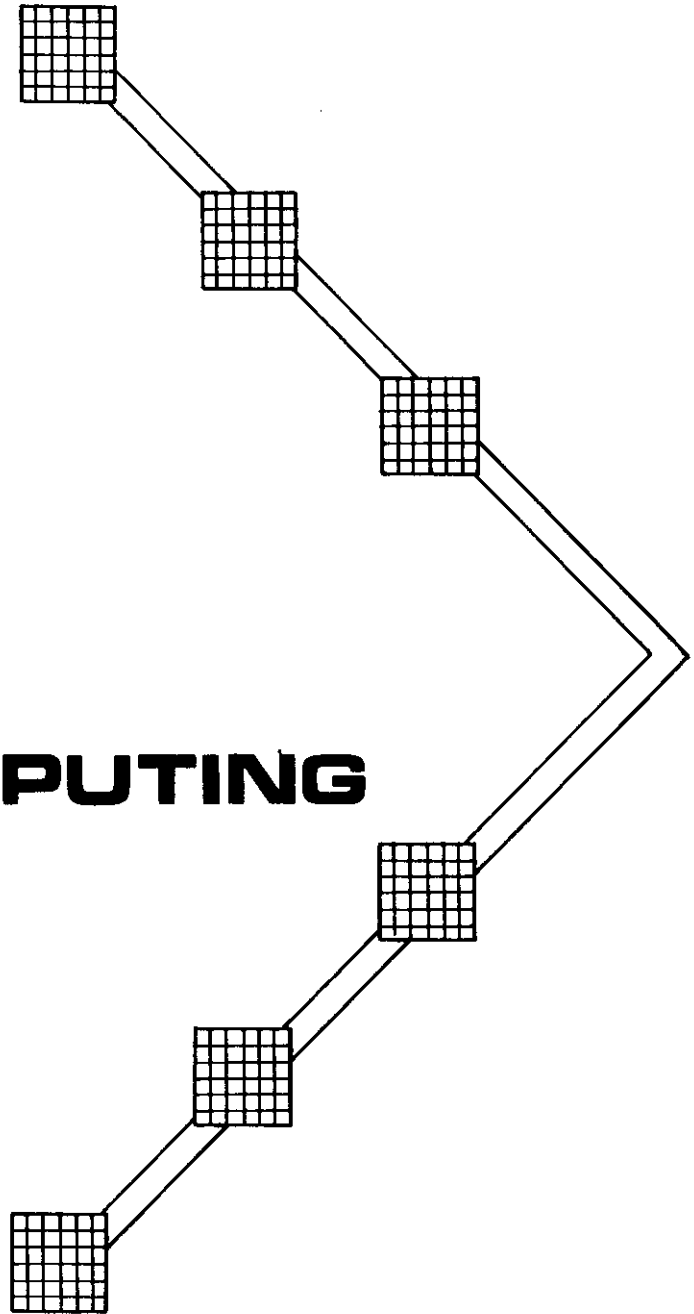


ICC

**OFFICE/COMPUTING
COMPLEX**



International Computing Corporation

Architectural Thesis 1983

William R. Gamble

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This thesis brochure is dedicated to my mother and father for providing so much love and support over the many years.

Thanks to Corky for her patience and understanding.

Thanks also to the students and professors that expressed an interest in my project.

A special thanks to the boys in Dallas, Texas, Fred Sahs and Tom (who deserves more credit than simply a first name, but for reasons beyond our control proves to be impossible) for their knowledge, enthusiasm, and willingness to help.

The project contained herein is the culmination of a thirty week process known as thesis. Thesis entails the selection of a building type for which a final design solution is to be executed. Before a final design is arrived at, several intermediate steps must be completed. Many hours are spent doing research giving the student an insight into the history and previous solutions to a particular building type. A space summary must be written which outlines the various spaces to be included and their size. The space summary also outlines exterior requirements such as parking, access and egress, and landscaping. After the preliminary ground-work is completed, the design process is begun. Countless hours are spent refining initial concepts into viable solutions which transcend architecture as built form into structure that exists in harmony with itself and its environment. The final step in the thesis process is the production of a presentation package. The student must amass all the abstract concepts, drawings, and information into a brochure that communicates the nature of the project.

While on my internship program, I was involved with a project which entailed the installation of a computer center onto three floors of an existing office tower. This experience gave me first-hand exposure to the problems involved in placing sophisticated computer systems into a structure not specifically designed to accommodate such systems. Problems ranging from inadequate size and location of mechanical chases to an exorbitant number of ramps leading to raised flooring to unclear circulation patterns can cause sleepless nights for the architect.

The exposure to these and other problems led me to realize that a complex designed specifically to accept and define the relationship between the office environment and computer environment is necessary if an office/computer complex is to operate in the most efficient manner.

The International Computing Corporation could be any corporation in existence which writes and sells programs to an unlimited variety of customers. Fee software then becomes the major purpose of the facility with the necessary support groups that make it a substantial office/computing facility.

Situated twenty miles southwest of Denver, Colorado in the foothills on the Ken Caryl Ranch, the 300 acre site is at an elevation of 6230 feet above sea level. The site is located one mile west of a ridge known as the Hogback and slopes up gently to the west. Continuing west from the site, the slope increases sharply to an elevation of 7600 feet at the first ridge of hills which defines the beginning of the Rocky Mountains.

Vegetation is sparse with the majority being prairie grass, evergreen trees, sage brush, and yucca. Sandstone outcroppings occur frequently throughout the area. The area is fairly arid with no lakes within several miles.

The setting is one that reveals very little of mans impact on the environment. The closest built form of any consequence is the Johns-Manville Headquarters located one mile south of the site. Any structure to be situated on a site such as this must establish a relationship and interaction with the natural surroundings.

Hills directly west of the site provide a backdrop for the building, and are designated as desirable views. Looking north and south along the foothills provides the most desirable views.

Monthly Sunshine

January 200 hrs.
 April 250 hrs.
 July 300 hrs.
 October 250 hrs.

Precipitation

Average annual precipitation 8 in.
 Average maximum rainfall in
 a one hour period75 in.
 Average maximum rainfall in
 one 24 hour period 1.75 in.
 Average annual snowfall 32 in.
 Average annual runoff75 in.

