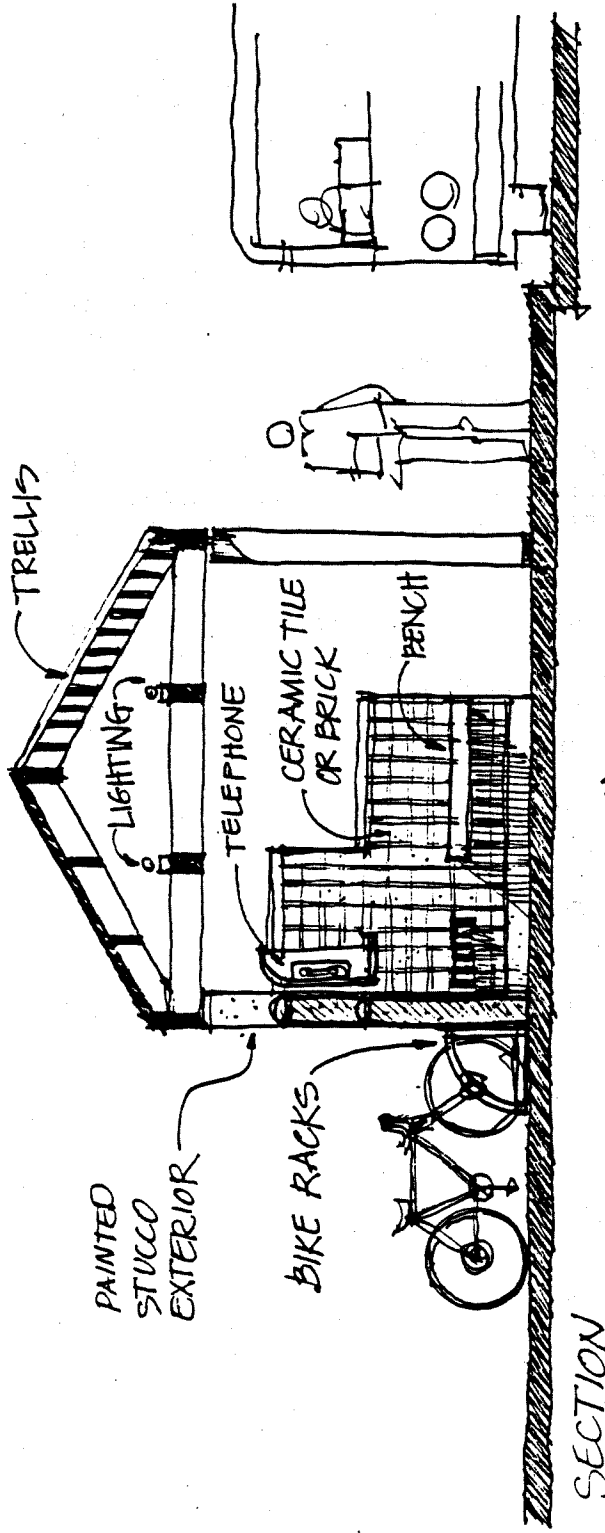
Below Grade Access

Utilization of a below grade access for the library permits an uninterrupted service road east and west through the southern portion of the campus. This access could also allow protected parking for maintenance and university vehicles.

Tram Shuttle Route and Stops

By designing a free flow counter-clockwise traffic pattern around the campus perimeter the predominance of traffic would occur in that direction. Therefore, a tram system with a number of stops would most likely follow a clockwise route with stops at all pedestrian paths to the campus and stops at all mainstreet and mall entrances. Tram pickup areas could be provided in the parking lots with turn-around and covered waiting areas for the passengers. Lessons learned from ASU Main should be built upon.

Figure 31 shows one possible idea for a tram shuttle stop.



ASU West Campus Plan
Tram Shuttle Stop

Figure 31

Parking Zones

Parking is identified by the user it is intended to serve. Figure 32 shows the parking zones. The campus parking zone is the major parking reservoir for ASU West with the campus expansion parking zone to be developed if and only if it is necessary to satisfy demands. Given the commuter nature of the campus and potential conflicts off-site if parking is not accommodated, it is imperative that the supply be sufficient.

A designated parking area for the commercial office use is provided. This conveniently located parking could be shared with campus activities during off hours. A residential parking area must be restricted at all times to serve the residential use. Service and loading/delivery short-term parking areas are also noted adjacent to buildings. These areas should accommodate this function and not be utilized as special privilege parking.

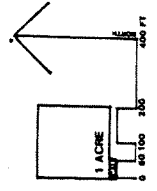
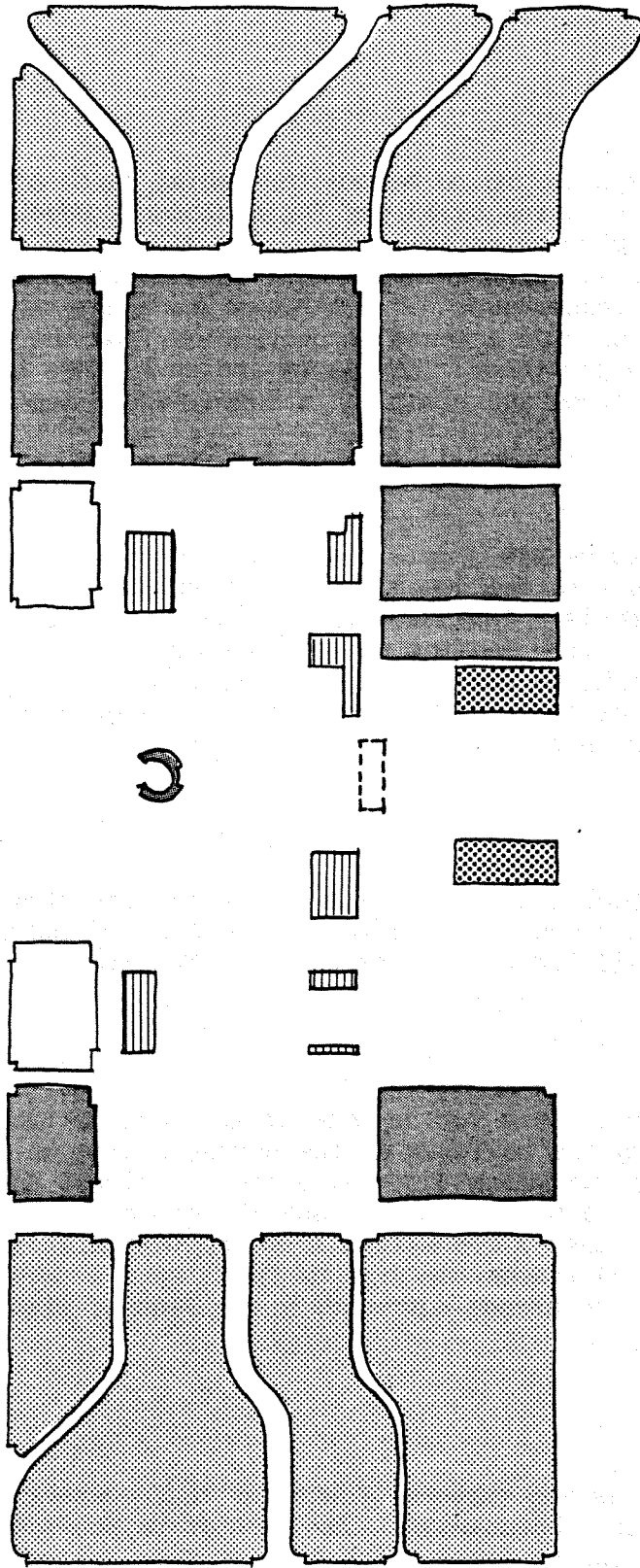
Parking installation should be accomplished in phases as the campus develops. All parking which is outside the campus perimeter should be constructed to a cross-section recommended by the soil investigation to be performed at a later date.







Parking which occurs in the initial phases of the campus construction in areas which are to be built-on in later phases can be constructed at a reduced cross-section or provided with an aggregate surface which can be asphalt treated. This treatment will require less initial costs and will be easier to remove at the time of construction of the future campus.

All permanent parking areas should be constructed with raised curb planter islands to help maintain traffic control.

Use of colored coded parking designations would be helpful in providing control for the commercial and short-term lots.

The use of controlled access gates could be utilized in faculty lots and for University maintenance vehicles.



- KEY**
-  CAMPUS EXPANSION PARKING
 -  CAMPUS EXPANSION PARKING ONLY
 -  COMMERCIAL OFFICE PRIORITY PARKING
 -  RESIDENTIAL PARKING ONLY
 -  SERVICE/LOADING /DELIVERY
 -  ("BELOW GRADE")

ASU West Campus Plan
Parking Zones
 Figure 32

Campus Pedestrian Systems

The Campus Pedestrian System is given in Figure 33. Specific components are described below.

Central Mall/Plazas

These interlocking spaces are to become the social heart of the campus. They rely on the surrounding buildings for enclosure, hence the height requirement on the surrounding buildings. The facades of the buildings fronting on the mall and plazas should define the mall or plaza edge; the facades with their arcades must be continuous and connected. The enclosure is intended to provide a sense of protection from the desert openness and as much shade as possible. The spaces are envisioned as hard spaces softened by rows of trees and planting in containers. See Figure 34.

Water Features

The three water features are jewel-like focal points of the plazas. They should be like springs in the desert, gently bubbling not vigorously gushing into their pools. They have three goals: 1) the aural effect, occupying and acoustically masking the spaces; 2) the visual effect, catching abundant light to sparkle as a contrast with neutral desert colors; 3) the humidifying affect, providing a magnet of coolness that would be expected in an oasis.

Building Arcades

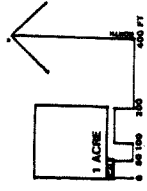
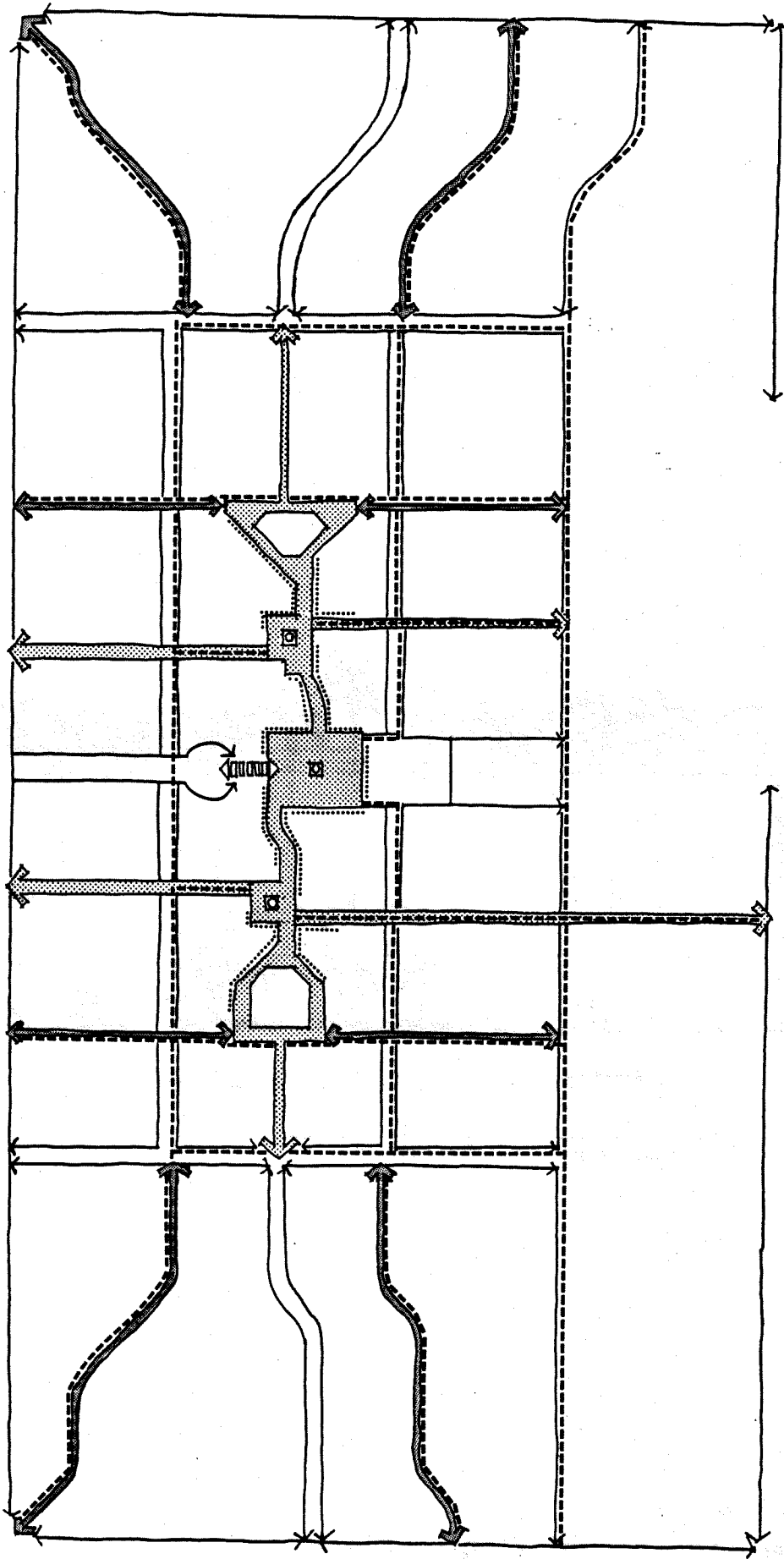
Arcades provide a wider spread of space for pedestrian flow where building entrances occur. They are the highest degree of shade and sense of protection along the mall and around the plazas. See Figures 34 and 35.

