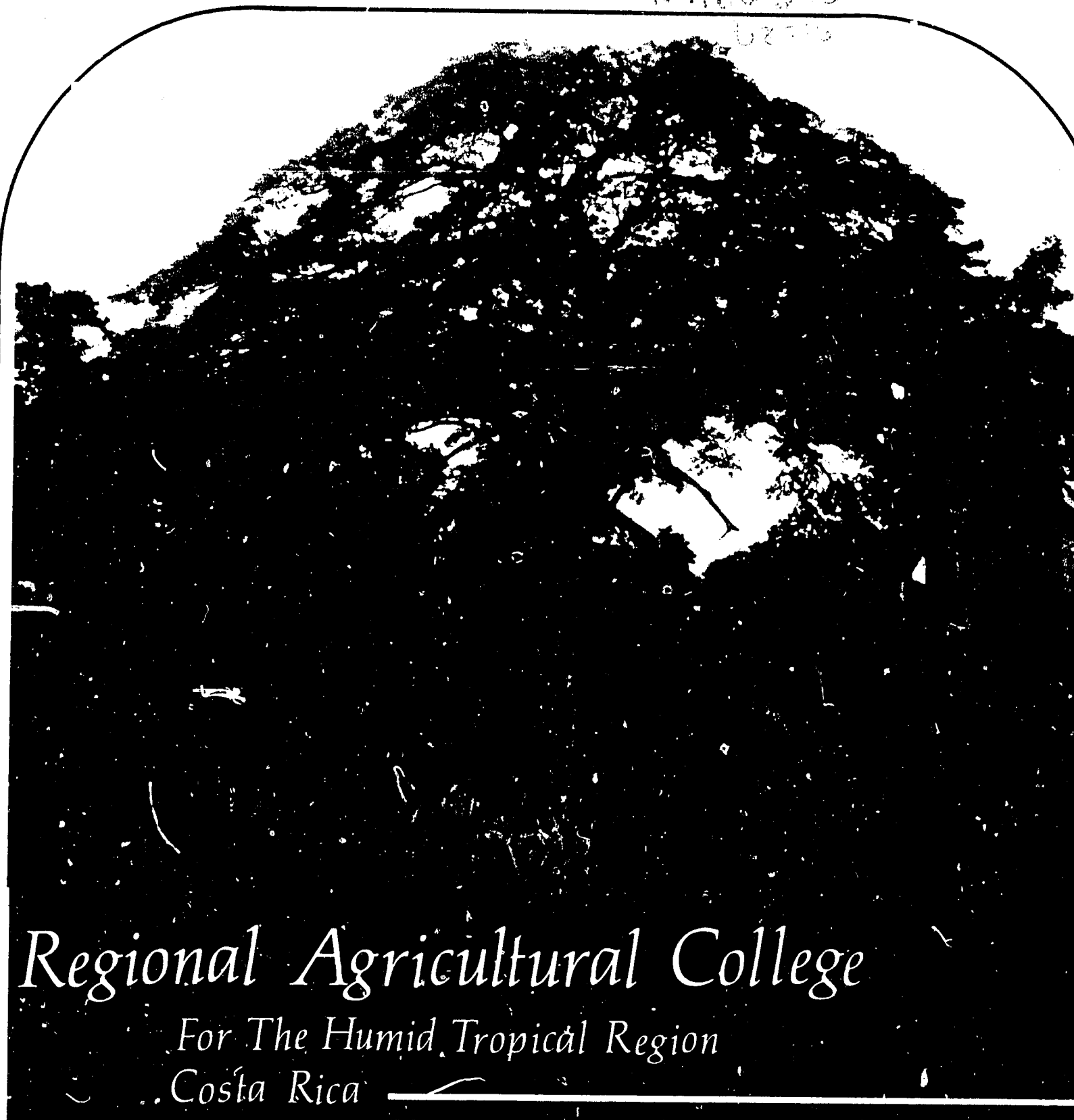


Regional Agricultural College

For The Humid Tropical Region

Costa Rica

FOR: EARTH PROJECT

(ESCUELA AGRICOLA DE LA REGION TROPICO HUMEDO)

USAID /COSTA RICA

SAN JOSE , COSTA RICA

PN-ABG-346

PROJECT "E.A.R.T.H."
AGENCY FOR INTERNATIONAL DEVELOPMENT
San Jose, Costa Rica

Architectural and Engineering Consideration for Master Plan Development for 400 Students with Expansion to 800 Students Agricultural School at the Atlantic Water Shed Costa Rica

Prepared by:
REYNOLDS, SMITH AND HILLS
Architects-Engineers-Planners, Incorporated
Jacksonville, Florida
United States of America

AEP File Number 85502-000
Contract Number 515-000-C-00-5559-00
January 3, 1986

a

REYNOLDS, SMITH AND HILLS

ARCHITECTS · ENGINEERS · PLANNERS

INCORPORATED

January 3, 1986

Dr. Paul J. Kretchmer
Agency for International Development
Mission to Costa Rica
Embassy of the United States of America
San Jose, Costa Rica
APO Miami, Florida 34020

Dear Dr. Kretchmer:

Attached is Reynolds, Smith and Hills' (RS&H) final Master Plan Report for the new 3,000 hectare "Learning by Doing" college, Escuela Agricola de la Region Tropico Humido (E.A.R.T.H.), located at the Atlantic Water Shed of Costa Rica. This Master Plan provides for the initial infrastructure requirements for 400 students with the ultimate expansion to 800 students. The report is summarized in the Executive Summary, Section I of the report. This summary identifies key issues as they pertain to vehicular access, land acquisition, existing farming operations and roads, site analysis summary, environmental considerations, the overall Master Plan, professors' housing, and, lastly, the campus core master plan.

We are most grateful to you, Paul, and also to Mr.. Heriberto Rodriguez, for your invaluable assistance in providing us with the necessary data, background information, and coordination with the Consultecnica-DYPSA consortium and representatives of the Kellogg Foundation.

We are particularly appreciative of your efforts in making the arrangements for us to stay and visit the Hacienda Bremen. Our thanks go to the present tenants, managers, and part-owners, Javies and Fredrico Rojos, for a most productive and enjoyable stay.

In addition, we would like to extend warm thanks to Dr.. Larry Rathbun, Associate Dean of Agriculture, California Polytechnic State University, San Louis Obispo, California, for being a most gracious host in providing us with a tour of their facilities in California as well as accompanying us to Zamorano and Honduras, and Hacienda Bremen.

904 739 2000 • 6737 SOUTHPOINT DRIVE, SOUTH • POST OFFICE BOX 4840 • JACKSONVILLE, FLORIDA 32201
JACKSONVILLE • ORLANDO • TAMPA • FORT LAUDERDALE • MERRITT ISLAND
ATLANTA • GREENVILLE • JACKSON • SALT LAKE CITY

Our thanks also go to Dr. Simon Malo, Dr. Jorge Roman, Mr. Adolfo Midence, and Dr. Gordon Straub of the AID mission in Honduras for giving us a very educational and meaningful tour of the impressive Zamorano facilities in Honduras. This campus visit, as well as the Cal Poly campus, provided the RS&H Planning Team with the necessary background information to plan the new E.A.R.T.H. campus.

Our gratitude is extended to architect Manuel Trejos - Consultecnica, and engineer Rodolfo Castro - DYPSA, for their campus programming assistance, background data, and accompanying us to California Polytechnic State University, California, Zamorano campus in Honduras, and Hacienda Bremen, and being present at all of our project review sessions.

Lastly, we extend our thanks to Glen Taggert. His valuable input was appreciated at our two project review sessions in our home office in Jacksonville, Florida.

Paul, it has been a pleasure meeting and working with you and AID, Costa Rica, and being given the unique opportunity to Master Plan the new "Learning by Doing" E.A.R.T.H. campus for the people of Costa Rica.

We welcome continued involvement and implementation of this campus Master Plan as well as additional projects that warrant our professional expertise.

Sincerely,

Bernard L. Walsh, Jr., AVP
Department Head - Planning Division

BLW:mbr

Encl.

TABLE OF CONTENTS

(TABLE OF CONTENTS continued)

(TABLE OF CONTENTS continued)

(TABLE OF CONTENTS continued)

LIST OF FIGURES

I EXECUTIVE SUMMARY

This Master Plan Report is a result of a joint team effort carried out by Reynolds, Smith and Hills Architects-Engineeers-Planners, Incorporated (RS&H), with technical assistance provided by the Consultecnica-DYPSA consortium, representation from California Polytechnic State University, and the W. K. Kellogg Foundation. The following report represents the site analysis, environmental considerations, and program Master Plan requirements for a proposed 3,000 ha. "Learning by Doing" E.A.R.T.H. college located at the Atlantic Water Shed of Costa Rica. The ultimate program requirements call for a campus of 800 students, to be initially planned for 400 students including the necessary infrastructure requirements to support a campus of this size. The following are key concepts proposed in the Master Plan report.

- o Access/Transportation: A new access road and entrance area to the campus from the Siquirres-Guapiles Highway will necessitate additional property acquisition.

- o Utilization of the existing farm roads in conjunction with the Master Plan planning objectives.

- o Widening of the proposed main entrance road from the guard house to the existing east-west farm road to accommodate farm vehicles which support the existing banana operation and for future agricultural field units.