Monthly Rainfall

January5 in.
 April 1 in.
 July 2 in.
 October75 in.

Average Monthly Minimum Temperature

January 10°F
 April 30°F

July 55°F
 October 35°F

Average Monthly Maximum Temperature

January 40°F
 April 55°F
 July 85°F
 October 65°F

Monthly Average Temperature

January 30°F
 April 40°F
 July 70°F
 October 50°F

Average Winds *

January southerly @ 3 mph
 April southerly @ 1 mph
 July southerly @ 2 mph
 October southerly @ 2 mph

* During spring months, winds will occasionally reach speeds of up to 100 mph and sweep along the foothills from the north.

Spaces will be designed to allow a maximum degree of flexibility. Furniture and partitions will be adaptive to change as the corporation changes.

Artificial lighting will be adaptive to any change in the office layout.

HVAC systems will be zoned in such a manner as to prevent hot and cold spots in the office spaces.

Circulation systems will remain consistent and distinguishable.

Temperature and humidity control is of prime importance in the computer center. HVAC systems will be able to maintain temperature and humidity at consistent levels.

Chilled water systems which cool machinery in the computer center will be adaptive to change.

Natural lighting in the computer center will be controlled to prevent damage to equipment and to lessen mechanical loads.

Artificial lighting in the center will be adaptive to change as several areas require task lighting.

Public circulation systems will be readily apparent and easily definable.

Inter-office circulation will allow the highest degree of efficiency while utilizing the least amount of space as possible.

Mechanical vertical circulation will be apparent upon entering the building, and will be integrated with the horizontal circulation.

Fire stairs will be located on major horizontal circulation systems and readily identifiable.

A guard station will be provided complete with video monitors of the entire computer center, video monitors of all entries to the complex, and an audio/visual signal system which monitors mechanical systems vital to computer operations.

A combination lock system and card reader will be located at every entrance door to the computer center and on appropriate doors within the rest of the complex.

Video cameras will be placed at every entry door to the computer center and all entries to the complex.

The guard station will be occupied from 5 pm until 9 am Monday through Friday and 24 hours on weekends and holidays.

Access to the complex will be by means of a two lane road ending at the complex.

Service access will be by means of a two lane road splitting off the main road a minimum of one quarter of a mile from the complex.

Egress will be the same as access.

Service docks will be capable of handling vehicles which range in size from small vans to 18 wheel tractor trailers.

A service vehicle waiting area will be provided in the event that more vehicles arrive than can be unloaded.

Exterior lighting will be kept to a minimum, occurring only where needed for reasons of human safety and security.

Planting will consist of only materials that are common to the area.

Space Summary

OFFICE CENTER

Vice President	1 @ 400	400	Sq. Ft.
Director	1 @ 225	225	" "
Managers	26 @ 180	4680	" "
Professionals	219 @ 120	26280	" "
Administrative Asst.	1 @ 150	150	" "
Executive Sec.	1 @ 150	150	" "
Secretaries	26 @ 120	3120	" "
Conference Rms.	6 @ 1400	8400	" "
Customer Briefing Rm.	1 @ 1600	1600	" "
Teleconferencing Rm.	1 @ 1200	1200	" "
Copier Rms.	16 @ 100	1600	" "
Manager Storage	26 @ 200	5200	" "
Reception	1 @ 1800	1800	" "
Mail Rm.	1 @ 2000	2000	" "
Reproduction Rm.	1 @ 600	600	" "
Stationary Stores	1 @ 600	600	" "
Storage	1 @ 1500	1500	" "
Display Area	1 @ 2500	2500	" "
Vending Lounge	1 @ 2000	2000	" "
Sub Total		64005	Sq. Ft.

Circulation	20%	12000 Sq. Ft.
Mechanical	7%	4200 " "
Office Center Total		80205 Sq. Ft.

COMPUTER CENTER

Raised Flooring	34 Staff	44000 Sq. Ft.
Managers	4 @ 180	720 " "
Secretaries	4 @ 120	480 " "
Planning Facility	1 @ 1500	1500 " "
Operators Lounge	1 @ 800	800 " "
Paper Storage	1 @ 3000	3000 " "
Sub Total		64000 Sq. Ft.
Circulation	20%	10000 " "
Mechanical	7%	3500 " "
Total		64000 Sq. Ft.

RESTAURANT

Indoor Seating	300 @ 14	4200 Sq. Ft.
Kitchen		1800 " "
Total		6000 Sq. Ft.
Loading Dock	2 @ 540	1080 Sq. Ft.
Total Complex Square Footage		151,285 Sq. Ft.

PARKING REQUIREMENTS

Employee

350 Spaces

Visitor

25 Spaces

Total

375 Spaces

Departmental Description

Vice President: Liason between this complex and other ICC complexes.

Director of Development: Director of entire complex.

Finance Programs Department: Produce software and sell to finance industries. Example: Programs for 24 hour automatic teller machines.

Finance Development Department: Write the actual programs sold to finance industries.

Finance Testing Department: Test the programs written by the development department.

Retail Programs Department: Produce software and sell to retail industries. Example: Programs for electronic cash registers which control inventory, departmentalize sales, and price automatically.

Retail Development Department: Write the actual programs sold to retail industries.

Retail Testing Department: Test the programs written by the development department.

Web Services Manager: Responsible for the operation of the computers.

Spine Management Control (SMC): Responsible for both data and physical security of the computers and computer center. Also acts as an auditor for changes made to the programs that run in the computers. (Basic Operating Systems - PM, PS, DFS, DBDP).

Potential Machine (PM): Basic operating system that programmers use to write programs to sell to ICC customers (Fee Software). This group installs and maintains this operating system.

Potential Spine (PS): Same as PM, but another operating system.