Building Portal

The primary symbolic gateway to the pedestrian heart of the campus is a component supplied by the building at the northern side of the Central Plaza. The building may house administrative functions, but it must span a space that: 1) has a wide opening visually terminating the palm-lined entry allee; 2) achieves a transition from the vehicular drop-off zone to the Central Plaza; 3) frames the view of the library; and 4) distinguishes itself from the arcade surrounding the Central Plaza. See Figure 34.

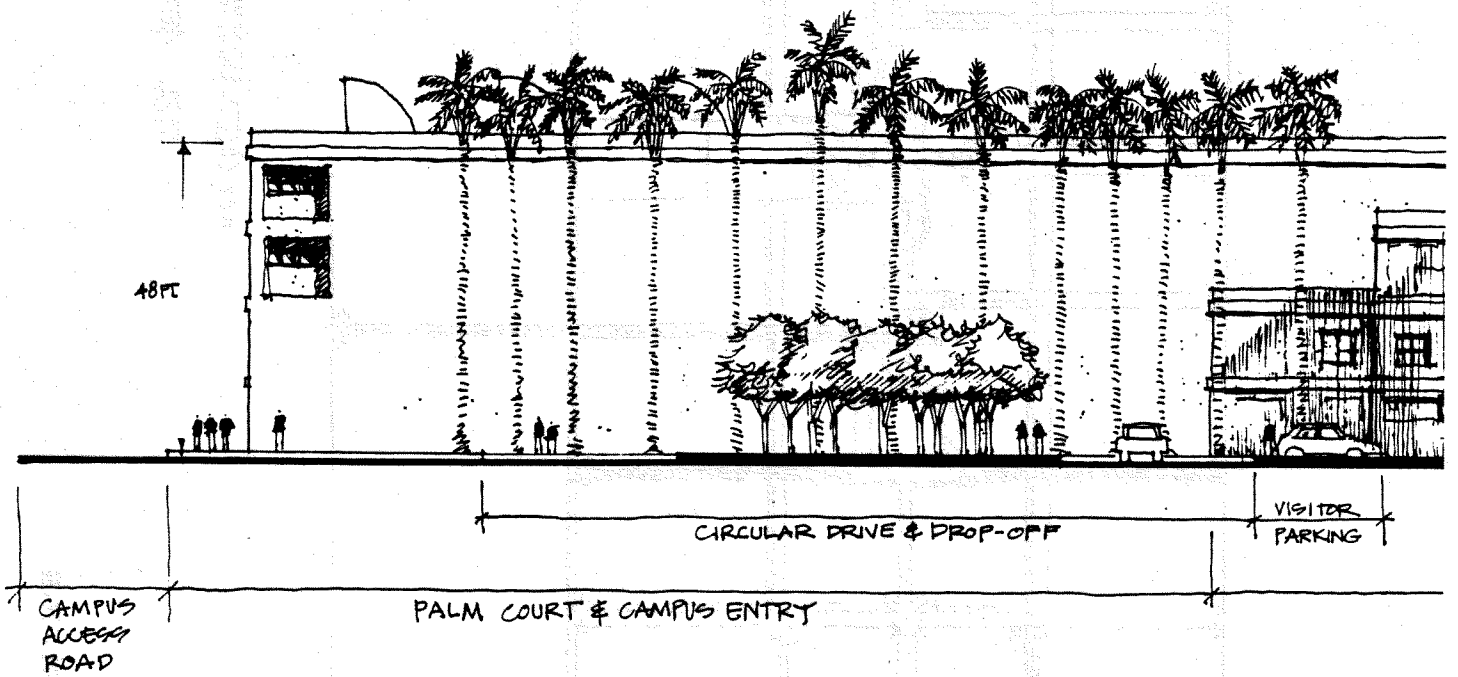
Landscaped Walkways

These pedestrian paths are ribbons of shelter that connect the built-up campus edge to the site boundaries. The shelter is provided by a continuous, double row of canopy trees which draw parking lot pedestrians to their coolness. The amenity supports the day-to-day campus arrivals. Lighting and pausing areas should be integrated with the marching trees.

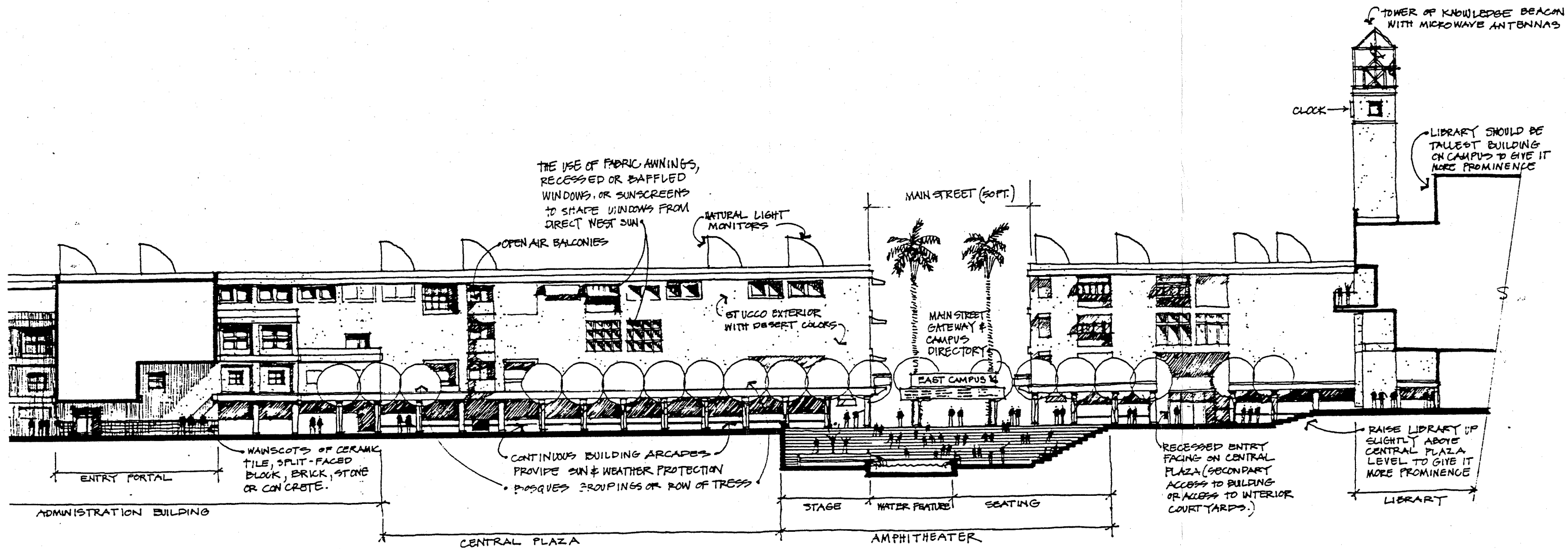


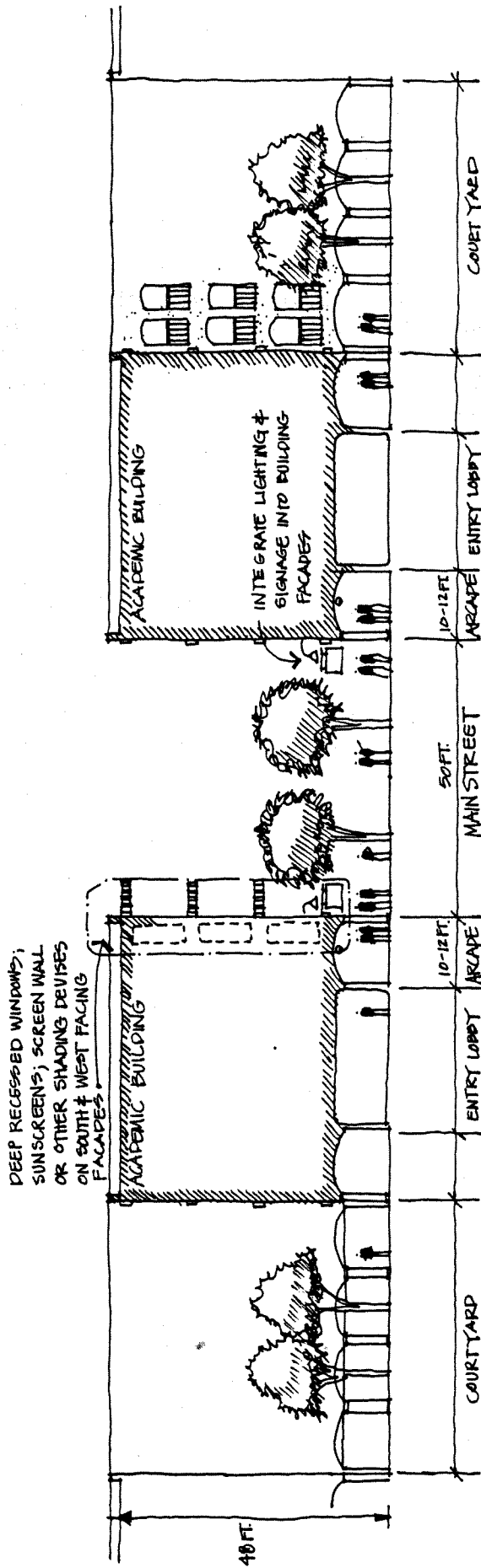
- KEY**
- ← CENTRAL MAIN STREET/PLAZAS
 - ↔ LANDSCAPED WALKWAY
 - ◻ WATER FEATURE
 - ↔ BUILDING PORTAL
 - ⋯ SIDEWALKS
 - ⋯ BUILDING ARCADES
 - SEPARATED BICYCLE LANE

ASU West Campus Plan
Campus Pedestrian Systems
 Figure 33



ASU West Campus Plan
 North/South Section Through Central Plaza
 Figure 34





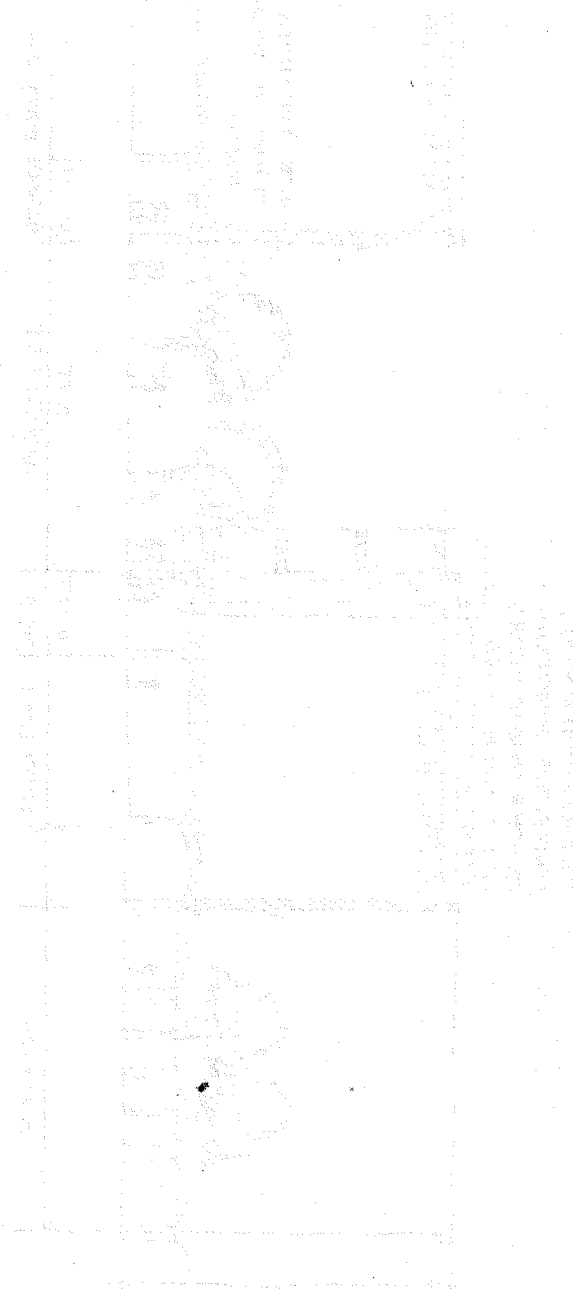
ASU West Campus Plan
Section Through Main Street
 Figure 35