- o Existing conditions: Approximately 91 percent of the 3,000 ha. ranch has been cleared of native strata for improved pastureland and banana operations.

- o Preservation of the 210 ha. high forest preserve for flora and fauna research.

- o Environmentally sensitive areas occur in somewhat hydrologically isolated riparian forests along the river floodplains and small depressions throughout the ranch.

- o The existing commercial banana plantation and operation will continue to be operated as a viable and economic resource.

- o A site analysis summary identifies three zones on the Bremen Ranch (Hacienda Bremen) that represent physical limitations found in the soil textures, slopes that range from 6 to 30 percent and acidity that ranges from 4.8 to 5.0 pH. All of these factors determine the number and degree of limitations on the land for sustained crops, pastures, silviculture, and field crops.

- o The ranch is extremely well drained being bordered on three sides by the Rio Parismina, Rio Destierro, and is drained in the center by the Rio Dos Novillos. Draining into these well defined river systems, are extensive and well managed interconnecting farm ditches and natural swales that effectively drain the entire ranch.

- The campus program elements provide the infrastructure requirements for 400 students with the ultimate expansion to 800 students.

- The major elements of the campus master plan include property acquisition, new entrance area, general service, the campus core, Faculty and Staff housing, Field Units, and the high forest preserve. These elements are located based on their functional relationships and the capacity of the land to support each use.

- The campus core area is located on a relatively flat plateau area containing 57 ha.; is ideally suited for the campus affording a centralized location; panoramic views of the farm field unit, prevailing breezes; and well drained soils. Key elements of the campus core plan include academic units, services, and housing. A retention/detention lake is provided near the campus core to limit runoff pollutants from discharging into the adjacent rivers. A secondary consideration will be for a fire protection reservoir.

- The Professors' Lodging Unit containing 54 ha. is located immediately east of the main campus core area. Key elements include Rector/Provost/ Professors' Housing, Administration and Staff Housing, Grammar School/Nursery, and the Faculty Club. A total of 90 separate building sites, each containing approximately .5 ha., are provided for the housing units.

II LOCATION

According to the political subdivision of Costa Rica, the Hacienda Bremen is located in the province of Limon, the fourth canton of Guacimo, the second district of Mercedes, and the third district of Pocora, with geographic coordinates 10^{o}, 12' latitude north and 83^{o} 36' longitude west, about 80 kilometers northeast of San Jose (see Figure A).

The Ranch site is presently reached via the road to Turriabla, Port Limon, and then to Guapiles. With completion of the new world bank-finance road to Limon later this year, the Ranch site will be 15 minutes from Guapiles and one hour from San Jose. Current travel time from San Jose to the campus site is approximately 3-1/2 hours due to the circuitous route of the present road, mountainous grades, and heavy traffic.

The present access road from the Siquirres-Guapiles Highway which runs through Hacienda las Mercedes is narrow, unpaved, and has a very irregular alignment creating potential traffic safety problems, particularly at the present railroad crossing. The diagonal juncture creates impaired visual contact of approaching trains. The entrance road also leads through the most congested area of Hacienda Bremen where existing houses, commissary, bar, office, and banana packing operations occur. To alleviate the existing entrance road problems, the Master Plan proposes a new entrance road from the Siquirres-Guapiles Highway as well as additional property acquisition.

VICINITY MAP

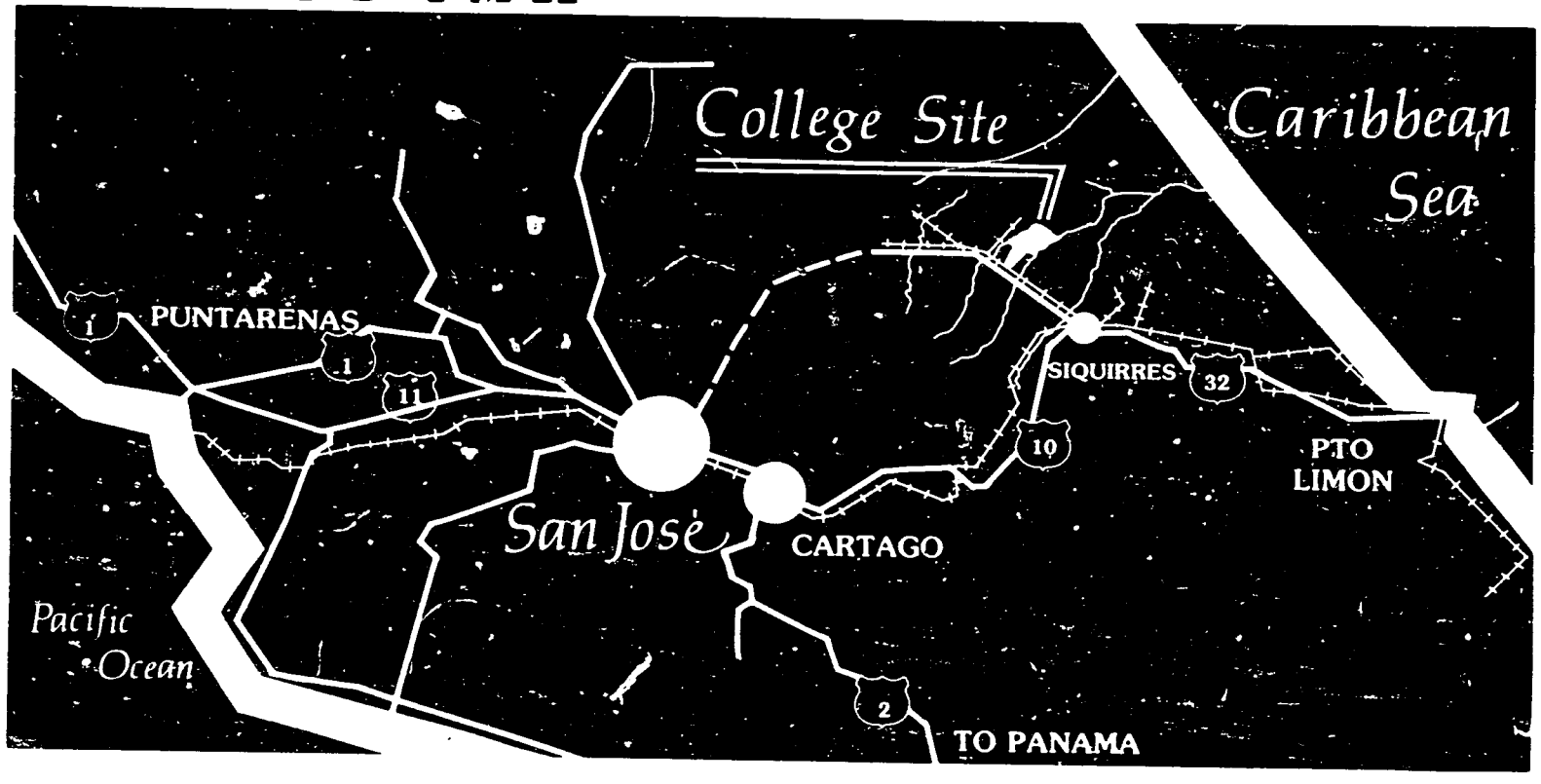


FIGURE A

III EXISTING CONDITIONS

1. GENERAL

The irregularly shaped site for the new college is bordered on the south by the Siquirres-Guapiles railroad track for a distance of 380 meters, on the west and north with other property owners and the Rio Parismina, and on the east by the Rio Dos Novillos and Rio Destierro (see Figures B and C).