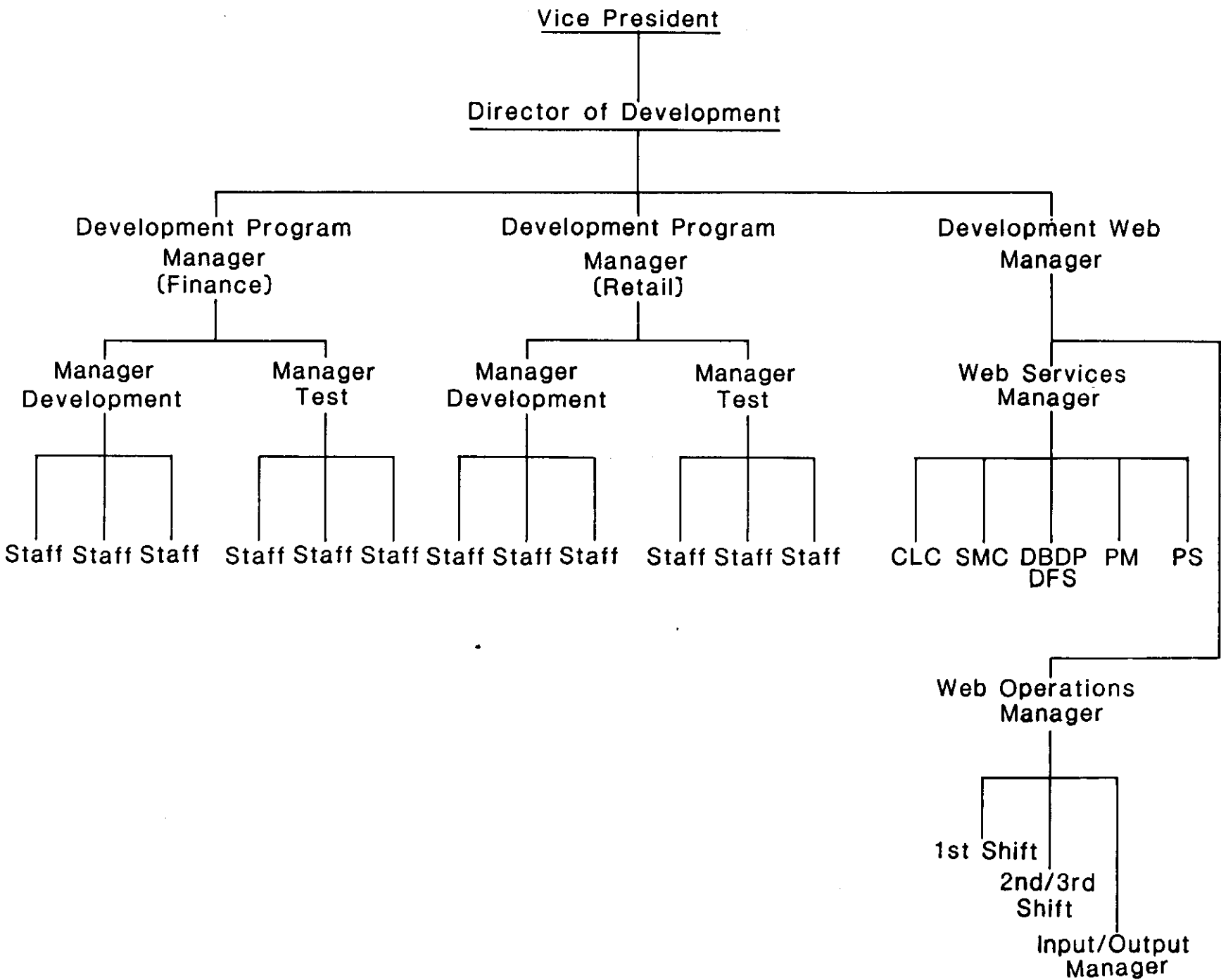
Disk Functioning Spine (DFS): Same as PM and PS.

Data Base Data Perception (DBDP): Large programs the programmers use to write other programs. Specifically the DBDP Systems are Annunciation Management Spine (AMS) and Consumer Annunciation Control Spine (CACS).

Computer Layout Control (CLC): Responsible for the physical layout of the machinery, ordering of machinery, and design of how the operating systems will fit into the computers.

Web Operations Department: The actual people that run the machines in the computer center.

Finance and Planning Manager: Manages the budget for the entire complex.



Access - one means of access to the site.

Automobile - how cars move through and are stored on site.

Weather - hot summers and cold snowy winters.

Winds - spring winds out of the north exceed 100 mph.

Site drainage - precipitation runs off the hill and moves through the site.

Communication/ Circulation - how people move, and how materials and systems are carried through the building.

Future expansion - the nature of the computer industry as it relates to growth.

To provide an atmosphere which will be conducive to worker productivity.

To design a complex in which circulation systems are easily recognizable from the exterior and interior.

To allow expression of individual entities within the whole composition.

To produce a finished product that expresses the nature of the complex.

To produce a project which is a complete expression that allows for future expansion.

To produce a building that interacts with the site through the use of materials and respecting contours.

To take full advantage of exterior views.

The International Computing Corporation complex is organized around an opposing public/private grid system. Private office spaces occur on one orthogonal grid. A second grid opposed 45 degrees contains public spaces.

As was stated earlier, producing fee software is the major function of the complex. The configuration of the complex is derived from the corporations organization of the development and testing groups in the retail and finance divisions. Each development and testing group is comprised of 45 staff members with three managers for a total of 180 staff members and 12 managers. These numbers breakdown into 12 pods with one manager and 15 staff per office pod. The finance and retail divisions are set at a 90 degree angle to one another with the major horizontal circulation system connecting them. The circulation system also serves to separate the public and private areas, while at the same time, tying the two structural systems together. The circulation paths from each division meet to define the main entry to the complex where the vertical circulation is located. Entry to the complex occurs at grade level where the reception and display areas are located. Office spaces are located on the second and third levels.

Office pods on the second level contain the Finance and Retail Development Departments. The major public areas on the second level include a full service restaurant located in the northern section of the office center and an employee vending lounge in the southern section of the center. The restaurant has views looking north along the foothills while the vending lounge looks south along the foothills. The third level of the office center is identical to the second with the Finance and Retail Testing Departments located in the pods.

The office center is connected to the computer center by a bridge which contains the remainder of the office spaces. Web Services and Web Operations occupy the second level while upper level managers are located on the third level. Circulation between the office center and the computer center is also by means of the bridge. This circulation is expressed on the exterior through the use of narrow strip windows at each level. These strip windows are visible when approaching the complex.