Sidewalks

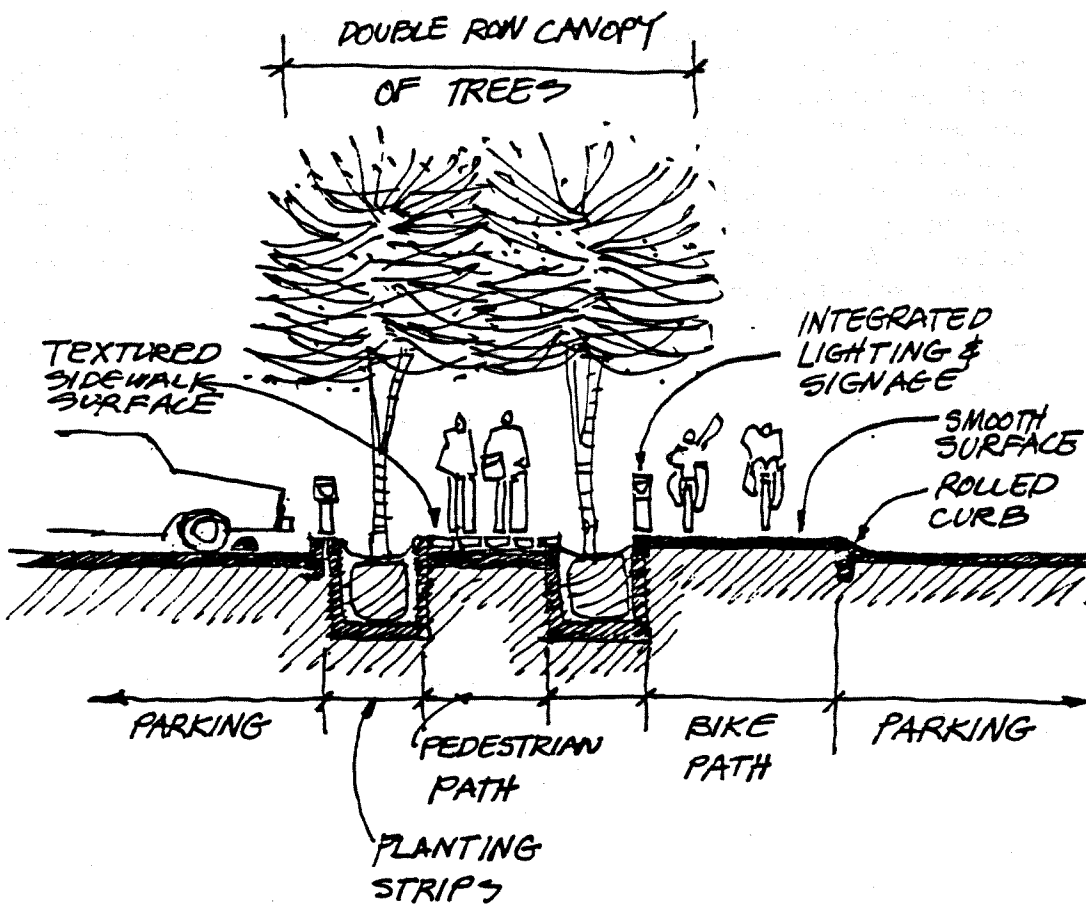
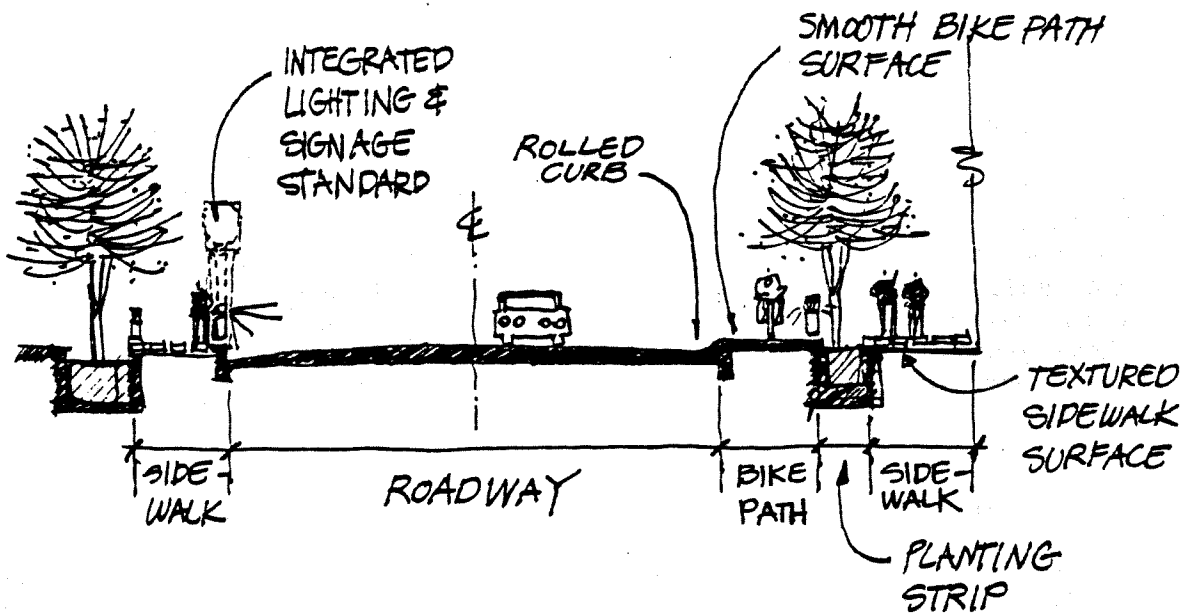
These paths are similar to the Landscaped Walkways but are scaled down and are provided with a single row of canopy trees.

Separated Bicycle Lanes

These routes should be separated from their accompanying pedestrian paths by either tree trunks or bollards where no trees occur. Smooth paving for bicycles and less smooth paving for pedestrians would insure that each mode stays on its designated path. Possible bicycle lane configurations are shown in Figure 36.



3000
Bicycle Lane
Pedestrian Lane



ASU West Campus Plan
Separated Bicycle Paths

Figure 36

Landscape Network

Throughout the entire campus native and naturalized plant materials are recommended. Drought tolerant material with low water consumption needs are also to be used. Water conservation is important in design of plantings as well as choice of specs. A conservative use of material in both species selected and quantities used is also recommended. Consideration of maintenance requirements and allergy sensitivity, generated by species should also be included. The use of horticultural specimens and ornamentals is limited to very special and small areas. However, a diverse palette of materials is possible within this framework. Individual species selection is not prescribed so long as the above general requirements as well as the following performance standards are met. The experience at ASU Main should be applied to the new campus. The Landscape Network is given in Figure 37.

Pedestrian Corridors

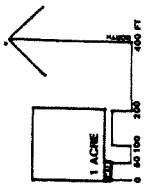
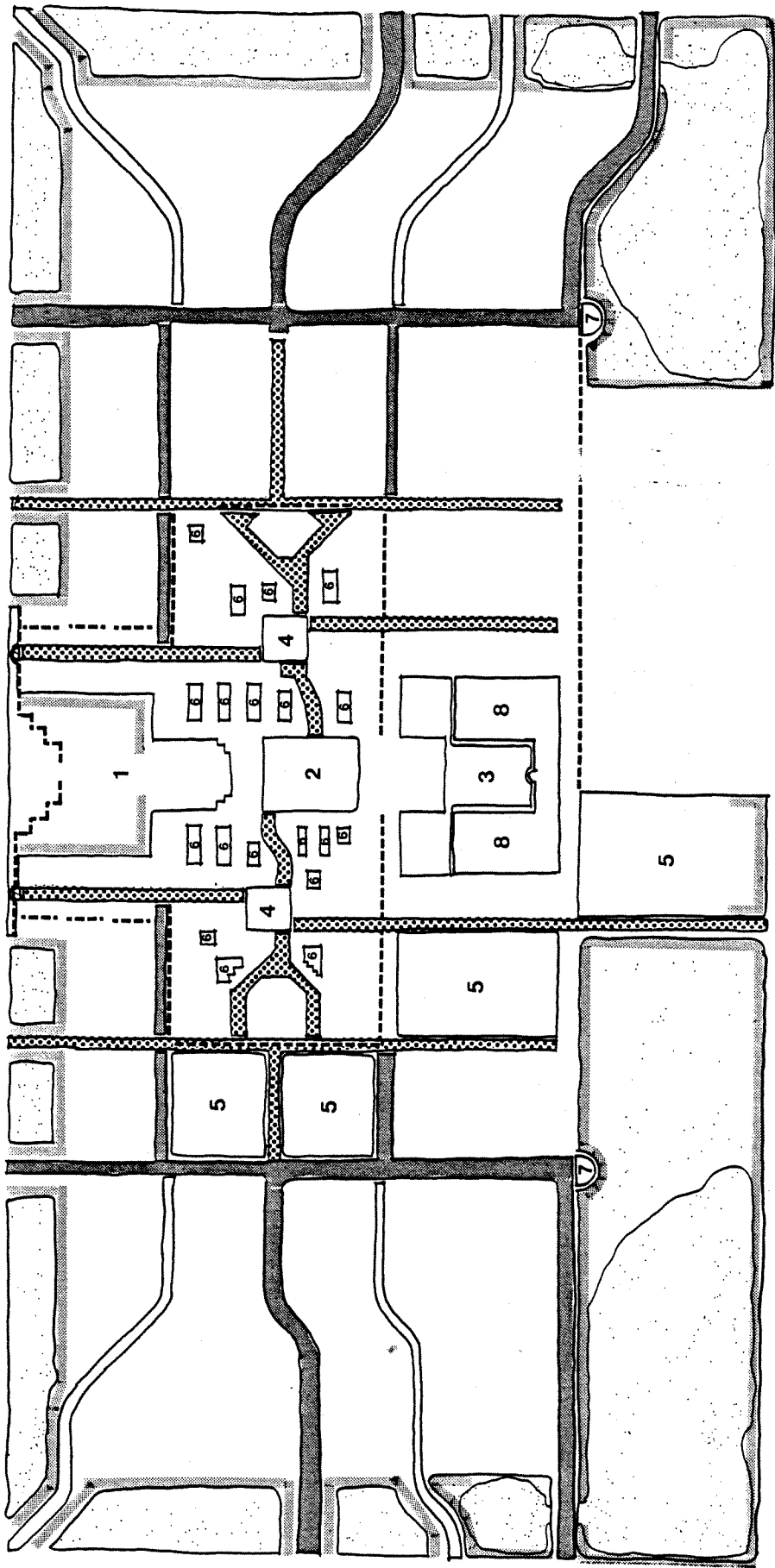
These pedestrian paths connect the parking lots to the heart of the campus. They are intended to provide visual and physical relief from the large parking areas and to connect the core campus area to the perimeter of the site.

The landscaped walkways include a view of tightly spaced trees on either side of the paved walk. It is intended that a continuous canopy and shade belt be formed by these trees. As an alternative, trees could be clumped to use fewer trees and conserve water. Use of vine covered trellises could be considered. A variety of species with similar habits may be used rather than a single species. Lighting and other street furniture including benches and trash containers should be integrated into this living arcade. Along any individual walk a single species is recommended, but specie selection may vary between paths.