2. NATURAL CONDITIONS

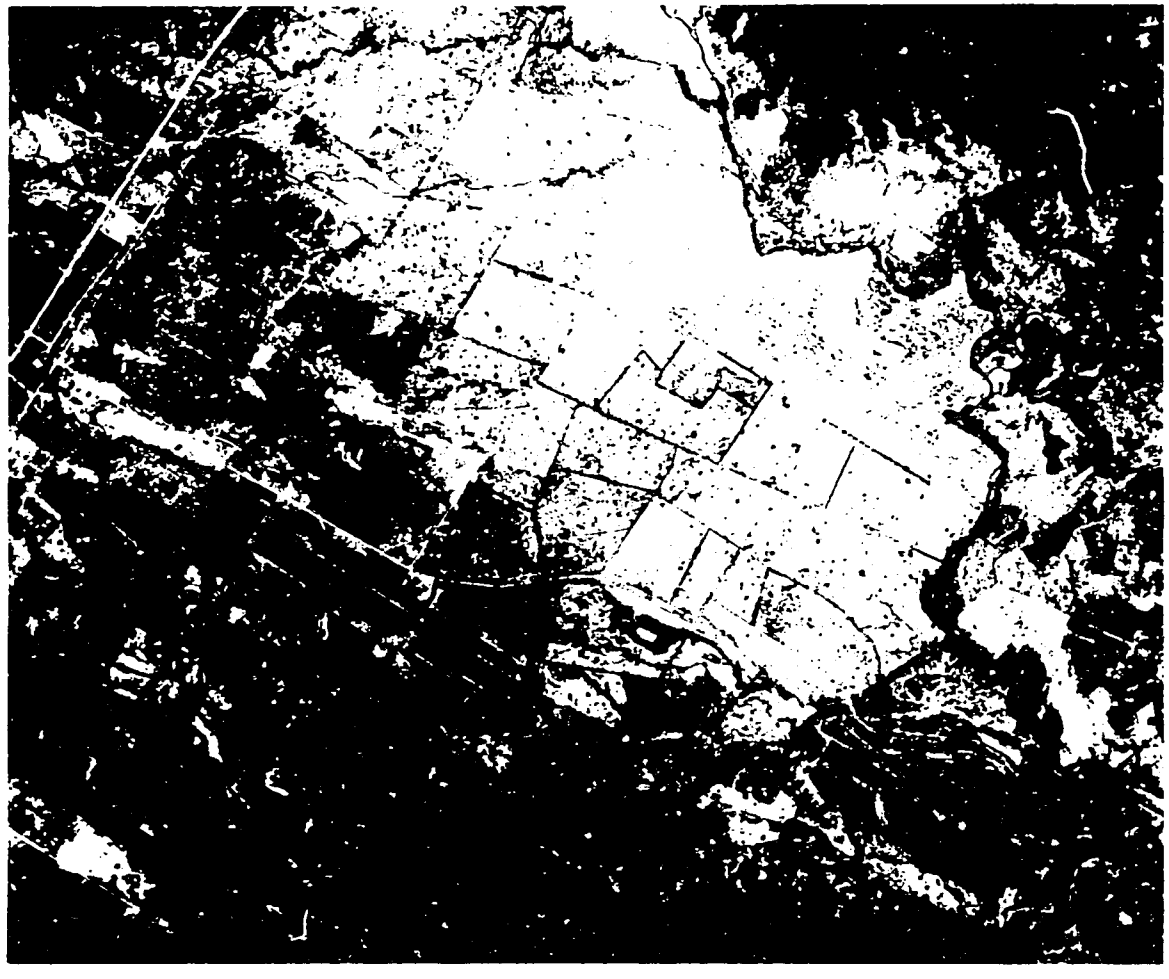
The topographic relief of the site ranges from flat to gently rolling land, interrupted by lowland drainages. Former forest resources of the site have been mostly converted for agricultural purposes into beef cattle and horse pasture, and banana plantations. Approximately 91 percent of the Ranch was cleared of all native vegetative strata and seeded with introduced grasses (star grass). These open grasslands exhibit a low degree of physical structure, a single level of herbaceous vegetation, and do not support a high diversity of wildlife.

Banana plantations comprise approximately 11 percent of altered land on the Hacienda Bremen. A variety of banana cultivars (primarily Cavendish) are grown as a cash crop along the low-lying, flat areas of the property. Except for the invasion of weedy, pioneer herbaceous vegetation (bamboo, elephant grass), the banana plantation is a well maintained, monotypic association that exhibits low structural diversity. Although very little is known about banana plantations as an ecological habitat type, a wide variety of animals could potentially utilize the canopied, high fruit-producing community for cover, food, and water.

The remainder of the property consists of remnant or second-growth forests and natural or slightly altered water courses (eight percent). A 210 ha. forest reserve is located upon a highland, well drained, undulating northeastern corner of the Ranch. Although high-graded to a certain extent, the forest is unsuitable for agricultural purposes and therefore has been conserved. The secondary growth, high forest reserve, constitutes the primary upland natural resource on the Hacienda Bremen. The forest reserve is the most highly structured community and exhibits the greatest species diversity on or within the immediate vicinity of the property.

In addition to the high forest reserve, large trees are scattered throughout the pasture as remnants of the original rain forest. Trees within pasture occur as single specimens, in small hardwood stands, along fence lines, and in various stages of growth in ungrazed or abandoned fields.

At lower elevations on the property, the undulating highland is replaced by flat, broad floodplains and low-lying gullies and pockets. Natural resources in these areas consist of wetlands and surface waters. Wetlands include leguminous swampland in circular to ovoid, low-lying depressions; meandering, linear rush/sedge-dominated swales; and river floodplain forests.



VICINITY MAP

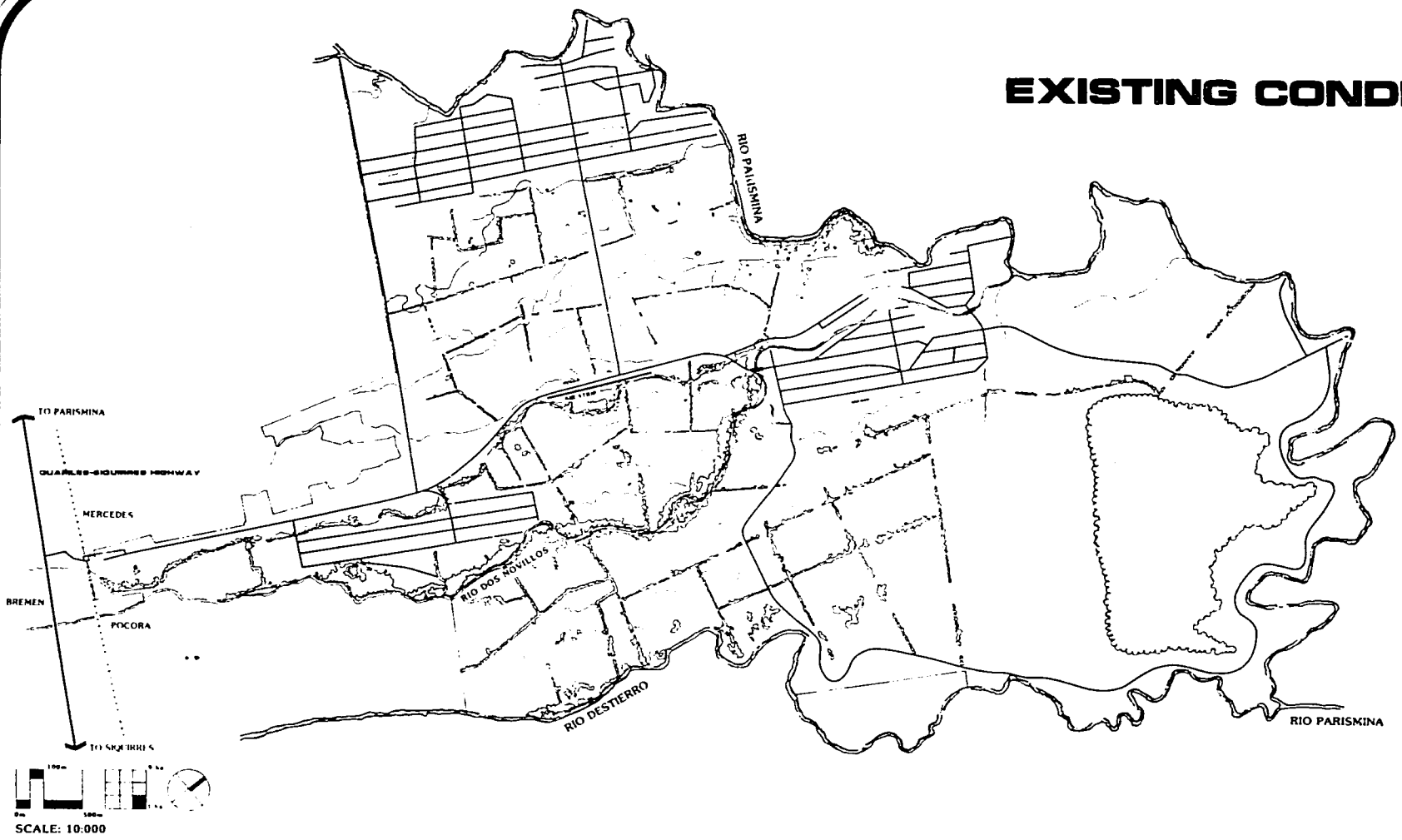
Regional Agricultural College

FOR CARTO PROJECT
USAID COSTA RICA
SAN JOSE COSTA RICA

RS&H

FIGURE B

EXISTING CONDITIONS



Regional Agricultural College

FOR EARTH PROJECT

USAID COSTA RICA

SAN JOSE COSTA RICA

RS&H

FIGURE C

The swampland situated above the river floodplains is somewhat hydrologically isolated and occurs infrequently in small areas. The rush/sedge-dominated marshy swales are shallow to moderately incised drainages that direct stormwaters into the lower reaches of the property. These freshwater swamps and marshes retain and/or detain rainfall and thus provide water quality and wildlife habitat benefits on the Ranch. However, the most significant wetland and aquatic natural resources on the site consist of riparian forest and river courses. The Rio Parismina, Rio Destierro, and Rio Dos Novillos partially form the boundaries of the property and provide a host of important human and wildlife benefits. The forested river floodplains support a high diversity of plants and animals, maintain a constant water temperature, provide stormwater filtration, protect upland regions from floodwaters, and stabilize river banks from soil erosion. The three rivers are narrow to broad, deeply incised water courses that connect and flow in a north to northeasterly direction. In addition to the natural resource value of these rivers in terms of edible fish species, freshwater, and wildlife habitat, the rivers, together with the associated forested floodplains, are also an aesthetic resource by providing a visual relief to the otherwise monotonous open grasslands and cultivated fields.