Two different materials are used to express the essentially two different functions. The computer center is clad in enamel panels scored in one foot by one foot sections. The panels encase the entire center with the exception of the southeast corner where fenestration occurs. Windows are located only in this area due to their close proximity to the work areas and horizontal circulation. The lack of fenestration in the remaining center cuts down on cooling load

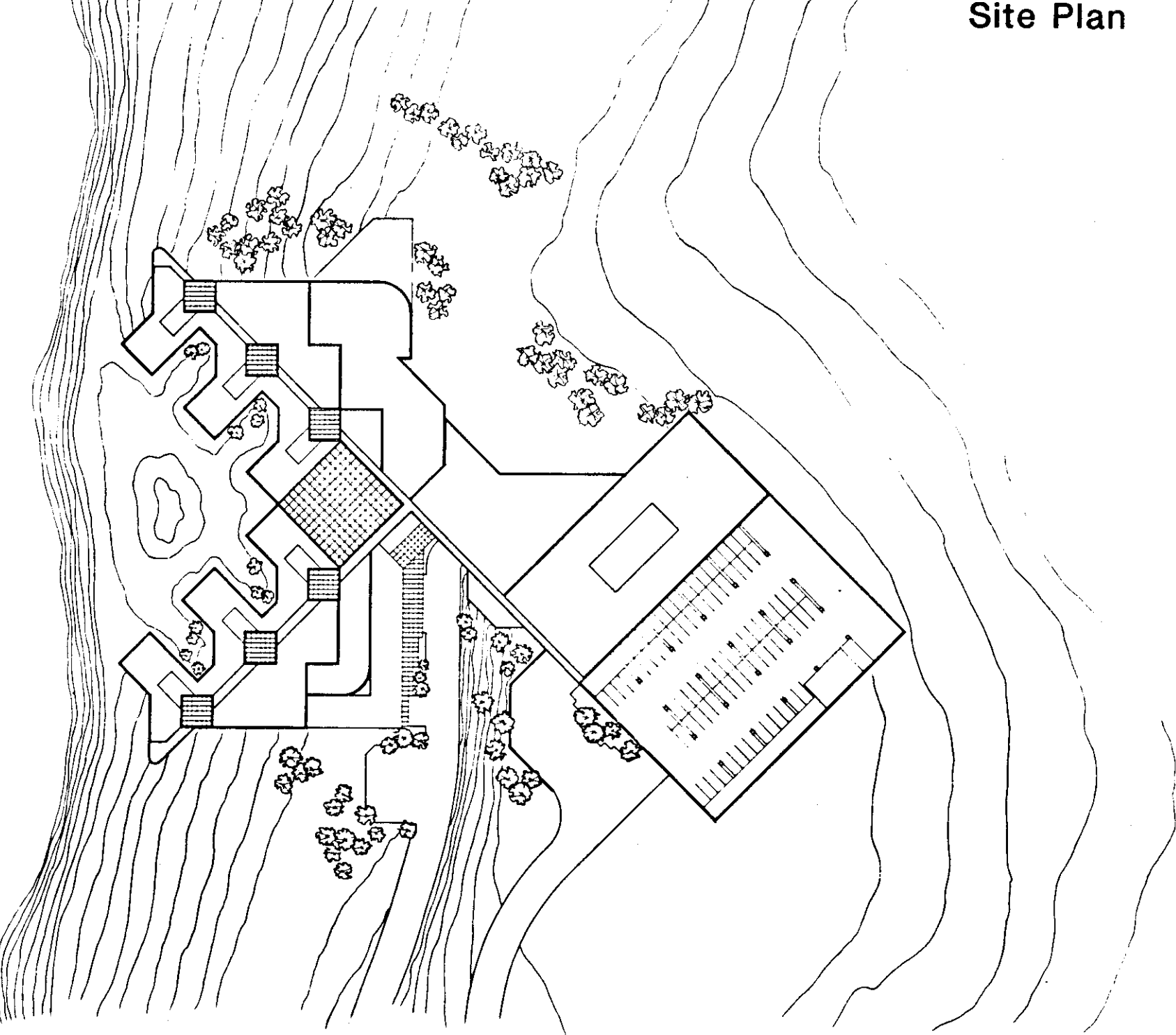
due to solar gain. Materials in the office areas will be poured in place concrete using six inch board formwork, and a continuous window system. The use of the formwork will give a rugged texture that relates to the mountainous site.

The scored enamel panels extend above the roof line to enclose a mechanical chase which carries co-axial cable from the computer center to each office pod. Each staff member requires a CRT unit and the co-axial cable links the CRTs directly to information stored in tapes and disks run in the computer machinery. From the exterior, the mechanical chase acts as a unifying element tying the office center and computer center together to form a single expression.

Future expansion was an aspect of the design that needed to be explored. The computer industry is one of the fastest growing industries in the world today, and the necessity for expansion of a complex is not unusual. The ICC complex can be easily expanded without compromising the design solution. Using the vocabulary and rhythm established in the office pods, expansion is possible. The computer center is also easily expandable. The structural grid used in the center has been expanded out into the parking garage. Reinforcing bar has been extended through the top of the concrete slab and then capped by the exterior lighting system. If expansion becomes necessary, the reinforcing bar can be uncapped and another computer center can be built.