The secondary pedestrian sidewalks are to be more informally treated. A single row of trees, also tightly spaced, creating shade are to line these walkways. The walk surface may be a compacted, crushed stone rather than hard paving. Lighting is to be provided. (See Figures 34, 35 and 36)

Vehicular Corridors

Treatment of vehicular access to campus from the perimeter streets should integrate with both the desertscape and parking lot treatments. Very limited emphasis is given to the minor vehicular entrances to the campus.



- KEY**
- PEDESTRIAN CORRIDORS
 - VEHICULAR CORRIDORS
 - DESERTSCAPE
 - VISUAL SCREENS
 - BERMS
- SPECIAL PLACES**
- 1. CAMPUS ENTRY
 - 2. CENTRAL PLAZA
 - 3. ORCHARD
 - 4. SECONDARY PLAZAS
 - 5. ATHLETIC FIELDS
 - 6. BUILDING COURTYARD
 - 7. VIEW TERMINI
 - 8. RESIDENTIAL AREA

ASU West Campus Plan
Landscape Network
 Figure 37

Secondary Plazas

Semi-formal plantings in keeping with the theme of oasis are appropriate for these focal points. These plazas are the only location on campus wherein a riparian character may be created in the plant materials selected.

The paths linking the central plaza and these three secondary plazas may have overhead trellis's with vine plantings to create shade and separate the plazas.

Athletic Fields

The only areas on campus proposed to be in turf are the athletic fields. Drainage and irrigation of these fields should be carefully considered. An alternate surface to turf may also be considered for the playing surface.

Building Courtyards

A more informal treatment is possible in these smaller courts. Softer planting may be implemented; tailoring each court to the functional needs of the building users and creating individual identity for each space.

View Termini

A cluster of plant material, perhaps combined with built forms, is intended to establish a vertical target. Development could include a rest station and informational kiosk. Landscaping will be complementary to development and visually distinguishable from the surroundings.

Residential Area

Adjoining the orchard is the residential area. The landscape treatment may be the most informal and ornamental of any areas on campus in this zone. Naturalized vegetation and low water consumption are still primary considerations, however, in the selection of individual plants.

Drainage Basins

Surface runoff is to be detained in impoundment areas to allow for percolation through the soil into the groundwater. Treatment of these catchment areas should allow for some siltation and the collection of debris. Since the basins will be flooded with water for only relatively short periods, it may be possible to accommodate recreational activities within the drainage basins. Designs should consider this option. The contrast of a free form, informal open space/recreation/drainage basin could complement the structured campus to the northeast.

Desertscape

The desertscape developed around the perimeter of the campus is intended to preserve the natural, desert beauty and serenity within the urban surrounds. The contrast between the intense development adjacent to and within the campus will be heightened by the natural arid vegetation used throughout these areas. The ground surface is to be sparsely planted with native desert material. A pebble surface will help to minimize wind erosion. Occasional use of Saguaro cactii is also possible.

Landform sculpturing and berms are to accentuate the perimeter desertscape and to create a sense of enclosed tranquil spaces.

The desertscape perimeter of the campus, allows flexibility for development in the future. As the surroundings become more urbanized, the campus perimeter reserve could be developed with commercial or academic uses. Compatibility with the surroundings as well as with campus functions must be assured.

Special Places

There are strategic green spaces or breathing zones throughout the campus, each with its distinguishing treatment.

Campus Entry

The "front door" to the campus is a transition zone. The landscape treatment is to be an intense desertscape with the characteristics of an arboretum. The diversity, quality and number of specimens of desert plantings should be the highest in this zone. Landform sculpturing may also be used to reinforce the sense of separateness of this zone. (See Figure 39)

Central Plaza

The central plaza located at the heart of the campus is to be more formally treated with perimeter archetype planting of row trees and accent containers of ornamentals. This plaza is the central ceremonial space on campus and plantings should be reinforce this celebration of academia and the marketplace. (See Figure 34)

Orchard

The agriculture theme of an orchard grid planting is to be used in this area. The grid spacing should be tight enough to create an overhead canopy to establish a zone of quiet retreat. A more open grid spacing to conserve water and number of trees may be considered if a species with a broad canopy mature habit is selected. The irrigation system must take into consideration pedestrian access and minimize surface area covered by ponding.

Visual Screens

Throughout the campus there are functional areas which require screening to minimize their impact on the overall visual quality of the campus. Hedges or fences with planting may be used. Such areas include service/utility docks at individual buildings and parking lot perimeters.

Campus Edges

The envisioned, overall treatment of Campus Edges is given in Figure 38.

Campus "Front Door" with Open Space

This Open Space is a first impression of the campus, and its purpose is more symbolic than strictly functional. Its goal is to become a tranquil contrast to the busy experience along Thunderbird Road; the openness should have a peace about it capturing a re-established preserve, portraying the beauty of the original valley. This large scale, botanic desert forms a foreground for the campus beyond, heightening the inward-oriented, geodic quality of an oasis.

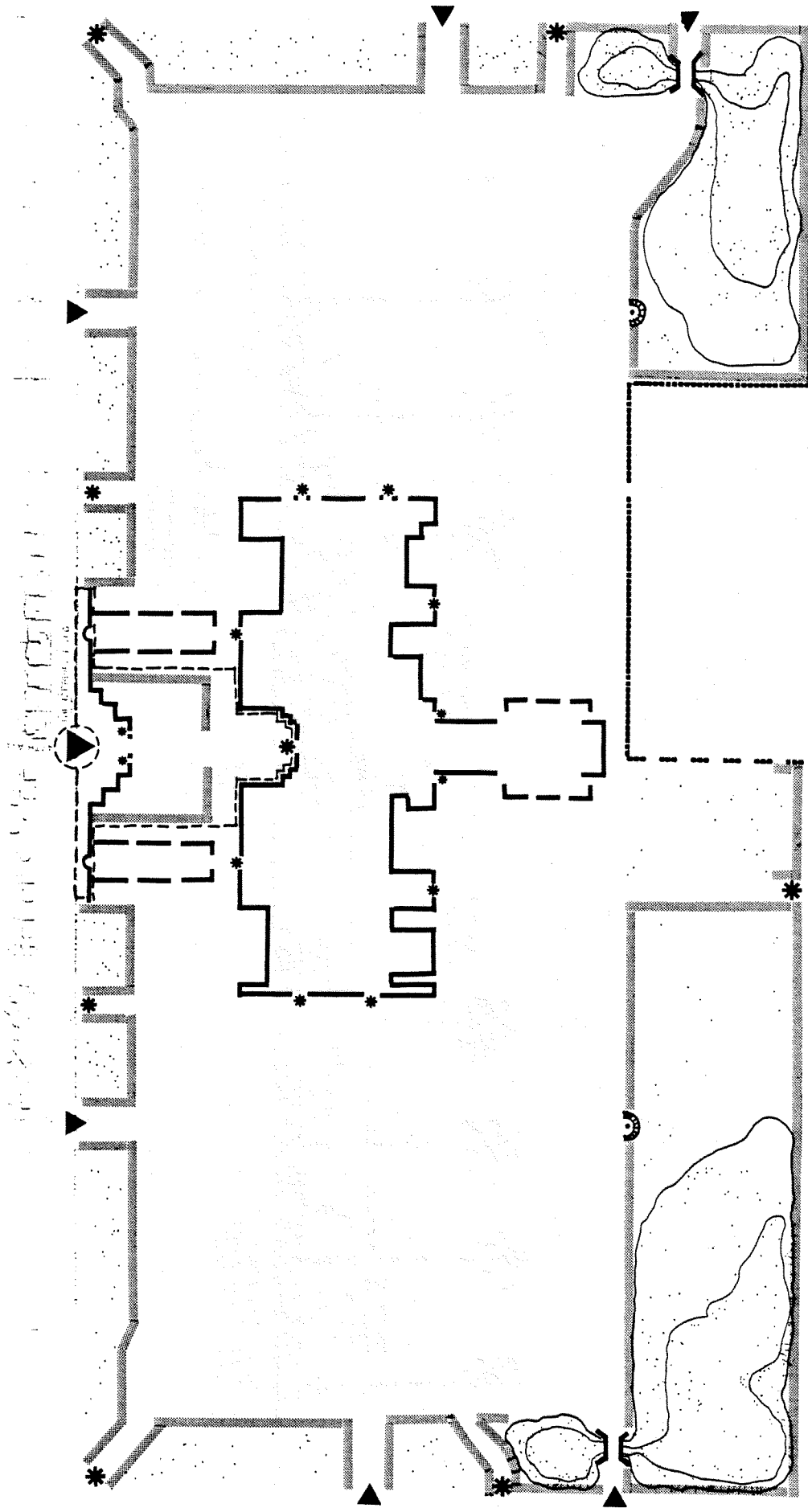
A statement is made to Thunderbird Road in the form of a complex gateway, announcing the arrival at the campus, initiating the sense of place for visitors. Its model is perhaps the highway statement for "el rancho" that is headquartered beyond the first pasture. This gate, and the other gates mentioned below, are architectonic elements and must be consistent with the campus architectural design. Graphics and decoration should respond to the speed of traffic along Thunderbird Road. The scale of the vehicular openings should allow emergency vehicles to pass. See Figure 39.

Connecting the gate and the drop-off at the actual campus building arrival, and bisecting the open space, is a palm allee, the traditional, formal, desert procession. Vehicular movement around the open space is concealed by berms integrally sculptured with the desertscape.

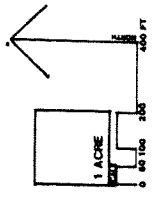
Building Massing Edge

Since the hard edge control of building phasing begins at the pedestrian mall and plaza faces, the Building Massing Edge designated on Figure 38, is necessarily the growth face (that which moves outward over time) and the service entrances. There are, however, four exceptions of control, exceptions to the discontinuity that will probably occur at this campus edge. They are:

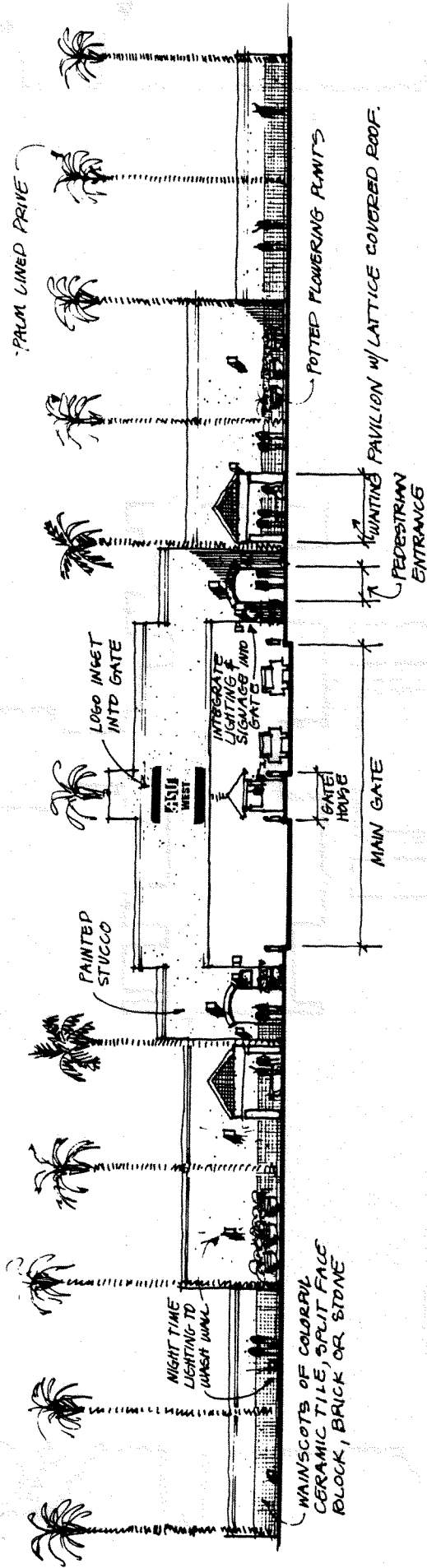
- Near the Front Door/Open Space. Here, the Gateway Building (Administration) and the flanking Campus Core buildings must enclose their respective sides of the circulation drop-off area.
- The North and South Pedestrian/Bicycle Gateways. These gates should be established initially in their final locations. Therefore, the buildings adjacent to them should reach out with solidity, into which the gateways themselves may be cut.
- The Commercial Office Core Edge Toward the Campus Front Door with Open Space. These facades should be as anonymous and continuous as possible to create a calm surrounding to that peaceful open space.