3. RANCH FACILITIES

All the structures and facilities existing on the site are in good to very good condition. These include:

- Banana packaging plant
- Sawmill
- Machinery repair and storage building
- Office building
- Hydroelectric plant
- Ten houses for farm laborers
- Three houses in fairly good condition
- Swimming pool
- Tennis court
- Small school
- Football field
- Horse stable
- Cattle working corrals
- Forty kilometers of improved gravel road
- Small landing strip
- Fences enclosing the pastureland

4. WORK FORCE

The Ranch presently employs about 260 workers, most of whom live in the nearby communities of Mercedes and Pocora. These employees, guided by two resident managers/owners, run a very successful farming and ranching system. It is suggested that due to the complexity of initiating an instructional program, consideration be given to retaining the two ranch managers/owners, for the first two to five years after opening the college for continuation of the operation. In addition, the existing work force must be considered in terms of its role in the operation of the farm and of minimizing the disruption of its members' lives during and due to the change in ownership of the farm.

IV SITE ANALYSIS SUMMARY

1. GENERAL

This is an assemblage of all pertinent site analysis information evaluated and documented in the report in order to ascertain the site development suitability for the proposed campus program elements. On-site conditions at Hacienda Bremen were verified by the RS&H Planning Team and Environmental Specialist as well as representatives from the Agency for International Development (AID) Costa Rica and Consultecnica DYPSA consortium. In addition, the following technical reports represent an invaluable resource of back-up information that was utilized in preparing the site analysis.

- Reconnaisance soil survey of Hacienda Bremen, Guacimo, prepared by: Agrinomico Engineer Antonio Ugalde M., April 1985.

- Hacienda Bremen S.P., Capacidad de Uso de las Tierras, Guacimo-Limon, prepared by: Ing. Marco A. Ugalde M., April 1985.

- Hacienda Bremen S.P., Reconocimiento de los Suelos, Guacimo-Limon, prepared by Ing. Marco A. Ugalde M., April 1985.

- Preliminary Review, Forest Resources, Hacienda Bremen, Province Limon, Costa Rica, prepared by: Dr.. Timothy G. O'Keefe, Associate Professor, Natural Resources Management Department, California Polytechnic State University, San Louis Obispo, California

- Site Evaluation for E.A.R.T.H., Hacienda Bremen, prepared by: Mr. Charles Atlee, Professor, Crops Science, Dr. Timothy O'Keefe, Associate Professor, Natural Resource Management, Dr. Larry Rathbun, Associate Dean of Agriculture, California Polytechnic State University, San Louis Obispo, California.

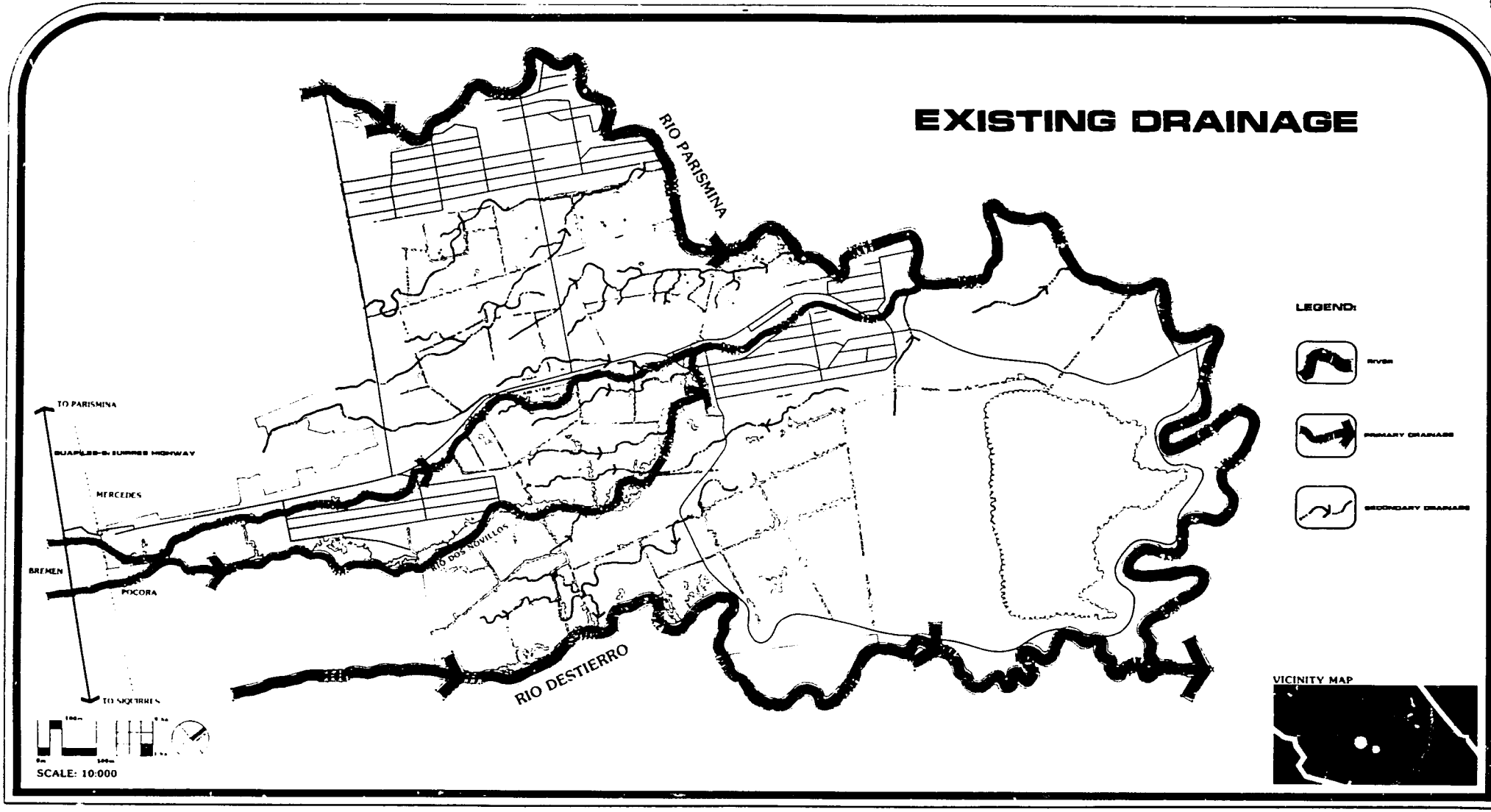
In evaluating the site, three zones were identified. They represent physical limitations found in the soil textures which range from moderately heavy to light, slopes that range from 6 to 30 percent and acidity that ranges from 4.8 to 5.5 pH. The number and degree of limitations on the land for sustained crops, pastures, and trees will depend upon the types of field crop units that will be a part of the campus teaching facility.

Based upon this information, a site development suitability map at a scale of 1:10,000 was prepared indicating the 3,000-ha. Hacienda Bremen and summarizing the three development zones as noted on Figure E. The common factor in the evaluation of each zone consisted of:

- Land Use Classification: This designation is based upon the U.S.D.A.-S.C.S. eight classes of soils and slope conditions that indicate various degrees of limitations to sustain production of agriculture crops and silviculture. As the number increases, so do the limitations for crops, pasture, or trees. Only classes II, III, and IV of the eight were identified on the site.