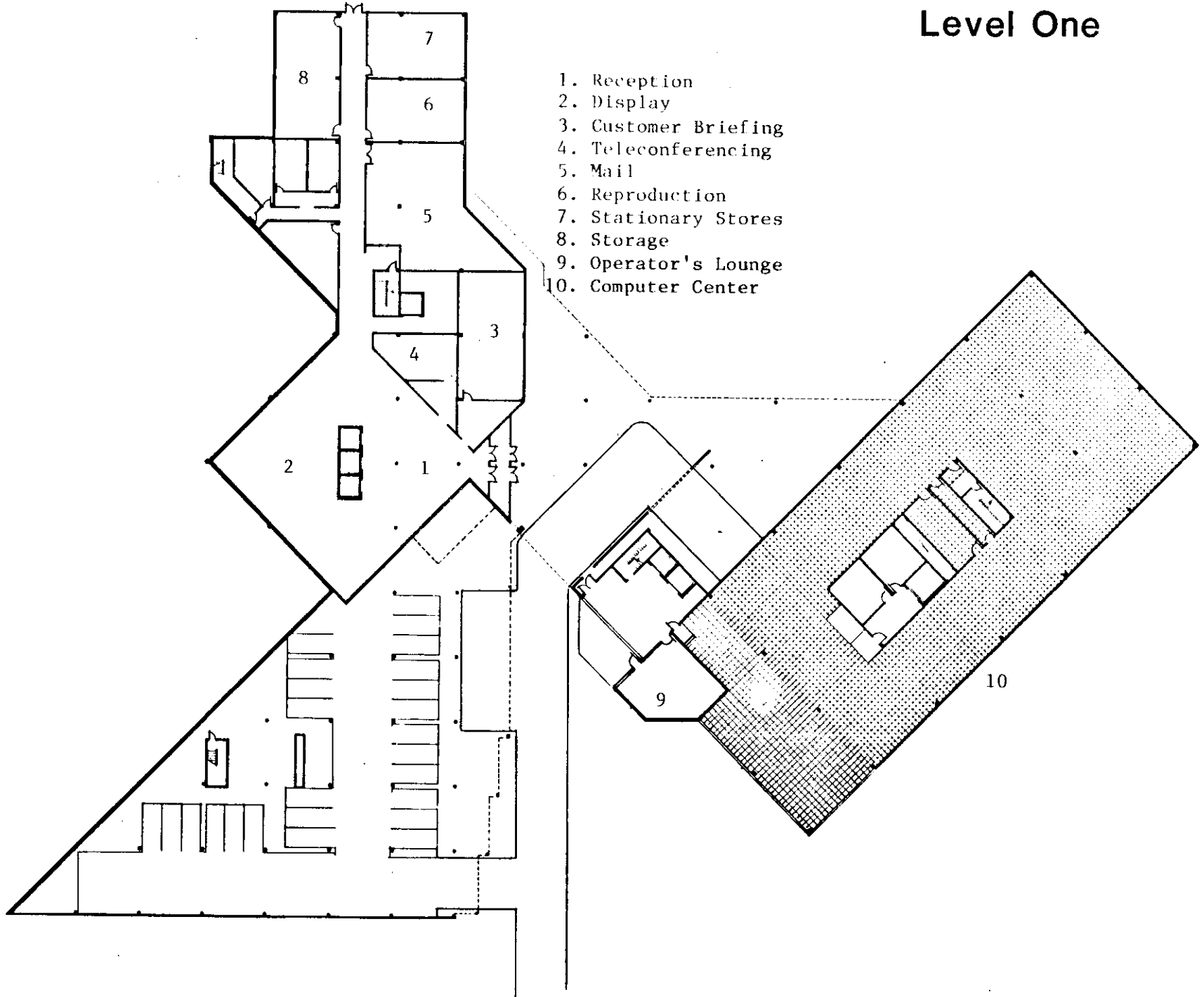
The parking garage extends under the existing computer center and has the capacity to handle 100% of the employee parking requirements. Should a second center become necessary, only a few parking spaces would be sacrificed to building core requirements.