- KEY**
- CAMPUS "FRONT DOOR" WITH OPEN SPACE
 - BUILDING MASSING EDGE
 - PEDESTRIAN/BICYCLE GATEWAY
 - * BERMED RETENTION BASIN/DESERTSCAPE
 - VEHICULAR GATEWAY
 - FENCE-NO ACCESS
 - BERMED DESERTSCAPE CULVERT/BRIDGE
 - FENCE-LIMITED ACCESS
 - VISUAL TERMINUS



ASU West Campus Plan
Campus Edges
 Figure 38



ASU West Campus Plan
 Campus "Front Door" from Thunderbird Road
 Figure 39

- Housing. Whatever form the housing development takes, it should be inward focusing also and treat its edge as a solid enclosure, continuously protecting its portion of the oasis.

The other edges, which are products of program and phasing control, should conceal the service yards and parking lots that occur behind them. These, more garden-like walls, should be as solid and protective as possible.

Vehicular Gateways

These portals, sized to permit the passage of emergency vehicles, should be scaled-down interpretations of the theme established by the Campus "Front Door." They should also provide a sense of place, but for day-to-day vehicular arrival; the scale of graphics and decoration should respond to traffic speed on their respective streets.

Pedestrian/Bicycle Gateways

These arrival places should be scaled to their particular usages and should consist of a further step down to the vehicular gateway theme. Graphics and decorative elements should respond to the slower pace. Distinction must be made for each movement mode: pedestrian or bicycle.

Bermed Desertscape

These elements form a visual connection between the various architectonic gateways at the outer edges of the campus property. These should serve as screens of the parking from the surrounding streets but not be so high they conceal the campus buildings. The outward spaces which they define are desert buffers initially, but, for the future, preserve a perimeter zone that can be densified when the nature of Phoenix changes.

Bermed Retention Basin/Desertscape

These extensive zones are critical for handling the campus' share of stormwater run-off. The treatment of these declivities must consider both empty and full extremes with a desert expression. They should be perceived as site amenities.

Fence - No Access

In the specific areas shown in Figure 38, it is necessary to establish physical separation and limit access. These edges are to be defined by fences which could range in transparency and materials from a cyclone fence to a stucco wall. Heights could range from three to six feet to meet specific requirements. The specific design must be consistent with the materials and functions intended for the location.

Fence - Limited Access

This edge is the same as that described previously except that movement is allowed on a restricted basis.

Culvert/Bridge

These two landscape features are expansions of the nearby gateways' places. They are to bring arrivees in contact with the special character of the retention areas. They also should be architectonic in nature, not highway engineer.

Visual Termini

These features are to be seen from certain sections of the vehicular loop as objectives at the ends of these axes. But, they should turn their backs on the vehicles and open toward the basins. They would serve as minor pedestrian destinations, out-of-the-way places.

Signage and Lighting

Directional

Traffic Control and Guidance

A coordinated and consistent system of signage is recommended for all of the ASU West Campus. The character of the system should be compatible with the Campus Architectural Theme and generally should be user-friendly and non-institutional while remaining systematic and consistent and simple. The initial vehicular direction would be integrated into the vehicular gateways described previously. Low key directions must be provided at every decision making point.

Traffic control should be integrated with directions where possible and should also pursue a continuity with the architectural theme (as an example, stop signs on a stucco plane rather than a standard). The signing and readability of messages and symbols should follow viewing distance and travel speed standards.

Pedestrian Orientation

This portion of the signage system continues the design themes but is appropriately scaled to the pedestrian pace and is at peace with the surrounding environment.

Identification

The identification of components of the campus should be the result of a thorough addressing system that pursues a logical, user friendly approach to naming and locating places. The character of the system, again, should be responsive to the architectural design theme. Since the major movement is mostly hardscape anticipating an abundance of people present for interacting, the signs should not stand free in the movement path, and therefore, should be integrated into the building facades, bracketed or flat. (The use of ceramic tile as system components should be investigated.)

Advertising

In the retail area the signage should be encouraged to contribute to the social liveliness expected there. A balance should be sought between chaos and sterility, between clutter and vacancy: a level of fun and excitement is sought. The vocabulary would be richer than the rest of the campus: awning edge signs, show windows with neon or boldly, painted logos, modest but ebullient bracketed signs, expressive doorways, and, most of all, the shop itself spilling out onto the hardscape as advertisement. The graphics system should address an ordering approach to a socially enriching experience in this area.

Other

The campus graphics system should address the ad hoc user needs that are part of campus life: message boards, want ad centers, events posters, student convenience advertising, etc. Special places should be defined and reserved as a kinetic forum of communication.

Parking Lighting

The basic intent is to make the parking lots safe for students' usage into the night. The efficiency of lighting all corners must be accomplished with fixtures which have concealed light sources so the neighbors off campus are not disturbed by the long hours of illumination. Low height standards in the 15' to 30' range are recommended as opposed to a few high intensity "moons".

Campus Street Lighting

To distinguish vehicular movement from vehicular parking, and to provide relief from the constant surveillance attitude needed for safety in the parking lots, the campus streets may rely on pathway clarification from side bollards and reflectors in the street surface. Intersections, however, would be announced with overhead illumination for clarity. Car headlights are present anyway.

Walkways

Pedestrian paths connecting the built-up environment with the parking areas or gateways should have the lighting coordinated with the tree planting so that there is the continual accompaniment of light. The fixtures could be low level (10-15 feet) concealed source; the trees may be used as diffusers or reflectors themselves.

Pedestrian Malls and Plazas

Lighting in these areas should contribute a sense of life at all times, since many students may use the campus only after dark. Not only should there be adequate lighting but there should be punctuation of sparkle: exposed source; multiple, transparent globe or lantern-like lamps for example. The illumination should be contained in the space and not spill out so that the neighborhood is annoyed. The geode effect of the oasis should be augmented by the lighting effect.

Building Illumination

Buildings should rely on the light within for nighttime expression from a distance. Floodlights should not be used to illuminate buildings.

The overall illumination concept should be guided by the following:

"To flood everything in light is not the answer. By the imaginative application of light we can reduce the visual chaos of unplanned light and bring a sense of joy and enrichment to the public domain."*

Further, the lighting or signage should in no way contribute to light pollution, such as that which could impact astronomic studies.

* Richard C. Peters
"Light and Public Places"
Places
Volume 1, Number 2, Winter 1984
The MIT Press

Architectural Design

Theme

The architectural character should be intelligently derived from the desert southwest. It may involve memories of Indian, conquistador or cowboy cultures, but it should not be imitative. Elements which determine the character can solve functional, visual and psychological problems: extreme solar radiation, drying winds, orientation, identification, socialization, symbolic reading, and maintenance. The character may be extremely innovative, but in the end, should not appear to have been transplanted from another region.

A unified image is desirable for ASU West. The first buildings designed will be the pacesetters. Later developments will be expected to be contextually sensitive to their predecessors in scale, color, rhythm, materials, modeling, profiles, foci and symbols, even though interpretations may vary and time will have passed.

Colors

The basic palette should be derived from the desert floor: tans, beiges, pinks, buttercreams, warm greys, ochres, terra cottas, etc. Value ranges should be given careful considerations: paleness, over a large area, can cause uncomfortable glare in some situations; darkness can absorb and re-radiate heat and can also cause discomfort. On the exterior, a subdued, tonal scheme is recommended as opposed to color shocks.

Quality

It is the intent of ASU West to pay for flexibility and durability, but not for glamor or external prestige. Cost projections have been based on this descriptive model. Therefore, the basic quality level should be one of modesty except where pursuing the goals of flexibility and durability.

Materials

Stucco is highly recommended for the primary external material. It has the inherent nature to achieve the theme, the color, and in most aspects, the quality level mentioned above. In pursuit of better durability, wainscots may be used to improve maintenance where stucco might suffer damage with normal usage. These secondary materials could be any of the following: high performance coatings, ceramic tile, split-faced block, brick, stone or concrete. It should be noted that copper for sloping or vaulted roofs, might be economically feasible again, in Arizona.

Utilities and Drainage Systems

Water

All construction of the water main system will be performed in accordance with the City of Phoenix and the Maricopa Association of Government Standards. All fire hydrants will be City of Phoenix standards and will be placed with the spacing as required by the Fire Department.

Valves will be placed in the system to allow at least three-fourths of the main fire loop to remain in service in the event a break occurs.

The entire main fire loop should be installed during the first phase so that uninterrupted fire protection and domestic service is maintained.

Sanitary Sewer

All sanitary sewer mains will be installed in accordance with the City of Phoenix and the Maricopa Association of Governments standards.

All sewer mains will be installed during the initial phase which are necessary to assure no major corridors or paths are disturbed during subsequent phases. Taps will be extended beyond the corridors to allow for future connections.

Storm Water Retention and Detention.

Retention basins will be designed and excavated to their ultimate capacity at the initial phase of construction. The quantity of excavation may be minimized by accepting fill material free of charge from the Maricopa County Flood Control District. This would be used to provide berms around the property boundary and around retention areas. City of Phoenix guidelines for retention will be observed and in some cases, exceeded. This will ensure that on-site drainage is adequately controlled and does not add to the existing flooding conditions on 43rd and 51st Avenues. A storm sewer piping system within the campus core could be considered.

Central Plant

Various concepts of structure massing, shadowing and orientation are being employed architecturally to contribute to reduce the heat gain in campus buildings. These techniques do not eliminate the need for mechanically chilled water for comfort cooling in our geographical location.

Central systems are more flexible, because areas demanding service can be selectively controlled; they are more reliable, because less sophisticated equipment can be utilized; and they are more efficient, because there is less waste in the conversion of input energy. The recommended direction of centralized versus decentralized may be further studied as new information becomes available with the more detailed design of facilities. The specific servicing of academic and non-academic on-campus uses must be addressed.

One central plant is contemplated for this campus to be located in the southwest corner of the building cluster due to the lower lay of the land. The chilled water and steam piping will encircle the campus in a tunnel loop below the primary and secondary traffic circulation routes. Tunnel taps will branch off from the main tunnel system to permit protected entry into each structure.

The refrigeration system will consist of a multiple number of water-cooled centrifugal water chillers. A condenser water system will be employed consisting to condenser water pumps and multiple cell cooling towers with two-speed fan motors. Secondary pumps should be employed to pull the chilled water from the primary loop to circulate the chilled water through the buildings.

Additional items for consideration of energy conservation are the use of Plate and Frame Heat Exchangers and off-peak production of ice to permit load shaving during peak chilled water demand periods. These types of efforts will produce greater benefits as the cost of electricity rises as the campus grows.

An Energy Management Control System (EMCS) should be provided at the outset of this significant project. The EMCS should be used to measure and record all energy consumed by each individual building. Control valves and motors can be initiated from the EMCS' to permit the maximum control of energy usage and to limit waste. Monthly reports or billings can be generated automatically from a central location. In addition the EMCS can be utilized to achieve both the most effective peak load shaving and the lowest kilo watt hours operation per month. A maintenance management feature could also be considered.

The Central Plant building should be planned and designed for the ultimate configuration for the maximum number of students, staff and faculty. Consideration can be given to evaluating whether the entire building should be built or if the construction can be performed in phases.

The chiller system should be designed utilizing common headers so that greater flexibility of equipment can be realized. Further, additional pumps or chillers can be added to common headers previously fitted with appropriate valves and blind flanges. The distribution piping loops can also be fitted with valves and blind flanges sized for a theoretical maximum value.

Utility Tunnel

The complete utility tunnel loop is anticipated to be built at the beginning of this project. As the tunnel is planned to be below the roadway that will encircle the ultimate built out, it is expedient to install the complete tunnel to limit the disruptions to the academic functions. The tunnel should have knock out panels on incremental spacings that coincide with the building spacing module for future extension of tunnel taps to serve the buildings.