- Characteristics of the terrain

- Limitations on crops

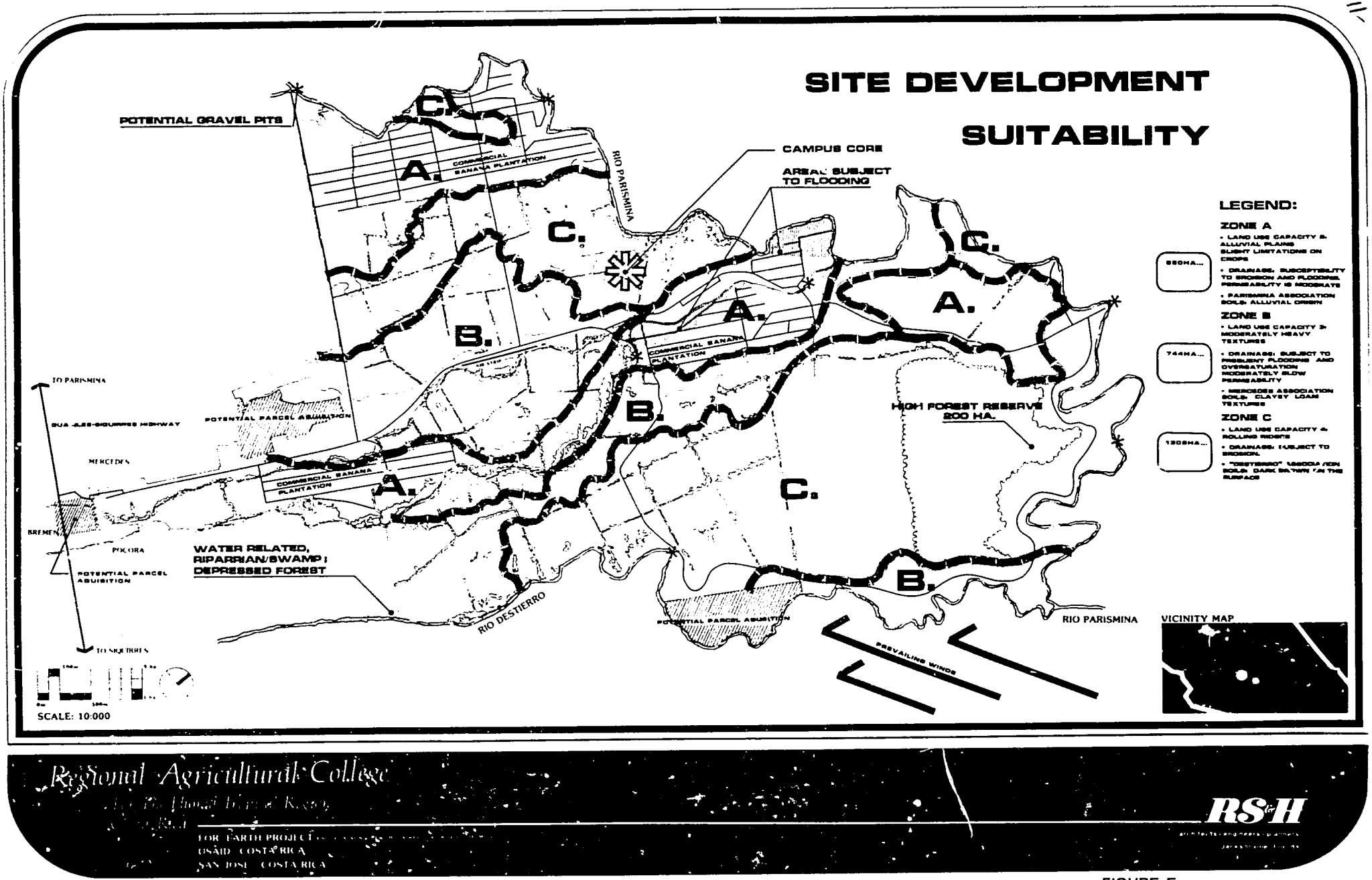


Regional Agricultural College

FOR EARTH PROJECT
USAID COSTA RICA
SAN JOSE COSTA RICA

RS&H

FIGURE D



Regional Agricultural College

FOR PARTII PROJECT
USAID COSTA RICA
SAN JOSE COSTA RICA

RS&H

FIGURE E

- o Drainage
- o Soils association

2. ZONE A: 850 HA.

2.1 General: These areas are located in the central and western portions of the site in the alluvial plains of the Parismina, Dos Novillos, and Destierro Rivers. These areas contain the very successful and well managed 300 ha. of commercial banana operations.

2.2 Land Use Capacity II: These lands are flat with deep, well drained soils of medium acidity, and medium textures on the surface. Their principal limitations consist of moderately light to light textures in the subsoil, and moderately good drainage in some areas. The water table ranges from 70 to 100 centimeters below the surface of the land.

2.3 Limitations on Crops: As indicated by the current banana operations in these areas, they are well suited for semipermanent crops (bananas, plantains, pejivaye, and gandul beans) as well as some permanent and annual crops. (See the Reconnaisance Soil Survey of Hacienda Bremen, Guacimo for more detailed information.)

2.4 Drainage: Susceptibility to erosion and flooding. Permeability is moderate.

2.5 Soils Association - Parismina: Alluvial origin, relatively flat, textures ranging from silty loam, loam, and fine, sandy loam. The pH is medium acid.

3. ZONE B: 744 HA.

3.1 General: These areas are located principally within the central portion of the site in two linear bands paralleling the lower Rio Dos Novillos alluvial plain. Physiographically, these are located on ancient and high terraces of the rivers in the area. The terrain is slightly undulated (two to six percent) except in restricted depressed areas.

3.2 Land Use Capacity III: The lands in this class are slightly undulated, the soils are well drained and deep.

3.3 Limitation on Crops: The main limitations are the slope (two to six percent), moderately heavy to heavy textures and possible acidity. They are moderately suitable for the same crops and fruit trees mentioned Zone A above except for bananas and flooded rice which are more adapted to the alluvial floodplains along the rivers.

3.4 Drainage: Subject to frequent flooding and over-saturation. Moderately slow permeability.

3.5 Soil Association - Mercedes: Most of the soils are deep (more than 120 centimeters) having clayey loam textures on the surface and clay in the subsoil. They are strong to medium acid soils.

4. ZONE C: 1308 HA.

4.1 General: These areas are principally located in the eastern and western portions of the site along ridges west of the Rio Destierros. At present they are being used for improved pastureland and secondary forests. Located within this zone in the northeast corner of the Ranch is the 200 ha. high forest reserve. It is the intent of the master plan to maintain this area in its natural condition through a management plan that could serve a variety of educational opportunities.

4.2 Land Use Capacity IV: Being rolling ridges, their main limitations are slope (12 to 30 percent), heavy texture, and acidity of the soil. Generally, the areas are undulated, with well drained, deep, and strongly acid soils.

4.3 Limitations on Crops: They are suitable for the crops and fruit trees referred to in Zone B, but the limitation of this area reduces the yield unless conservation measures are implemented.

4.4 Drainage: Due to the excessive slopes, these areas are subject to erosion. The excessive runoff would require extensive soil conservation practices should crop cultivation be implemented.

4.5 Soils Association - Destierro: These are deep soils with clayey loam, clayey textures on the surface, and clay in the subsoil. In addition, they are dark brown to intense brown on the surface and yellowish brown in the subsoil. They have a strong to medium acidity.

5. EXISTING DRAINAGE

According to the Guacimo map of the National Geographic Institute at a scale of 1:50,000, the elevation of the farm runs from 95.00 meters on the southern side (railroad) to ten meters at the banks of the Rio Parismina and Rio Destierro at the northern and northeastern sections of the farm (see Figure D). These two rivers are the principal drainageways for the entire 3,000 ha. campus. The principal means of drainage outfall for the region is the Rio Parismina into which the Rio Dos Novillos and the Rio Destierro flow. Ultimately, this river, being located in the Atlantic Coastal region of Costa Rica, drains into the Carribean Sea. The Dos Novillos provides secondary drainage in the central portion of the site. Draining into this well defined river system are extensive and well managed interconnecting farm ditches and natural swales that effectively drain the entire ranch. Drainage is also aided by the good permeability of all the soils in the majority of the ranch.

There are two areas susceptible to river overflowing and flooding. These are located in the northern section of the farm around the northern banana plantation and are as follows:

- The bank of the Rio Dos Novillos close to the corral.
- The bank of the Rio Parismina to the north and northeast of the banana plantation.

V CAMPUS PROGRAM ELEMENTS

1. INFRASTRUCTURE

1.1 Vehicular Roadways & Parking:

A. Access: Principal access to the campus will be from the Guapiles-Siquirres Highway.

B. Primary road: 24-meter right-of-way, six meters of paved roadway with a four centimeter asphalt sheeting and a 40 centimeter granular base, 1.5 meter shoulders on either side made of granular material, two meters, grass covered gutters on either side, and five meter grass covered strip on either side, including terracing.

C. Secondary road: 16 meter right-of-way, six meters of paved roadway with four centimeters sheet asphalt and 30 centimeter granular base, one meter shoulders on either side made of granular material.

D. Farm roads: Improving gravel roads, minor widening to bring the width of granular base to six meters, construction of the lateral gutters.

E. Parking Lots: Paved with four centimeters thick sheet asphalt and 20 centimeters thick granular base, rainwater collectors and sewer, perimeter sidewalks, traffic signals as required.

F. Bridges: Two multibeam bridges, eight meter span for HS 20 loan built with T-beams, in pairs, and the upper slab poured on the site, banisters as required six meter roadway plus 2.75 meter sidewalks.

1.2 Potable water supply:

A. Wells: Deep water wells, including pumps and controls will provide potable drinking water for the campus.

B. Elevated Storage Tank: Elevated storage tank of 200 m^3 capacity supply at adequate pressure to meet the necessary water requirements for the campus.

C. Fire Protection: The lower portions of the elevated storage tank will be utilized for back-up fire protection water supply for the campus. Potable water supply lines with fire hydrants at appropriate locations throughout the campus will provide hook-ups for fire protection.

1.3 Collecting and treatment of sewage:

A. Collection system: The collection and treatment of sewage could be accomplished by means of a sewer system in PVC pipe and oxidation ponds from the academic campus core area.

B. Oxidation Ponds: Five oxidation ponds of various depths, bottom and dykes, covered with an impervious polyethylene liner. Total area required: 2,900 m^2.

1.4 Electrical feeding and distribution:

A. Electrical power source: It has been assumed that electrical power would be tapped from the 34.5 kv, 30 line located along the railroad line at the southern end of the campus.

B. Primary Power Feed: Power feed will be high voltage (34.5 kv, 3 phase) by overhead conductors on concrete poles. For master planning purposes, this main power feed line will be located along perimeter property lines as well as fence rows to make the overhead lines as unobtrusive as possible.

C. Distribution: Secondary distribution will be overhead to the various facilities on the campus.

1.5 Telephone system:

A. Telephones: The two telephone lines of ICE now being used at Hacienda Bremen will be carried on the same high voltage line poles up to the telephone exchange at the administrative nucleus.

B. General Distribution: Two carrier wave units will be installed at the telephone exchange, each of which will have a capacity for 12 trunk lines. The capacity of the internal exchange has been planned for 200 lines. The telephone distribution at the main nucleus at the professors' residence section will be underground. For outlying nuclei, the telephone distribution system will be overhead, using the same poles as the electrical system.