Site Plan



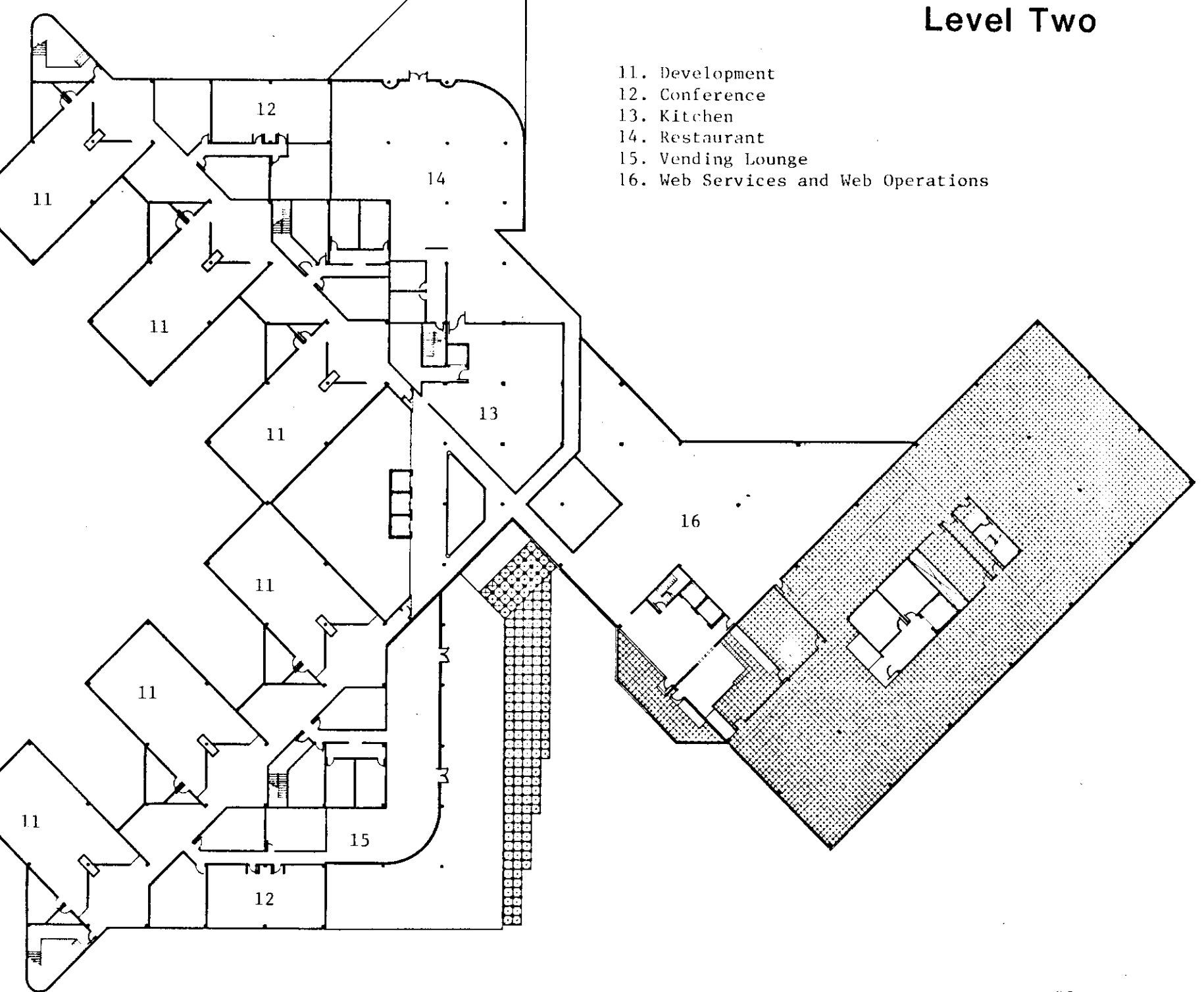
Level One

1. Reception
2. Display
3. Customer Briefing
4. Teleconferencing
5. Mail
6. Reproduction
7. Stationary Stores
8. Storage
9. Operator's Lounge
10. Computer Center