Electrical

Off-Site: Although the off-site electrical distribution cables will be designed and installed by APS, it is essential to be aware of depth of burial and configuration of the buried arrangement of cables. The northeast corner of the site will require the most extensive coordination. It is APS practice to have buried 69 kV transmission lines run as straight as possible and if crossings are necessary that the 12.5 kV distribution cables would pass below or above those of 69 kV. The minimum depth of 69 kV cables is 52 inches in a 36" wide trench. The minimum burial depth of 12.5 kV cables is in a 54" deep trench.

When a 12.5 kV cable parallels a 69 kV line as along 43rd Avenue a ten foot spacing is required between the trenches. Parallel feeders may be spaced 12 inches apart in a 30 in wide trench typically 42 inches deep and a separate distribution feeder may be placed 2 feet above these in the common trench.

It may be advised to put the feeders, those dedicated for the Campus and the existing distribution feeder that will pass under the Universities driveways, in nonmetallic conduits so replacement can be performed without disrupting the driveways and traffic circulation patterns.

Consideration should be given to have both feeders from both substations placed underground at the start of the project. By doing this, the costs and inconveniences associated with multiple excavations for partial systems can be avoided. Spare conduits for future use could be provided.

On-Site: In the Central Plant a 12.5 kV double ended primary switchgear assembly with a normally open tie breaker will have two feeder breakers on each half of the bus. The two feeders on each half will come from the same substation but the two feeder pairs will be from different substations providing a higher degree of reliability.

The feeder cable from each feeder breaker should be the largest conductor practical, as 500 MCM to feed a multiple switching assembly to be located in the tunnel. From the over current protected switches, smaller conductors which are properly sized to feed the individual buildings shall be routed through the tunnels to unit substations.

The growth of the on-site electrical power distribution system will occur smoothly as the main switchgear assembly should be purchased at the outset of the project. Feeder cables to the various over current protected switching units will follow campus expansion.

Telephone

Off-Site: If "T-1" lines are used to interconnect the ASU West Campus to the Tempe Main Campus, the cable will extend from one of the telephone manholes at the eastern property boundary and should be routed in one of two conduits, one for a spare, directly to the tunnel system. Once in the tunnel system the cable should be routed in steel conduit to the appropriate location.

On-Site: Routing of telephone cables should be performed by use of the tunnel system. Wire ways, such as 4" x 4" or 6" x 4" hinged covers should be utilized to provide a minimum of protection in the tunnel provided by and exclusively for the telephone cable installation.

Gas

The gas line will be direct buried and coated with a material to provide cathodic protection. The gas line would best be routed on the outside of the tunnel loop and cross above the tunnel where it would enter the central plant or other campus structure.

The pressure reducing station and the main gas line will be installed completely at the commencement of this project. Additional distribution to various buildings will be extended as required.

Implementation

IMPLEMENTATION

Development Phasing

The development of the ASU West Campus Plan will require a step-by-step series of coordinated actions over time. The first steps are critical in that they will establish the campus's physical direction as well as the community's perception of the project.

The intent of the development phasing plan is to match projects with available resources and to assure that a coherent and "critical mass" of the campus is developed. For several years the site will be largely undeveloped. Therefore, the limited amount of development that does occur is of great importance and must present a campus that appears to be complete at every interim stage of development.

Figures 40, 41, and 42 depict the phasing of campus development over the initial three years of implementation. Detailed assumptions of what is included in the build-up follow. The next section (Project Costs) provides details for the completed Initial Phase as well as the Build-Out Phase.

The Arizona State Legislature has appropriated \$9.5 million for the first year of campus design and development. Negotiations with the City of Phoenix for sharing of necessary off-site improvements would enable accomplishment of what work was estimated at \$11.5 million. Strong ASU West leadership must continue to follow through on the successful progress made to date.

TABLE 3

DEVELOPMENT PROGRAM - YEAR ONE

Assumptions: \$11.5 million appropriation, complete design for \$25 million of facilities and related infrastructure in Year One
(1985 Dollars)

Budget includes:

- Retention Basins
- Utilities for Initial Phase
- Site Clearing and Berms
- Design Fees for a \$25 Million Building and Below Listed Infrastructure Costs

Appropriated Funds = \$11,583,000

Design

8% for A/E Fees for a \$25 Million Building = (2,000,000) *1,885,000*

8% for On- and Off-Site Infrastructure Consulting Fees = (548,400)

- Initial On-Site = \$3,217,500 X 8% = \$257,400
- Total Off-Site = \$3,635,000 X 8% = \$291,000

Actual Construction

On-Site Project Costs

- On-Site Utilities \$ 3,217,500
- Clear and Grub¹ 1,611,000
- Retention Pond¹ 187,500
- Berms¹ 832,000

(5,848,000) *7,615,000*

Off-Site Project Costs

(\$3,635,000) /

TOTAL YEAR PROJECT COSTS

\$12,031,400

¹ Specific on-site costs may be high due to the use of a 25% design contingency factor.

TABLE 4

DEVELOPMENT PROGRAM WITH CITY OF PHOENIX CONTRIBUTION - YEAR ONE

Assumptions: \$11.5 million appropriation, complete design for \$25 million of facilities, and City of Phoenix contributes \$2 million for off-site improvements in Year One

(1985 Dollars)

Budget includes:

- Retention Basins
- Utilities for Initial Phase
- Site Clearing and Berms
- Design Fees for a \$25 Million Building and Below Listed Infrastructure Costs
- Thunderbird Entrance

Appropriated Funds = \$11,583,000

Design

8% for A/E Fees for a \$25 Million Building = (2,000,000)

8% for On- and Off-Site Infrastructure Consulting Fees = (548,400)

• Initial On-Site = \$3,217,500 X 8% = \$257,400

• Total Off-Site = \$3,635,000 X 8% = \$291,000

Actual Construction

On-Site Project Costs

- On-Site Utilities \$ 3,217,500
 - Clear and Grub¹ 1,611,000
 - Retention Pond¹ 187,500
 - Berms¹ 832,000
 - Thunderbird Entrance 250,000
- (\$6,098,000)

Off-Site Project Costs² (\$1,295,000)

TOTAL YEAR PROJECT COSTS \$ 9,941,400³

¹ Specific on-site costs may be high due to the use of a 25% design contingency factor.

² Assumes City of Phoenix pays for \$2 million of total off-site project costs.

³ \$1,641,600 carried over to Year Two.

TABLE 5

DEVELOPMENT PROGRAM - YEAR TWO

Assumptions: Year Two appropriation of \$16 million
(and carry over \$1.6 million from Year One)

(1986 Dollars)

Actual Construction

<u>Building Costs</u>	<u>GSF</u>	<u>Project Costs</u>
Library	75,000 ¹	\$ 8,101,000
Classroom (Building A)	56,000	5,412,000
Central Plant	<u>10,000</u>	<u>591,000</u>
Total Building	141,000	\$14,104,000
<u>Site Improvements</u>		\$ 3,413,000
Includes:		
<ul style="list-style-type: none"> • Parking • Roads • Utility Tunnel • Curbs • Sidewalks • Sod/Grass • Fountain/Amphitheatre • Central Plaza 		
TOTAL YEAR TWO PROJECT COSTS		<u><u>\$17,517,000²</u></u>

¹ The 75,000 GSF is an affordable amount of space and not the programmed amount. The initial phase (5,000 FTE) identified about 93,300 GSF of Library with a project cost estimate of \$10,253,000. This total year the project costs would amount to \$19,669,000. One alternative is to build the programmed amount of library space and build less of Classroom (Building A) and use a portion of the library for classroom on a temporary basis.

² All project costs inflated at 5% a year for 1.5 years to bring to future costs. Budget for Year Two = \$17.6 million (\$16 million + \$1.6 million carried over from Year One)

TABLE 6

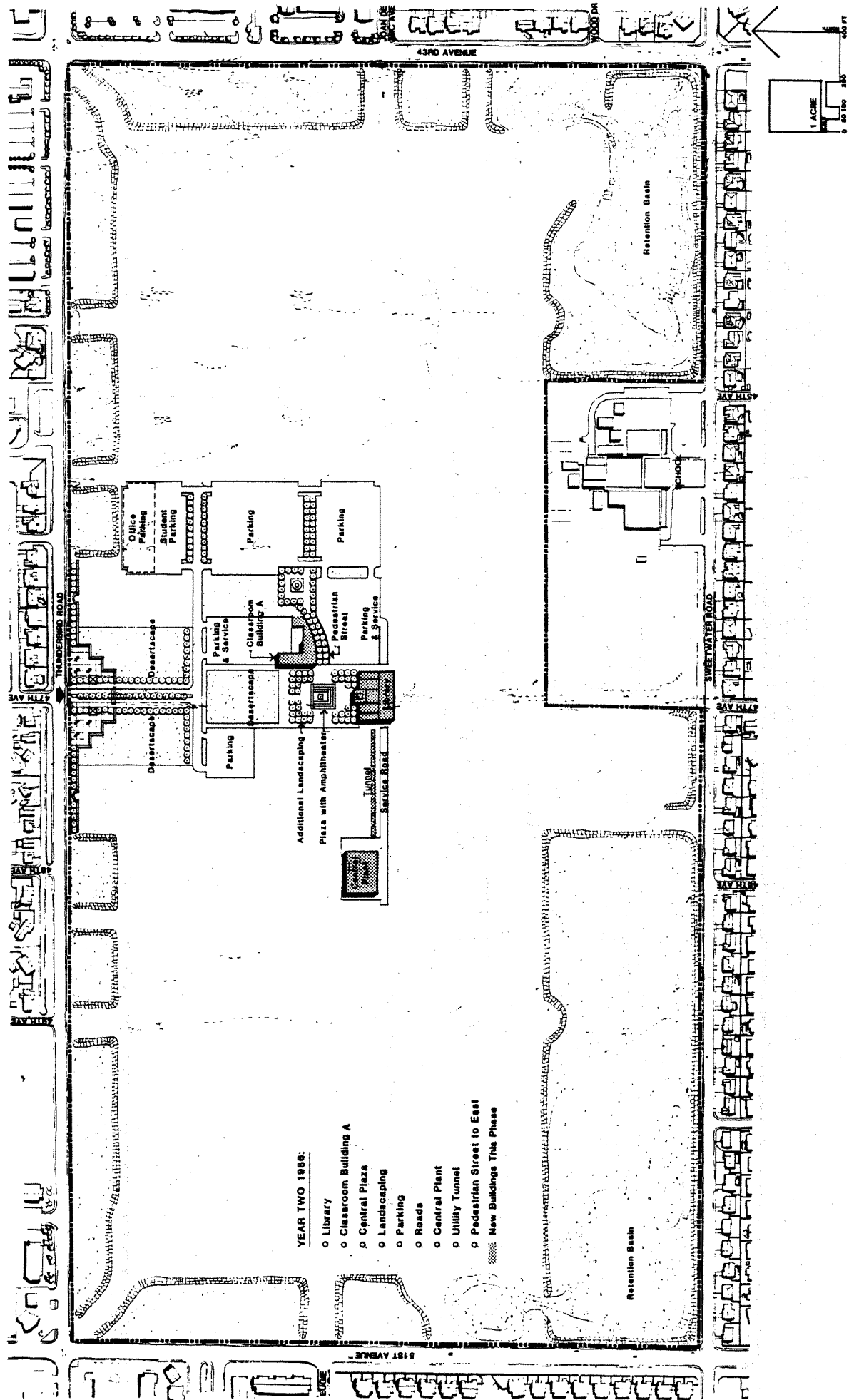
DEVELOPMENT PROGRAM - YEAR THREE

Assumptions: Year Three appropriation of \$20.5 million
(1987 Dollars)