2. ACADEMIC UNIT - SERVICES TO STUDENTS

2.1 Administrative Building:

	Gross bldg. (m^2)
AREAS REQUIRED:	
A. Rector Office: includes private office, receiving/ waiting area, secretarial space, and water closet	56
B. Provost Office: includes private office, receiving/ waiting area, secretarial space, and water closet	49
C. Board Room: 20 persons, located between Rector and Provost, will double as a meeting room	56

	Gross bldg. (m^2)
AREAS REQUIRED:	
D. Dean of Academic Affairs, including secretary @ 7	22
o Admissions	14
1 person @ 12, 1 secretary @ 7	19
Fireproof room	12
o Farm Manager	14
3 staff members @ 12 each, 1 secretary @ 7	43
o Counselor + Placement	14
1 person @ 12, secretary @ 7	19
E. Dean of Business, including 1 secretary @ 7	22
o Fundraiser	14
o Assistant Director of Finance	14
3 persons @ 12, 1 Secretary @ 7	43
o Resident Engineer	14
o Extra person @ 14, 1 secretary @ 7	21
o General Services	14
F. Conference Room	21
G. Lobby	37
H. Computer Room	36
I. Printing Area, Xerox	42
J. Bathrooms	47
K. Janitorial	4
L. Storage	21
Subtotal	668
30% circulation (for small rooms)	200
GROSS BUILDING AREA:	868

Ground area for parking: 15 visitors and staff

Proximitas: Located as focal entry point to campus core over main access and internal road. Near Classrooms, Labs, Library, Dining Hall, and University Center. For Master Plan purposes, consideration is given to one-story building.

Expansion: 20%: Building: 174
Ground area per parking: 5 cars

Total buildout: Building: 1042
Ground area parking: 20

2.2 Classrooms/Laboratory/Faculty Office Units:

AREAS REQUIRED:

This will include three nuclei, each comprising classrooms, faculty, support staff, and general services.

	Gross bldg. (m^2)
A. Nucleus 1	
1. Faculty - 14 @ 15	210
2. Secretarial - 2 groups @ 30 each (this includes 4 secretaries and 2 students)	60
3. Classrooms - 3 @ 100	300
4. 2 Labs @ 200 (this includes crops and soils/ forestry)	400
Workroom (shared labs)	165
5. Meeting room (shared)	21
6. Copying machine and filing	21
7. Paper and supply storage	21
8. Bathrooms (men's and women's)	47
9. Janitorial	6
Subtotal	1,251
B. Nucleus 2	
1. Faculty - 14 @ 15	210
2. Secretarial - 2 groups @ 30 each, (this includes 4 secretaries and 2 students)	60
3. Classrooms - 2 @ 100	200
4. 2 Labs @ 200 (this includes Chemistry-Physics/Biology-Zoology)	400
Workroom (shared labs)	165
5. Meeting room (shared)	21
6. Copying machine and filing	21
7. Paper and glassware storage	21
8. Bathrooms (men's and women's)	47
9. Janitorial	6
10. 1 meeting room for 60 people	150
Subtotal	1,301
C. Nucleus 3	
1. Faculty - 14 @ 15	210
2. Secretarial - 2 groups @ 30 each (this includes 4 secretaries and 2 students)	60
3. Classrooms - 2 @ 100	200
4. 2 Labs @ 200 each (this includes nutrition and meat processing with cold storage)	400
5. Computer lab (air conditioned)	167
6. Meeting Room (shared)	21
7. Copying machine and filing	21
8. Paper and supply storage	21
9. Bathrooms (men's and women's)	47
10. Janitorial	6
11. 1 meeting room for 120 people with stage/vehicular access door	250
Subtotal	1,403

	Gross bldg. (m^2)
Subtotal 25% (of nucleus 1, 2 and 3) for circulation.	989

GROSS BUILDING AREA: (Nuclei 1, 2, and 3).....4,944
Ground area for parking: 50 cars

Proximitas: Located on perimeter road (near Administration, Dining Hall, Library). The area will be divided into three nuclei in order to provide human scale.

Expansion: 100%: 3 nuclei: Buildings: 4,944
Ground area for parking: 50 cars

Total buildout: Buildings: 6 nuclei, 9888
Ground area for parking: 100 cars

2.3 Agricultural Machine Center and Shop:

AREAS REQUIRED:

	Roofed area (m^2)	Open Yard (m^2)	Gross bldg. (m^2)
A. Agricultural machine shop - teaching facility			605
B. Farm equipment maintenance/gas station			480
C. Sleeping quarters for 2 students			19
D. Support staff sleeping quarter: 9 bedrooms (2 persons/bedroom), game room, bathroom			250
E. Canopied area for motor pool and farm equipment with graveled floor	900		
F. Open Yard - All weather service (i.e., crushed rock)		2,000	
GROSS BUILDING AREA: (includes circulation)	900	2,000	1,354

Ground area for parking (included in items E and F above)

Proximitas: Located near the central core on perimeter road with access to commercial farming roads. All buildings around main parking yard with security fence. Service station on separate fireproof building. Support staff sleeping quarters to be located outside the perimeter security fence for controlled access to building complex.

Expansion: Shop area 6 X 9.3 @ 605.

Total buildout: Buildings: 1,959
Covered buildings: 900
Yard area: 2,000

2.4 Library:

	Gross bldg. (m^2)
AREAS REQUIRED:	
A. Overall area to include circulation and expansion provisions, air conditioning, two-level stack area, and necessary circulation	1,400
GROSS BUILDING AREA: (includes circulation)	1,400

Ground area for parking: 20 cars

Proximitas: Must be the main focal point of the Campus Core area.

Expansion: 100% Building area: 1,400
Ground area for parking: 20 cars

Total buildout: Building: 2,800
Ground area for parking: 40 cars

2.5 Infirmary:

AREAS REQUIRED:

A. 3 offices: doctor, X-ray, dentist	34
B. Emergency room	20
C. 4 isolation rooms	37
D. 3 general hospital rooms: 2 persons each	37
E. Lobby/waiting area/nurses' station (including administration area)	28
F. Nurses' bedroom	11
G. Chauffeur's bedroom	11
H. Bathrooms (men's and women's)	19
I. Janitorial, electrical and mechanical storage	5
J. Ambulance garage	11
Subtotal	213

	Gross bldg. (m^2)
20% Circulation	43
GROSS BUILDING AREA:	256

Ground area for parking: 5 cars

Proximitas: Air conditioned; located near Student Dormitories and perimeter road.

Expansion: Double the hospital rooms (C and D above): 74

Total buildout: Building: 329
Ground area for parking: 5 cars

2.6 Dining Hall:

AREAS REQUIRED:

A. Student dining: 400 people (1 m^2 for seating/person).....400

B. Professors and staff dining: 75 people (1 m^2 for seating/person).....75

C. Support staff dining: 25 people (1 m^2 for seating/person).....25

D. Kitchen, etc. (.5 meter/person).....250

GROSS BUILDING AREA: (includes circulation).....750

Ground area for parking: 20 cars

Proximitas: Planned for multiple use in early construction stages. Over perimeter road with access for supplies and waste. Near Classrooms, Lab Unit, Library, and Administration. Should have covered access from other facilities in the campus core as well as vehicular drop-off points.

Expansion: None in Dining Hall. 40% in kitchen area: 100

Total buildout: Building: 850
Ground area for parking: 20 cars

2.7 Snack Bar:

	Roofed area (m^2)	Gross bldg. (m^2)
AREAS REQUIRED:		
A. Building area	25	

	Roofed area (m^2)	Gross bldg. (m^2)
B. Covered open area.....	100	
GROSS BUILDING AREA: (including circulation).....	100	25
Ground area for parking (not required)		

Proximitas: Open space for 75 people, located near Classrooms, Lab Units, Library, Administration. Will serve coffee, soft drinks, snacks, etc.

Expansion: 100%: Building: 25
Covered open areas: 100

Total buildout: Building areas: 50
Covered open areas: 200

2.8 University Center:

AREAS REQUIRED:

A. Book Store

B. Supply Store for teaching material

C. Post Office

D. Barber Shop and Beauty Parlor

E. Bank branch

F. Public telephones

G. Branch Infirmary

	Gross bldg. (m^2)
GROSS BUILDING AREA (includes 20% circulation).....	300
Ground area for parking 10 cars	

Proximitas: Mainly for internal use. Located on perimeter road near Administration Building and Classroom facilities.

Expansion: 100% Building: 300
Ground area for parking: 10 cars

Total buildout: Building: 720
Ground area for parking: 20

2.9 Auditorium/Nondenominational Chapel:

AREAS REQUIRED:

A. Design for 800 people (to be built in very late stage)

GROSS BUILDING AREA (includes circulation): 1,637
Ground area for parking: 50 cars

Proximitas: Located on perimeter road for easy access and parking. Location adjacent to the Administration Building and Classroom facilities. Covered pedestrian access should be considered.

Expansion: No provisions.

Total buildout: As shown.

3. ACADEMIC UNIT - FIELD

3.1 Crop Unit:

AREAS REQUIRED:	Yard area w/ gravel (m^2)	Gross bldg. (m^2)
A. Building area		790
B. Yard area	250	
GROSS BUILDING AREA:	250	790

Ground area for parking:
included in yard area

Proximitas: The crop unit, for master planning purposes, is shown east of the proposed campus core area. This will provide access to the Student Dorm areas and Classroom/Laboratory areas.