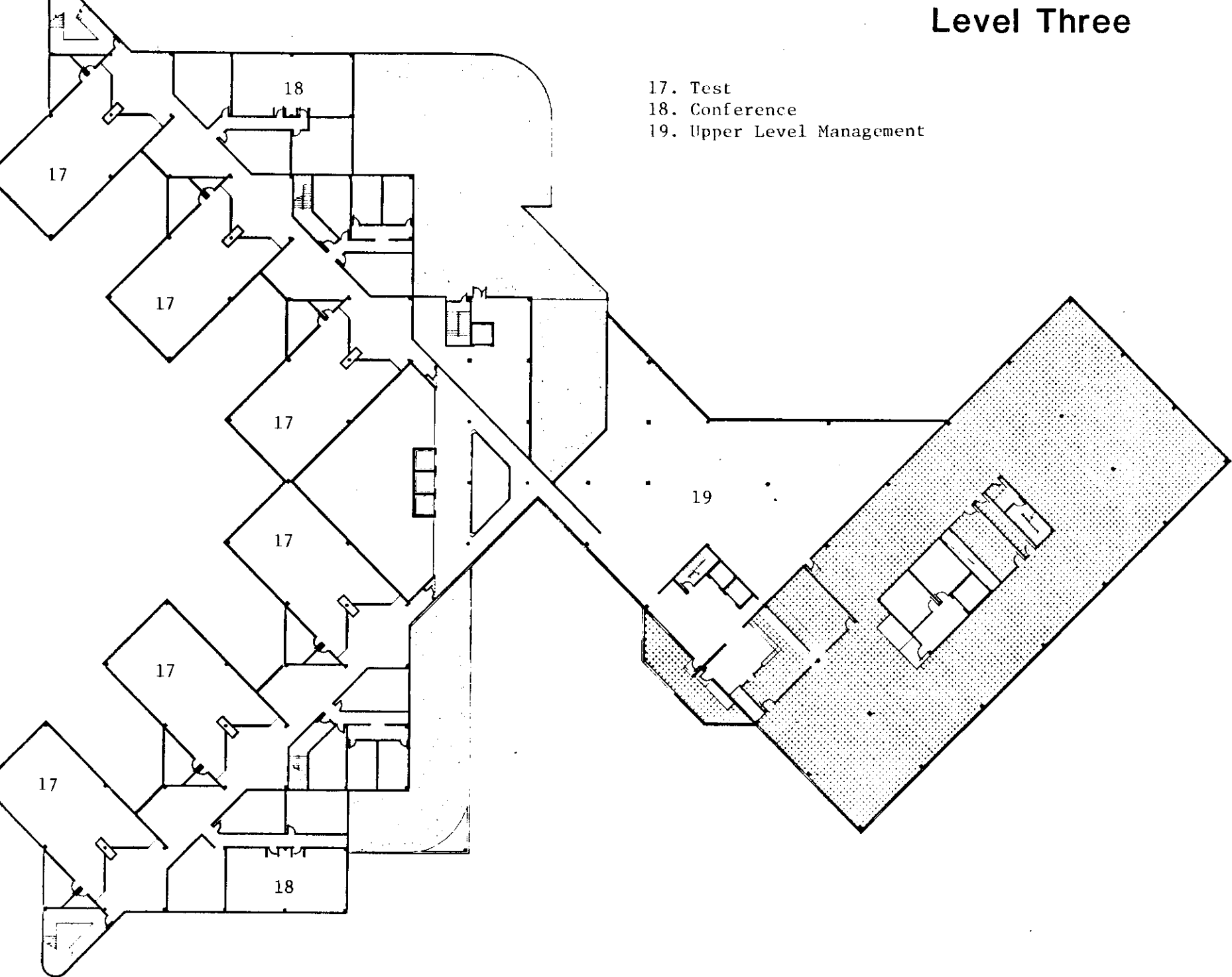
Level Two

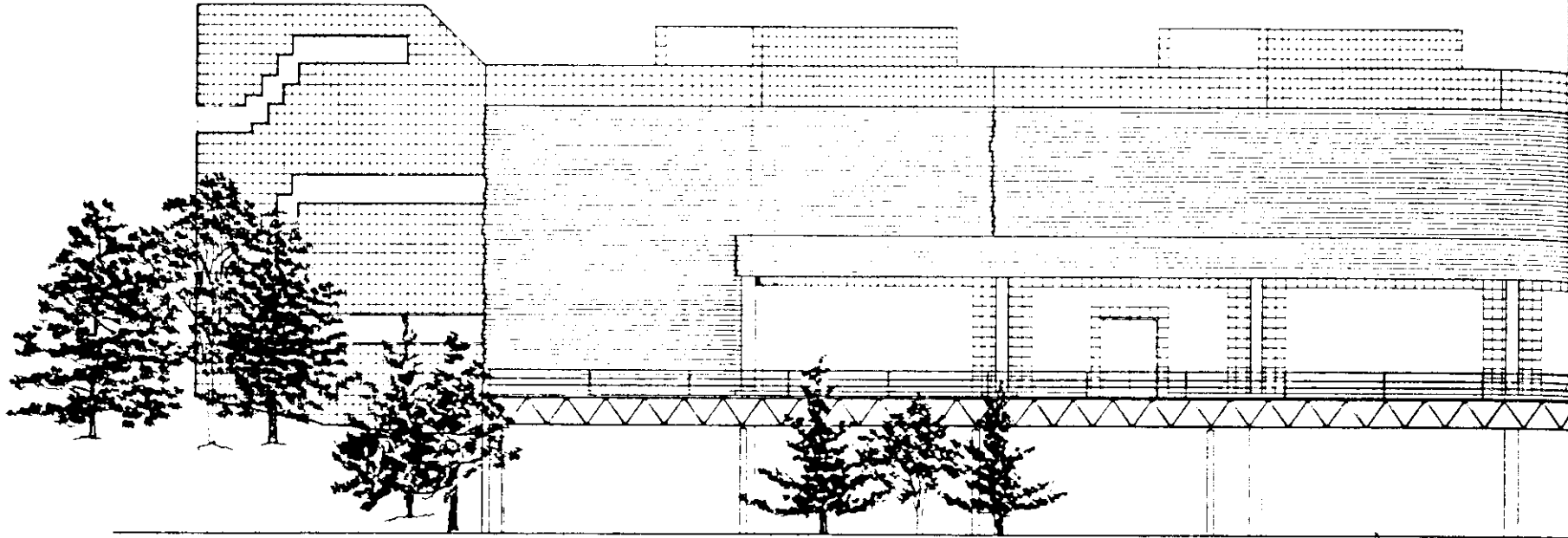
- 11. Development
- 12. Conference
- 13. Kitchen
- 14. Restaurant
- 15. Vending Lounge
- 16. Web Services and Web Operations

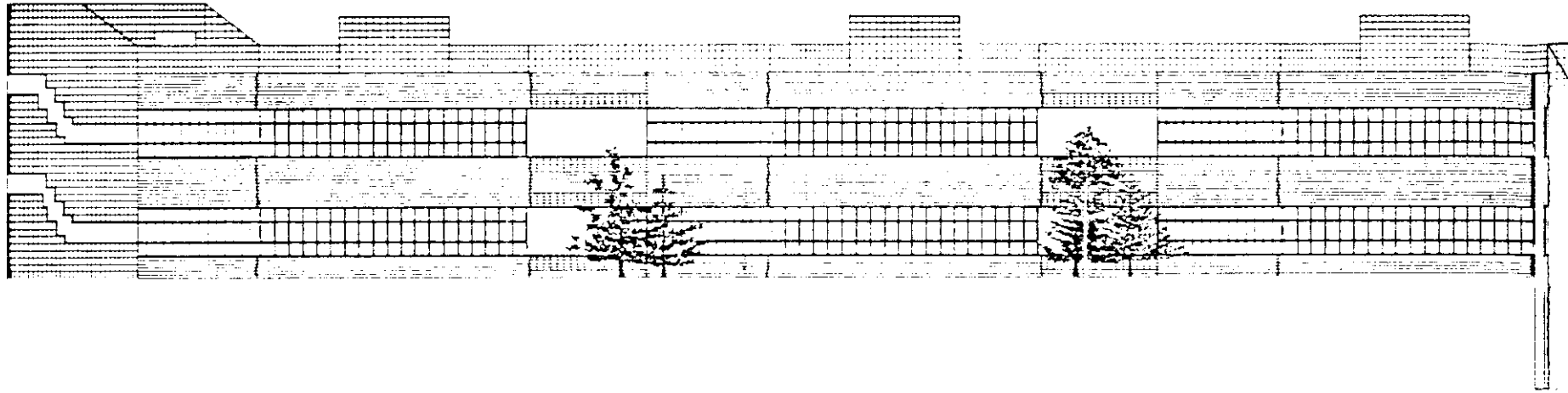


Level Three

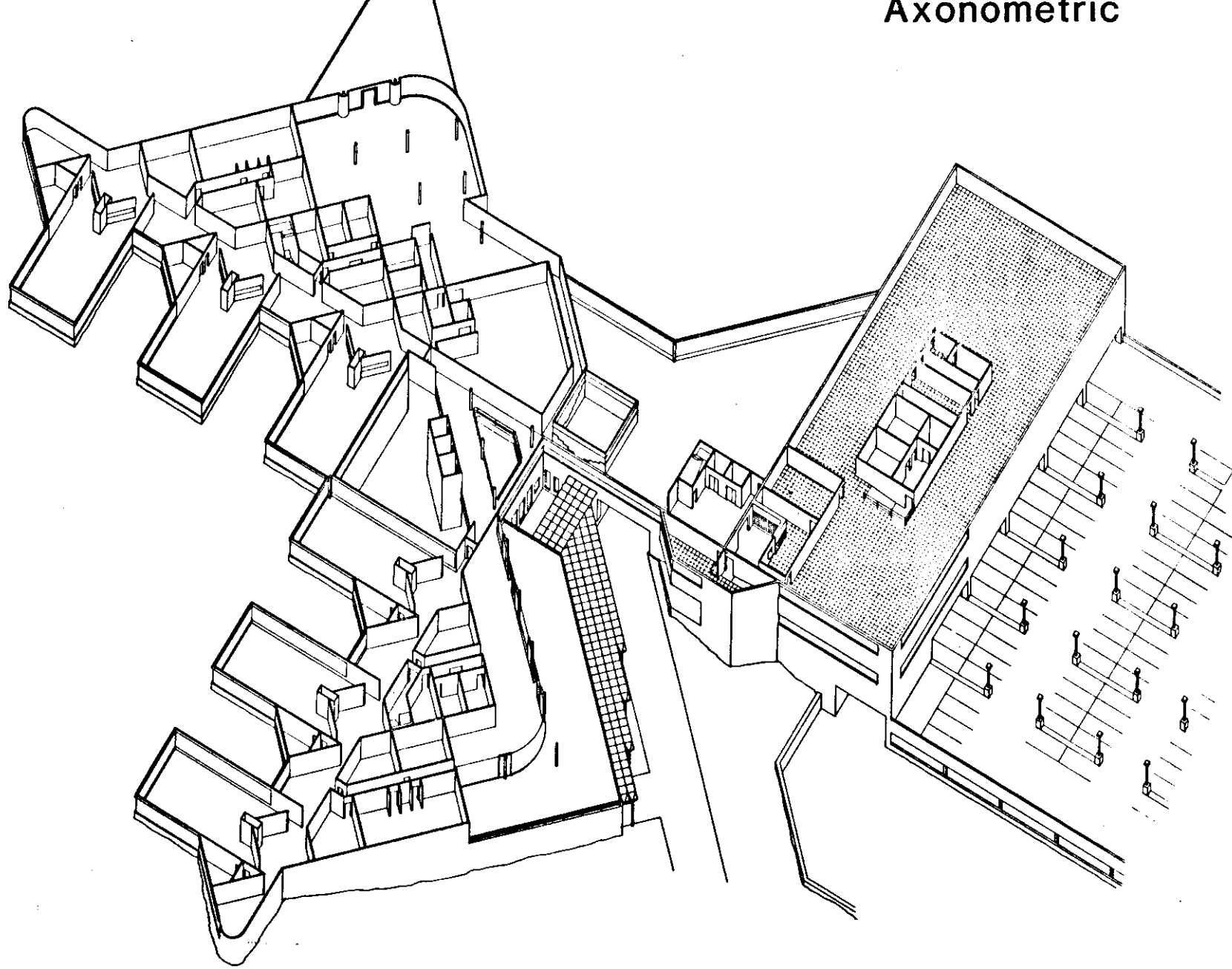
- 17. Test
- 18. Conference
- 19. Upper Level Management