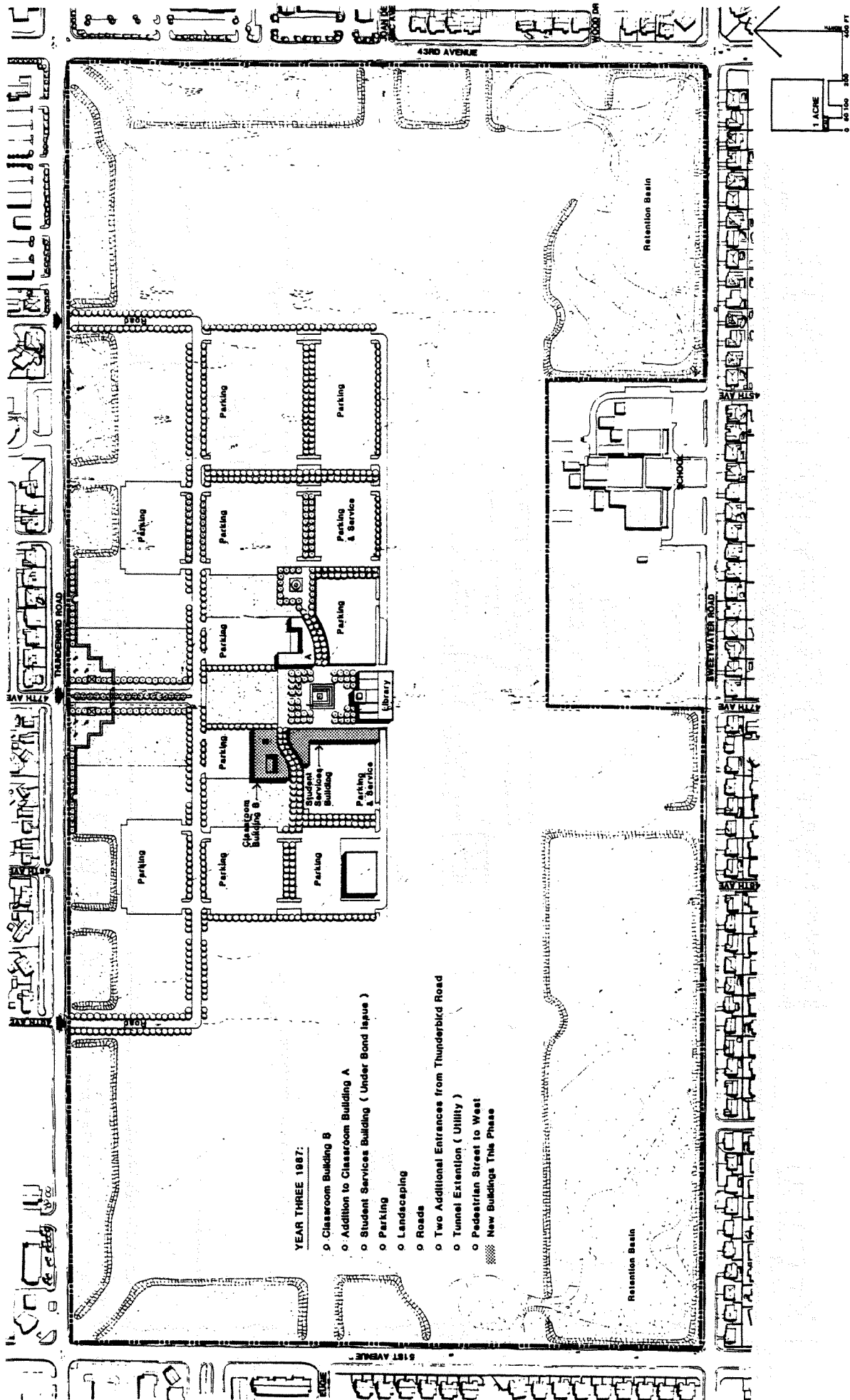
Actual Construction

<u>Building Costs</u>	<u>GSF</u>	<u>Project Costs</u>
Classroom (Building B)	78,000	\$ 7,726,000
Student Services Building	<u>92,500</u>	<u>8,884,000</u>
Total Building	170,500	\$16,610,000
<u>Site Improvements</u>		\$ 3,945,000
Includes:		
<ul style="list-style-type: none"> • Parking • Roads • Utility Tunnel Extension • Curbs • Sidewalks • Landscaping • Secondary Entries 		
TOTAL YEAR THREE PROJECT COSTS		<u><u>\$20,555,000¹</u></u>

¹ All project costs inflated at 5% a year for 2.5 years to bring to future costs.



ASU West Campus Plan
Phasing: Year Two - 1986
 Figure 41



YEAR THREE 1987:

- ◻ Classroom Building B
- ◻ Addition to Classroom Building A
- ▨ Student Services Building (Under Bond Issue)
- ▧ Parking
- ▩ Landscaping
- Roads
- - - Two Additional Entrances from Thunderbird Road
- ⊞ Tunnel Extension (Utility)
- ▤ Pedestrian Street to West
- ▧ New Buildings This Phase

**ASU West Campus Plan
Phasing: Year Three - 1987**

Figure 42

Costs and Revenues

Project Costs

Project cost estimates for the West Campus Plan were based on a bottom-up build-up of costs for the following items:

- Infrastructure Costs: On- and off-site costs, i.e. utilities, roads, parking and landscaping, etc.
- Academic Costs: Academic facilities, i.e. library, classroom, administrative and research lab spaces, etc.
- Commercial Costs: Commercial facilities, i.e. office, retail, restaurant and apartment spaces.

In addition, project costs were estimated for planned phases of construction. The first phase would be designed to accommodate a campus with 5,000 full-time equivalent (FTE) students and the second phase would be an expansion to meet the space requirements of another 5,000 FTE students. The space program for the planned phases of construction is as follows.

TABLE 7

ACADEMIC AND NON-ACADEMIC SPACE PROGRAM

Initial: 5,000 FTE Students

• Academic Space	575,000 GSF
• Commercial Space	<u>197,500</u>
Total Initial	772,500 GSF

Additional: 5,000 FTE Students

• Academic Space	565,000 GSF
• Commercial Space	<u>105,000</u>
Total Additional	670,000 GSF

BUILD-OUT: 10,000 FTE Students 1,442,500 GSF

Source: The NBBJ Group, Cella Barr Associates.

All project costs are stated in 1985 dollars. Project cost estimates include expenses for building construction, infrastructure costs (on- and off-site) and design contingencies (A/E fees, taxes, permits, contingencies, etc.). Also, project costs were based on a campus designed to operate on a centralized mechanical and electrical system. Under this system, all campus buildings would be connected to a central plant facility which would provide the required heating, ventilation and air conditioning (HVAC) for the campus. As part of the analysis, the project costs associated with the construction of the West Campus were also examined with a decentralized HVAC system.

Costs for a centralized campus system were derived by adding the projected on-site infrastructure costs of a decentralized system to the additional project costs required to upgrade the mechanical/electrical systems for centralized operation.

Table 8 shows the estimated project costs for the West Campus.

TABLE 8

PROJECT COSTS

(January 1985 Dollars)

Initial: 5,000 FTE Students

• Infrastructure (On- & Off-Site)	\$ 25,439,000
• Academic	57,746,000
• Commercial	<u>9,848,000</u>
Total Initial	\$ 93,033,000

Additional: 5,000 FTE Students

• Infrastructure (On-Site)	\$ 7,332,000
• Academic	56,399,000
• Commercial	<u>5,411,000</u>
Total Additional	\$ 69,142,000

BUILD-OUT: 10,000 FTE Students \$162,175,000

Source: The NBBJ Group, Cella Barr Associates.

As shown, the initial campus development phase is projected to be 36% more costly than the additional phase due to:

- Increased Building Construction Costs - 772,500 gsf of total construction (academic and commercial space) is planned in the initial phase versus 670,000 gsf in the additional phase, and
- Increased Infrastructure Costs - The majority of on-site infrastructure costs and all of the off-site costs are planned for the initial phase.

Project costs for commercial spaces would be funded by private developers and not by the State of Arizona. The total build-out costs, net of commercial space-related costs, would be \$146,022,000.

The following detailed unit cost sheets (Tables 9-14) served as the basis for the calculation of the final project costs for the master plan. All costs are in January 1985 dollars.

TABLE 9
NON-ACADEMIC UNIT COSTS
 (January 1985 Dollars)

<u>Commercial Space</u>	<u>Gross Square Feet</u>		<u>Total \$</u>
	<u>Initial</u>	<u>\$/Unit</u>	
Retail Shell	50,000	\$42.00	\$ 2,100,000
Restaurant Shell	5,000	55.00	275,000
Office Shell	50,000	45.00	2,250,000
Housing (150 units) (100 single - 50 double)	<u>92,500</u>	<u>41.00</u>	<u>3,792,500</u>
Estimated Gross Square Feet	197,500		
Subtotal - Construction Costs		\$42.62 (Average)	\$ 8,417,500
Subtotal - Project Costs (\$8,417,500 + 17%)			\$ 9,848,475
 <u>Commercial Space</u>	 <u>Build-Out</u>	 <u>\$/Unit</u>	 <u>Total \$</u>
Retail	50,000	\$42.00	\$ 2,100,000
Restaurant	5,000	55.00	275,000
Office	50,000	45.00	2,250,000
Housing (150 units) (100 single - 50 double)	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
Estimated Gross Square Feet	105,000		
Subtotal - Construction Costs		\$44.05 (Average)	\$ 4,625,000
Subtotal - Project Costs (\$4,625,000 + 17%)			\$ 5,411,250

TOTAL - CONSTRUCTION COSTS	302,500	\$43.12 (Average)	\$13,042,500
TOTAL - PROJECT COSTS (\$13,042,500 + 17%)			<u><u>\$15,259,725</u></u>

TABLE 11

SITE WORK UNIT COSTS: INITIAL

(January 1985 Dollars)

<u>On-Site Work</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total \$</u>
Site Clearing	286.5 AC	\$ 4,500.00	\$ 1,289,250
Culvert Crossing	2 EA	2,000.00	4,000
A.C. Paving - 2-1/2" on Base			
: Roads	69,000 SY	19.00	1,311,000
: Parking	280,000 SY	11.00	3,080,000
Sidewalk - Portland Cement Concrete on Base	20,000 SY	16.00	320,000
Pavement Striping	235,000 LF	0.15	35,250
CIP Concrete Curb	107,000 LF	9.00	963,000
Planting incl. irrigation-green	22,200 SY	30.00	666,000
Orchard	14,233 SY	50.00	711,650
Grass - sod on top soil	4,000 SY	1.20	4,800
Field Amenities - goal post, etc.	2 EA	2,000.00	4,000
Desertscape	702,300 SY	1.75	1,229,025
Berms - 4'0" high	15,000 LF	32.00	480,000
Entrances-including Signage			
Primary	1 EA		45,000
Secondary	2 EA		10,000
Storm Retention Pond	2 EA		150,000
Trellis-with Ivy-like planting			NIC*
Waterscape - Fountains			
: Main	1 EA		150,000
: Secondary	2 EA		40,000
Brick Paving: Maincourt	7,000 SY	45.00	315,000
Intersections	1,500 SY	45.00	67,500
Block Screen Walls - 4' High	3,000 LF	42.00	126,000
Swimming Pool - 30' X 75'	2 EA		70,000

TABLE 10

ACADEMIC UNIT COSTS, continued

(January 1985 Dollars)

ADDITIONAL: 5,000 FTE STUDENTS

<u>Academic Space</u>	<u>Gross Square Feet</u>	<u>\$/Unit</u>	<u>Total \$</u>
Classroom	56,154	\$ 70.00	\$ 3,930,780
Class Lab	42,308	90.00	3,807,720
Research Lab	69,231	125.00	8,653,875
Faculty Office	82,308	60.00	4,938,480
Administrative and Support Staff Office	80,000	65.00	5,200,000
Library:			
Stack	31,539	88.00	2,775,432
Reading Area	46,154	78.00	3,600,012
Administration & Service	15,385	80.00	1,230,800
Computer Lab and Support	3,846	140.00	538,440
Student Services	61,538	85.00	5,230,730
Student Personal Storage	11,539	40.00	461,560
Plant Operation & Maintenance	14,410	47.00	677,270
Assembly Space (Auditorium/Theatre)	20,000	89.00	1,780,000
Gymnasium	<u>30,588</u>	<u>75.00</u>	<u>2,294,100</u>
Estimated Gross Square Feet	565,000		
Subtotal Additional - Construction Costs		\$ 79.86 (Average)	\$ 45,119,199
Subtotal Additional - Project Costs (\$45,119,199 + 25%)			\$ 56,398,999

BUILD-OUT: 10,000 FTE STUDENTS

TOTAL BUILD-OUT - CONSTRUCTION COSTS	1,140,000		\$ 91,315,885
TOTAL BUILD-OUT - PROJECT COSTS (\$91,315,885 + 25%)			<u><u>\$114,144,857</u></u>

TABLE 10

ACADEMIC UNIT COSTS

(January 1985 Dollars)