Expansion: No provisions.

Total buildout: As shown.

3.2 Silviculture Unit:

AREAS REQUIRED:	Roofed area (m^2)	Gross bldg. (m^2)
A. Building area		90
B. Covered area	790	
GROSS BUILDING AREA:	790	90

Ground area for parking
(included in yard area)

Proximitas: To be located in the extreme northeast portion of the campus within relatively good access to the forest preserve.

Expansion: No provisions.

Total buildout: As shown.

3.3 Poultry Unit:

	Roofed area w/conc.pvmt. (m^2)	Yard area w/ gravel (m^2)	Gross bldg. (m^2)
AREAS REQUIRED:			
A. Building area			310
B. Covered area	600		
GROSS BUILDING AREA:	600		310
Ground area for parking (included in yard area)			

Proximitas: To be located southwest of the proposed campus core immediately adjacent to the existing farm road.

Expansion: No provisions.

Total buildout: As shown

3.4 Swine Production Unit:

AREAS REQUIRED:			
A. Building area			240
B. Covered area	430		
C. Yard area		1,200	
GROSS BUILDING AREA:	430	1,200	240
Ground area for parking (included in yard area)			

Proximitas: To be located adjacent to the Poultry Unit on the existing farm road.

Expansion: No provisions.

Total buildout: As shown.

3.5 Beef Production Unit:

	Roofed area w/conc. pvmt. (m^2)	Yard area w/ gravel (m^2)	Gross bldg. (m^2)
AREAS REQUIRED:			
A. Building area			180
B. Covered area	450		
C. Yard area		1,150	
GROSS BUILDING AREA:	450	1,150	180
Ground area for parking (included in yard area)			

Proximitas: To be located northeast of the campus core area with access on existing farm road.

Expansion: No provisions.

Total buildout: As shown.

3.6 Slaughterhouse:

AREAS REQUIRED:			
A. Building area			230
B. Yard area		150	
GROSS BUILDING AREA:		150	230
Ground area for parking (included in yard area)			

Proximitas: To be located immediately across from the Beef Production Unit

Expansion: No provisions.

Total buildout: As shown.

3.7 Dairy Production and Creamery:

AREAS REQUIRED:			
A. Building area			470
B. Yard area		530	
C. Covered area	300		
GROSS BUILDING AREA:	300	530	470
Ground area for parking (included in yard area)			

Proximitas: To be located near the Silviculture Unit to the northeast of the campus core area with access to existing farm road.

Expansion: No provision.

Total buildout: As noted.

4. GENERAL SERVICE UNIT

4.1 Entry Control House:

	Roofed area (m^2)	Gross bldg. (m^2)
AREAS REQUIRED:		
A. Building area		10
B. Covered area	20	
GROSS BUILDING AREA:	20	10

Ground Area for Parking: 2 cars

Proximitas: Main Control House a juncture of existing farm road and proposed new entrance road.

Expansion: No provision.

Total buildout: As noted above.

4.2 Firemen and Security Station:

	Gross bldg. (m^2)
AREAS REQUIRED:	
Building area	250
GROSS BUILDING AREA:	250

Ground area for parking: 2 cars

Proximitas: Located on a high point along the main perimeter road.

Expansion: No provisions.

Total buildout: As shown.

4.3 Maintenance Unit:

	Roofed area (m^2)	Gross area (m^2)
AREAS REQUIRED:		
A. Building area		240
B. Covered area	220	

GROSS BUILDING AREA:.....220.....240
Ground area for parking: 10 cars/Loading dock

Proximitas: Dry storage area located on perimeter road near Cafeteria and campus core area. Supply area for carpentry, storage, electrical/mechanical.

Expansion: 50% Building: 120

Total buildout: Building: 360 + 220 canopy
Ground area for parking: 10 cars/loading dock

4.4 General Laundry Room:

	Roofed area (m^2)	Gross bldg. (m^2)
AREAS REQUIRED:		
Building area		140
GROSS BUILDING AREA:		140

Ground area for parking: 2 cars

Proximitas: To be located adjacent to or within the Maintenance Unit.

Expansion: No provisions.

Total buildout: As shown.

4.5 Agricultural General Store:

AREAS REQUIRED:

A. Building area.....20

B. Covered building area.....50

GROSS BUILDING AREA:.....50.....20
Ground area for parking: 10 cars

Proximitas: To be located at the main entrance road fronting the Guapiles-Siquirres Highway

Expansion: No provisions.

Total buildout: As shown.

5. STUDENTS' RESIDENCE UNIT

5.1 Student Dorms:

AREAS REQUIRED:
Assume for master planning purposes 24 m^2/student for gross building areas.

A. Individual bedrooms: Space for 2 beds, 2 desks, closets, furniture arranged as desired = 20.

B. Nulceus: Formed by four sub-nuclei of 40 rooms (2 students each = 80 students). Each nucleus will provide a game room (TV, ping-pong, pool), study room (6 desks) general study area, counselor's suite, laundry room.

General space requirements:

40 bedrooms
4 bathrooms
Common area
Circulation
Total nucleus = 1920 (24 m^2/student)

	Gross bldg. (m^2)
C. Building area: 5 nuclei (400 students) @ 1920	9,600
GROSS BUILDING AREA: (includes circulation)	9,600

Ground area for parking: 10 spaces/ nucleus = 50 cars

Proximitas: To be located near the campus core, Infirmary, Dining Hall, and Recreation and Sports Unit. For master planning purposes, consideration should be given to site planning for views, prevailing breezes, vehicular access, and separation but immediate access to the campus core.

Expansion: 100%: 5 additional nuclei = 9,600.
Ground area for parking: 50 cars

Total buildout: 10 nuclei @ 1,920 = 19.200
Ground area for parking: 100 cars

5.2 Married Student Housing:

AREAS REQUIRED:
For master plan purposes only.

10 units/2 bedrooms, seating, kitchenettes, bath, combination great room/living room @ 60 each = 600

Subtotal: 600

20% circulation = 120

GROSS BUILDING AREA: 720
Ground area for parking: 10 cars

Proximitas: To be located near Student Housing adjacent to campus core area.

Expansion: 100%: 10 units = 720
Ground area for parking: 10 cars

Total buildout: 20 units = 1440
Ground area for parking: 20 cars

6. Professors' Lodging Unit:

	Gross bldg. (m^2)
AREAS REQUIRED:	
6.1 Faculty Housing:	
A. Rector/Provost Housing Unit	
2 units @ 300 each	600
(including 2 - carport garage + storage)	
B. Professors' Housing Unit	
5 housing units @ 4 bedrooms 230 each	1,150
43 units @ 3 bedrooms 230 each	9,890
(areas include 2 carport garage with storage)	
GROSS BUILDING AREA: (includes circulation)	11,640
Ground area for parking (including in entrance drive and carport)	

Proximitas: To be located in the Professors' lodging near the Faculty Club and Grammar School. Vehicular access by the main entrance road.

Expansion: 40 more 3 bedroom houses. 40 @ 230 = 9,200
2 carport garage with storage 40 @ 74 = 2,960
Ground area for parking included in carport and entrance drive

Total buildout:
Rector/Provost Housing Unit 2 @ 350 = 700
Professors' Housing Unit: 5 - 4 bedrooms @ 260 = 1,300
83 - 3 bedrooms @ 230 = 19,090
90 carports @ 74 = 6,660

6.2 Administration and Staff Housing:

	Gross bldg. (m^2)
AREAS REQUIRED:	
10 units/2 bedrooms, seating, kitchenettes, combination great room/living room, bath @ 60 each	600
Subtotal	600
20% Circulation	120
GROSS BUILDING AREA:	720
Ground area for parking: 10	

Proximitas: To be located east of the proposed Faculty Club location in the Administrative and Staff Housing Unit.

Expansion: 100%, 10 units = 720
Ground area parking: 10 cars

Total buildout: 20 units = 1440
Ground area for parking: 20 cars

6.3 Grammar School/Nursery:

	Roofed area (m^2)	Gross bldg. (m^2)

AREAS REQUIRED:

A. 2 classrooms
1 kindergarten room
1 nursery room
1 teachers' room
1 administrative room

Subtotal.....400

B. Covered playground.....150

GROSS BUILDING AREA: (includes circulation).....150.....400
Ground area for parking: 5 cars

Proximitas: To be located between the Professors' Lodging Unit and the Married Student Housing Unit. Access by the main entrance road.

Expansion: 2 addition classrooms @ 80

Total buildout: Building @ 480
Ground area for parking: 5 cars

6.4 Faculty Club:

	Gross bldg. (m^2)

AREAS REQUIRED:

Dining Room (150 people) serving and eating area (serving from main cafeteria), swimming pool, cabana, barbeque area, bathrooms, storage.....370

GROSS BUILDING AREA: (includes circulation).....370
Ground area for parking: 10 cars

Proximitas: To be located in the Professors' Housing Unit area with immediate access from the Housing Units and vehicular access off of major loop road.