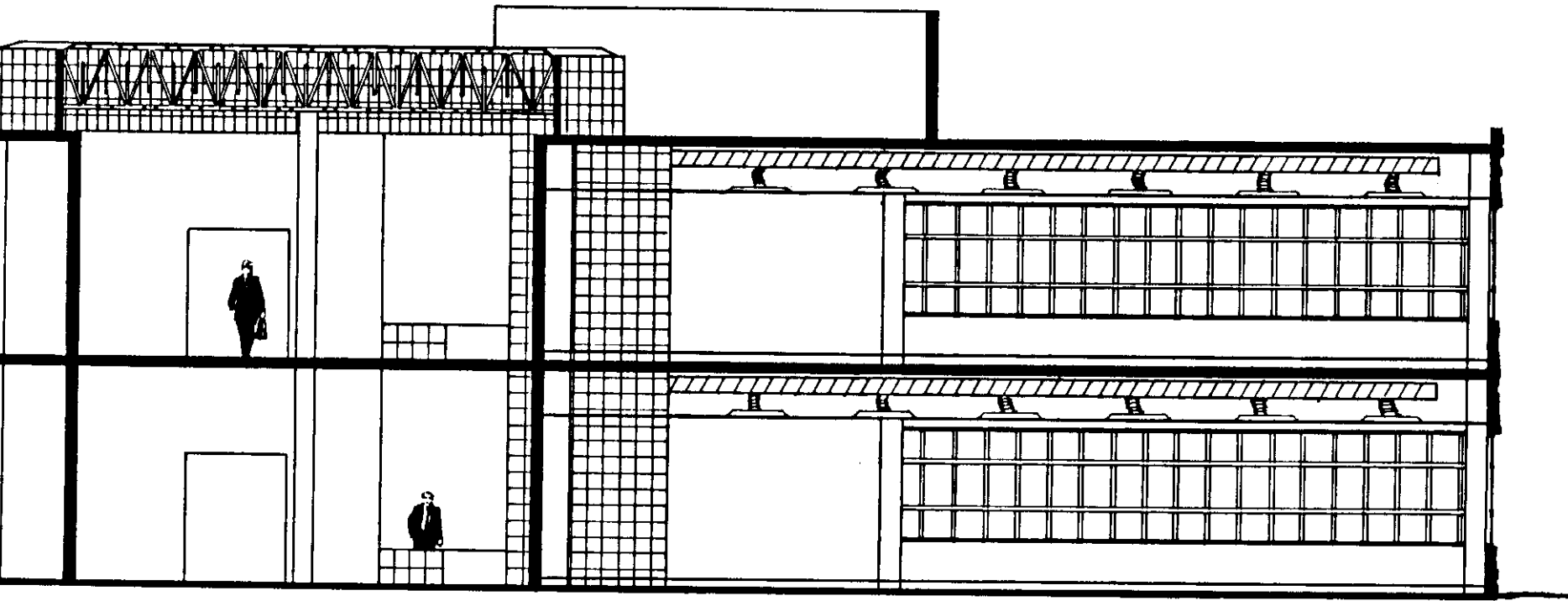




Axonometric



Section



Ideally at this point in time, the International Computing Corporation complex should be totally resolved, but issues and conceptual thought are in a constant state of flux. When designing a building, the best that can be hoped for is that issues were raised, researched, contemplated, and acted upon. The material presented here attempts to convey a solution to such issues as departmental relationships, clarity through circulation, composition, and site relationship.

Recently, major office complexes have been choosing more remote sites such as the one in this project. Locating in rural areas is opening up whole new sets of issues for designing large office buildings. Site relationship takes on an entirely new meaning. The, now all too common, office tower located amid dozens of other towers can not possibly establish a relationship which is harmonious with the site. Real estate is too expensive and scarce to allow a horizontal design solution. On a rural site, however, site relationship becomes an integral aspect of the design. Stark contrast is one possible design solution. The Architects Collaborative exhibit this contrast, through the use of materials and form, in the Johns-Manville World Headquarters building. The solution presented here attempts to show a building that exists in harmony with the site, appearing to have evolved from the site. Which solution is more justifiable? An age old question inherent in any two schools of thought.

Looking back on five years of schooling gives me a sense of pride and accomplishment in that I will leave the protective walls of academia and move into the harsh realities of the real world knowing that I have taken with me knowledge that will enable me to succeed.