INITIAL: 5,000 FTE STUDENTS

<u>Academic Space</u>	<u>Gross Square Feet</u>	<u>\$/Unit</u>	<u>Total \$</u>
Classroom	63,993	\$ 70.00	\$ 4,479,510
Class Lab	47,031	90.00	4,232,790
X Research Lab	69,390	125.00	8,673,750
Faculty Office	82,497	60.00	4,949,820
Administrative and Support Staff Office	80,184	65.00	5,211,960
Library:			
Stack	31,611	88.00	2,781,768
Reading Area	46,260	78.00	3,608,280
Administration & Service	15,420	80.00	1,233,600
Computer Lab and Support	11,565	140.00	1,619,100
Student Services	92,520	85.00	7,864,200
Student Personal Storage	11,565	40.00	462,600
Plant Operation and Maintenance	22,964	47.00	1,079,308
Assembly Space (Auditorium/Theatre)	-0-	-0-	-0-
Gymnasium	-0-	-0-	-0-
Estimate Gross Square Feet	575,000		
Subtotal Initial - Construction Costs		\$ 80.34 (Average)	\$46,196,686
Subtotal Initial - Project Costs (\$46,196,686 + 25%)			\$57,745,858

TABLE 11

SITE WORK UNIT COSTS: INITIAL, continued
(January 1985 Dollars)

<u>On-Site Work</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total \$</u>
Tennis Courts	4 EA		\$ 80,000
Volleyball/Basketball Court	4 EA		80,000
Playfields	2 EA		200,000
Site Utilities:			
Lighting			200,000
Power			1,150,000
Water			350,000
Sanitary Sewer			150,000
Storm Sewer			NIC*
Gas			NIC*
Telephone			<u>900,000</u>
TOTAL INITIAL ON-SITE WORK (DECENTRALIZED HVAC) - CONSTRUCTION COSTS			\$14,181,475
+ 25% for Design Contingencies			<u>3,545,369</u>
TOTAL INITIAL ON-SITE WORK (DECENTRALIZED HVAC) - PROJECT COSTS			\$17,726,844
+ Additional Project Costs to Upgrade to a Centralized HVAC System			<u>3,828,400</u>
TOTAL INITIAL ON-SITE WORK (CENTRALIZED HVAC) - PROJECT COSTS			<u><u>\$21,555,244</u></u>

* Not in Contract.

TABLE 12
SITE WORK UNIT COSTS: BUILD-OUT
 (January 1985 Dollars)

<u>On-Site Work</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total \$</u>
Site Clearing	286.5 AC	\$4,500.00	\$ 1,289,250
Culvert Crossing	2 EA	2,000.00	4,000
A.C. Paving - 2-1/2" on Base			
: Roads	70,000 SY	19.00	1,330,000
: Parking	545,000 SY	11.00	5,995,000
Sidewalk - Portland Cement Concrete on Base	30,000 SY	16.00	480,000
Pavement Striping	300,000 LF	0.20	60,000
CIP Concrete Curb	157,000 LF	9.00	1,413,000
Planting incl. irrigation-green	43,000 SY	30.00	1,290,000
Orchard	14,233 SY	50.00	711,650
Grass - sod on top soil	6,000 SY	1.20	7,200
Field Amenities - goal post, etc.	5 EA	2,000.00	10,000
Desertscape	702,300 SY	1.75	1,229,025
Berms - 4'0" high	20,800 LF	32.00	665,600
Entrances-including Signage			
Primary	1 EA		45,000
Secondary	6 EA		30,000
Storm Retention Pond	2 EA		150,000
Trellis-with Ivy-like planting			NIC*
Waterscape - Fountains			
: Main	1 EA		150,000
: Secondary	2 EA		40,000
Brick Paving: Maincourt	8,000 SY	45.00	360,000
Intersections	3,000 SY	45.00	135,000
Block Screen Walls - 4' High	3,800 LF	42.00	159,600
Swimming Pool - 30' X 75'	2 EA		70,000

TABLE 12
SITE WORK UNIT COSTS: BUILD-OUT, continued
 (January 1985 Dollars)

<u>On-Site Work</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total \$</u>
Tennis Courts	4 EA		\$ 80,000
Fitness Course	1 EA		23,000
Volleyball/Basketball Court	4 EA		80,000
Playfields	5 EA		500,000
Site Utilities:			
Lighting			300,000
Power			1,150,000
Water			535,000
Sanitary Sewer			200,000
Storm Sewer			NIC*
Gas			NIC*
Telephone			<u>1,600,000</u>
TOTAL BUILD-OUT SITE WORK (DECENTRALIZED HVAC) - CONSTRUCTION COSTS			\$20,092,325
+ 25% for Design Contingencies			<u>5,023,082</u>
TOTAL BUILD-OUT SITE WORK (DECENTRALIZED HVAC) - PROJECT COSTS			\$25,115,406
+ Additional Project Costs to Upgrade to a Centralized HVAC System			<u>3,772,000</u>
TOTAL BUILD-OUT SITE WORK (CENTRALIZED HVAC) - PROJECT COSTS			<u><u>\$28,887,506</u></u>

Note: On-site infrastructure costs for the additional phase of campus development can be calculated by subtracted costs for the initial phase from costs for the total build-out phase.

* Not in Contract.

TABLE 13

OFF-SITE WORK COSTS
(January 1985 Dollars)

	<u>Total \$</u>
<u>Off-Site Work*</u>	
Signals: Plan on 2 initially, 4 ultimately	\$ 400,000
Street Lighting	132,000
Road Pavement, Curb and Gutter	
Thunderbird Road including median @ \$38/SY	1,070,080
43rd Avenue @ \$24/SY	211,200
51st Avenue @ \$24/SY	211,200
Sweetwater Avenue @ \$10/SY	82,133
Electrical	<u>1,000,000</u>
TOTAL OFF-SITE WORK - CONSTRUCTION COSTS	<u>\$3,106,613</u>
TOTAL OFF-SITE WORK - PROJECT COSTS (\$3,106,613 + 25%)	<u><u>\$3,883,266</u></u>

* All off-site work will occur in the initial phase of campus development.

TABLE 14

DESIGN CONTINGENCIES*

(January 1985 Dollars)

	<u>Commercial</u>	<u>Residential</u>	<u>Academic</u>
Sales, Use and Other Business Taxes - 7% on 65% of Work	4.5	4.5	4.5
Major Moveable Equipment (Group 1)	0	0	5
Furniture, Furnishings (Group 2)	0	0	NIC**
A/E Fees	5	5	8
Special Consultants	1	1	1
Project Management	NIC	NIC	NIC
Testing, Inspection and Balancing	1	1	1
Market Studies	NIC	NIC	NIC
Owner's Administration	NIC	NIC	NIC
Survey	0.5	0.5	0.5
Soils	1	1	1
General (Owner's) Contingency	3	3	3
Insurance and Permits	1	1	1

TOTAL	17%	17%	25%

* Percentage applied to construction costs, and then added to construction costs to arrive at total project costs.

** Not in Contract.

Based on the market analysis the following four types of space were deemed economically feasible in the quantities listed below.

TABLE 16

NON-ACADEMIC SPACE PROGRAM

Initial: 5,000 FTE Students

Commercial Office Space	50,000 GSF
Commercial Retail Space	50,000
Restaurant Space	5,000
Apartments (150 units)	<u>92,500</u>
Total Initial	197,500 GSF

Build-Out: 10,000 FTE Students

Commercial Office Space	100,000 GSF
Commercial Retail Space	100,000
Restaurant Space	10,000
Apartments (150 units)	<u>92,500</u>
TOTAL BUILD-OUT	<u><u>302,500 GSF</u></u>

Source: The NBBJ Group.

All commercial spaces would double in size in the build-out phase except for the apartment space which would be built in the initial phase of construction.

In order to calculate the potential ground lease revenues generated from the development of commercial spaces the following steps had to be completed for each type of commercial space in the order listed below.

- Calculation of Net Operating Incomes
- Calculation of Economic Worths (supportable capital costs)
- Estimation of Total Project Costs
- Calculation of Residual Land Values
- Calculation of Ground Lease Revenues

TABLE 15

ANNUAL FACILITY-RELATED OPERATING COSTS

(January 1985 Dollars)

Initial:	5,000 FTE Student	\$3,804,000
Additional:	5,000 FTE Students	<u>1,363,000</u>
BUILD-OUT:	10,000 FTE Students	<u><u>\$5,167,000</u></u>

Source: The NBBJ Group, Cella Barr Associates

As shown, total build-out operating costs are estimated in 1985 dollars to be approximately \$5,167,000 a year. Costs for the additional phase of development were lower than those estimated for the initial phase due to projected cost savings in utility expenses (electricity) as a result of higher consumption levels lowering the effective unit cost charge rate.

Revenues

In an attempt to offset the capital and operating costs associated with the newly planned West Campus, a plan was proposed which allowed the development of commercial space on designated areas of the campus. The funds generated by this commercial space could be used to subsidize the capital and/or operating expenses of the new campus.

In order to determine the economic feasibility of incorporating commercial development on the ASU West property, a commercial market analysis was undertaken of the metropolitan Phoenix area as well as a detailed examination of the West Phoenix real estate market. The analysis permitted the identification of the types and quantities of commercial development possible given current and projected market conditions near the site. The details of the market analysis are provided in the second document: Planning Background, Section II: Analyses, under Economic Evaluation.

Operating Costs

Annual operating costs for the West Campus were based on a bottom-up build-up of costs associated with the operation of the campus at the sizes specified in the space program. The cost estimates also assumed the use of a campus designed with a centralized mechanical and electrical system. Annual operating cost estimates were also projected for a decentralized HVAC-based campus which would use HVAC systems within each individual building rather than relying on a central plant to provide the needed heating and cooling functions. Operating the campus, however, under a centralized system versus a decentralized system was projected to result in an estimated annual cost savings of 12%-13%.

Total annual operating estimates for the ASU West Campus included cost figures for the following expense categories:

- Utilities
 - Natural Gas
 - Water and Sewer
 - Electricity
- Maintenance
 - Maintenance and Custodial Labor
- Supplies
 - Maintenance and Custodial

All operating cost estimates were based on present Phoenix area labor and materials cost standards.

Table 15 shows the projected annual operating costs for the West Campus.

Several key financial assumptions were used to arrive at the potential ground lease revenues that could be derived from non-academic development (i.e. lease, operating and vacancy rates, etc.). Many of these assumptions were gained through information collected from the commercial market analysis. Given the fact that State law prohibits the sale of any portions of the ASU West Campus property to outside parties, income would be limited to ground lease revenues generated by commercial development. One of the major assumptions employed in the analysis was use of a 10% annual return on land as the basis for determining the amount of annual ground lease revenues collected by ASU. The 10% return criteria is consistent with those observed in the Phoenix area for improved land. Lastly, project cost estimates were based on construction of a campus utilizing a centralized HVAC system. The details of the revenue analysis are provided in the second document: Planning Background, Section II: Analyses, under Economic Evaluation.

The following are the ground lease revenues projected on the new campus.

TABLE 17

POTENTIAL ANNUAL COMMERCIAL REVENUES - GROUND LEASES

(January 1985 Dollars)

Initial:	5,000 FTE Students	\$205,000
Additional:	5,000 FTE Students	<u>243,000</u>
BUILD-OUT:	10,000 FTE Students	<u><u>\$448,000</u></u>

Source: The NBBJ Group.

As shown above, ground lease revenues are projected to generate approximately \$200,000 to \$250,000 a year in the incremental phases of development (initial, additional) and about one-half million dollars in the build-out phase. Given the magnitude of the required funds to build the West Campus, the total revenues generated from the commercial development would probably not be sufficient to offset much of the project cost of the campus. The revenues would be sufficient, however, to subsidize and therefore reduce the costs of operating the campus.

Summary

The following table summarizes the economic analysis of the master plan.

TABLE 18

SUMMARY COSTS AND REVENUES

(January 1985 Dollars)

	<u>Probable Project Costs¹</u>	<u>Annual Operating Costs</u>	<u>Potential Commercial Revenues (Ground Leases)</u>
INITIAL:			
5,000 FTE Students	\$ 93,033,000	\$3,804,000	\$205,000
ADDITIONAL:			
5,000 FTE Students	<u>69,142,000</u>	<u>1,363,000</u>	<u>243,000</u>
BUILD-OUT:			
10,000 FTE Students	<u>\$162,175,000</u>	<u>\$5,167,000</u>	<u>\$448,000</u>

¹ Includes projects costs for commercial development.

Source: The NBBJ Group, Cella Barr Associates.