Expansion: 100% @ 370
2 tennis courts
Ground area for parking: 10 spaces

Total buildout: Building @ 740
2 tennis courts
Ground area for parking: 20 cars

7. RECREATION AND SPORTS UNIT

	Gross bldg. (m^2)
7.1 Gymnasium and Lockers:	
AREAS REQUIRED:	1,380
7.2 Swimming Pool (25 meters):	
AREAS REQUIRED:	30
7.3 Soccer and Track Field:	
AREAS REQUIRED:	
1 Unit	
7.4 Tennis Courts:	
AREAS REQUIRED:	
2 Units	
7.5 Basketball Court:	
AREAS REQUIRED:	
1 Unit	
7.6 Volleyball Court:	
AREAS REQUIRED:	
1 Unit	
7.7 Baseball Field - 1 Unit:	
GROSS BUILDING AREA: (includes circulation)	1,410

Ground area for parking: 10 cars

Proximitas: To be located within easy access from the Student Dorm areas. Vehicular access and services should be provided to the Gymnasium and Lockers.

Expansion: No provisions.

Total buildout: As shown.

VI CAMPUS MASTER PLAN

1. GENERAL

Based on the program, a final Master Plan for the campus was generated after comments and considerations of several alternatives. The major elements of the plan include property acquisition, general service, the campus core, housing, field units, and the high forest reserve. These elements were located based on their functional relationships and the capacity of the land to support each use.

2. PROPERTY ACQUISITION

As shown in the Master Plan (Figure F) it is strongly suggested that three parcels of land be acquired prior to development of the new college. The first of these being a strip of land in Hacienda las Mercedes at the intersection of the Siquirres-Guapiles Highway and the proposed new campus entrance road. Ownership of this property, as shown on the map, becomes important for the relocation of the entrance road into the college, and the site for the location of the Farm Products Store (which will be discussed later). Acquisition of a strip of property across the highway from the entrance road will insure that the integrity of the entrance road be preserved.

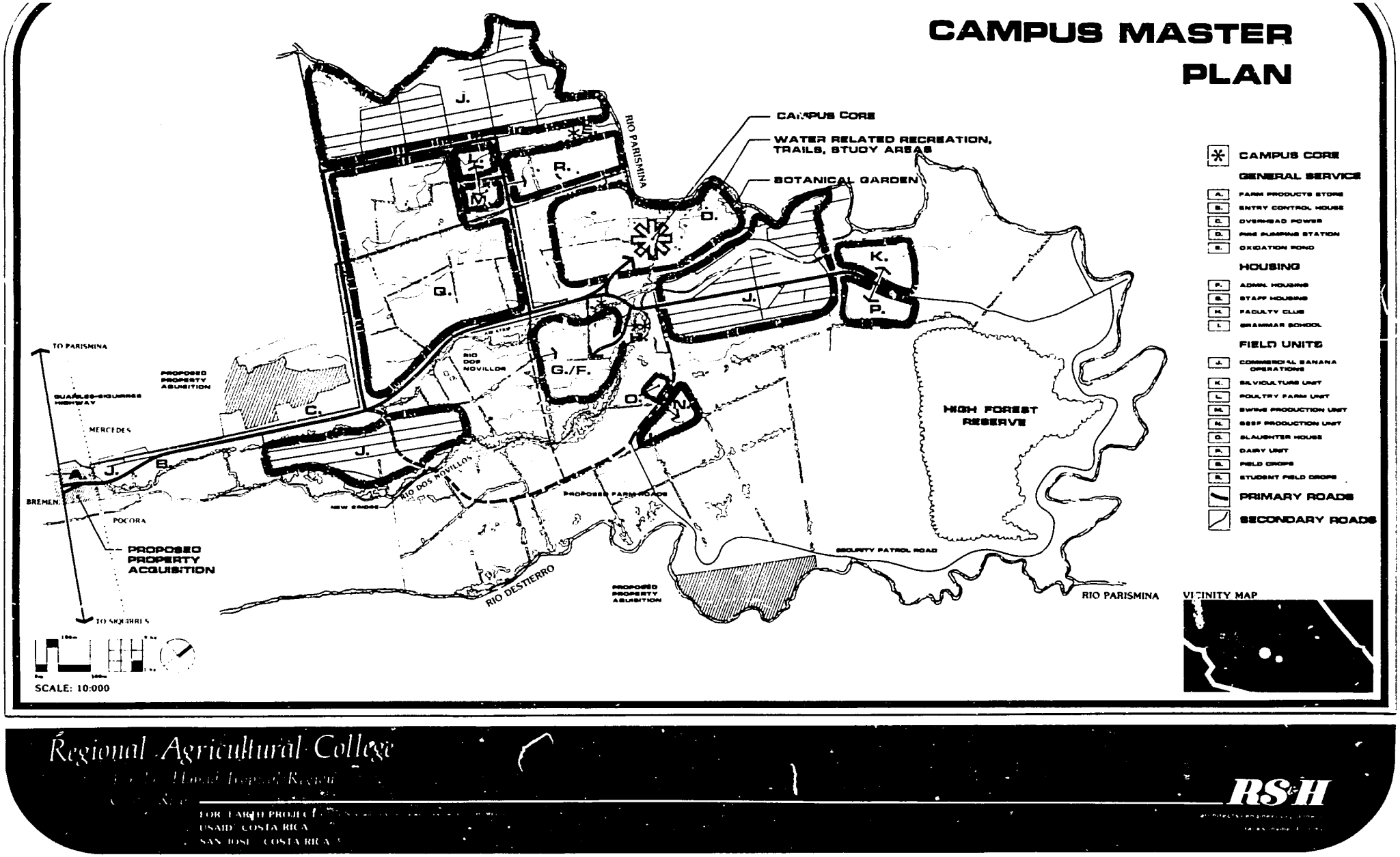
The second parcel of property recommended for acquisition is referred to as "Mr. Henry Stone's Farm". Its area is approximately 50 ha.; however, it will require more than 3,000 meters of fence. Acquisition of the property will replace the 3,000 meters of fence by no more than 700 meters and will considerably simplify the boundary of the campus. (One alternative which could be considered is the possibility of a land exchange that would produce the same results.)

The third acquisition area lies on the eastern part of the farm on the western bank of the Rio Destierro. It would be advisable to exchange or acquire this property in order to prevent problems of interference by those living on the land and to simplify the clear boundary of the farm along the river. In general, the acquisition of these properties will give the campus cohesiveness while increasing security.

3. CAMPUS ACCESS

The new entrance to the college will be located approximately .5 kilometers east of the existing Hacienda Bremen entrance road, in a proposed acquisition parcel. The main entrance road would be divided with a median which will display the site identification sign.

The Farm Products Store will be located at this point. As defined in the college campus program, this store will provide items for sale that are produced by the students as well as being a source of income for the University. According to the program, the following facilities will be provided at this location. The building will contain 20 m^2 of enclosed space and 50 m^2 of covered area for open air sales of farm products; parking for ten cars will also be provided. From this point the new entrance road will extend approximately one kilometer to the north intersecting with the existing farm road. This proposed route will be east of the existing Hacienda houses and more or less parallel the Rio Dos Novillos.



Regional Agricultural College

RS&H

FIGURE F

At the juncture of the new entrance road and the existing farm road an Entry Control House will be provided. The function of the Entry Control House is to provide security access (to include visitors and farm vehicles) into the campus core areas. According to the campus core program, this facility will be provided with control entry gates for both farm vehicles and automobile traffic. The building will contain ten m^2 of enclosed space with an additional 20 m^2 of covered area; parking will be provided for two cars.

From the Entry Control House to the existing east-west farm road near the airstrip, the campus entry road will be designed to accommodate farm vehicles as well as private automobiles. Beyond the east-west farm road to the turnabout at the campus core the road is designed as a typical six-meter wide paved cross section for private automobiles only. It is the intent of the Master Plan to prevent farm vehicles from utilizing the main entrance road from the airstrip to the turnabout near the campus core. This precludes interface of farm vehicles with pedestrians and private automobiles.

The land uses along the entry road are currently buffered by a "living fence", which is unique to the region. The character of this will be preserved.

4. GENERAL SERVICES

4.1 Internal Vehicular Roadways: In addition to the main campus entrance road, the existing farm roads are in good condition but will need to be upgraded to provide for the increased traffic of the new college. These roads provide farm machinery (particularly the padded banana trucks) easy access to the banana packaging house located just south of the proposed Entry Control House. Farm road service to the land uses in the north area of the campus is provided by a primary farm road that begins in the Silviculture and Dairy Units and nearly circumvents, to the east, the main entrance road. The first portion of this road proceeds south from the silviculture and dairy units through the banana operation. Immediately after leaving the banana operation the road turns sharply toward the east and on to the Beef Production Unit and Slaughterhouse. Passing through these, the road continues to the south through the southernmost banana operation until the new farm road intersects again with the main campus entry road.

In the description above, where the primary road turns sharply to the east, an automobile pathway continues south across the existing suspension bridge to connect with the turnabout and the existing campus core. A secondary farm road exists as a continuation of the main east-west road and intersects the loop just described.

4.2 Utilities: Wastewater treatment will be handled by means of a PVC sewer system and oxidation pond for the campus core, student housing, lodging, recreation, and other similar uses. The system will be gravity flow from the campus core to the oxidation pond which will be visually screened by the existing giant bamboo hedgerow. Wastewater from the Professors' Lodging Unit will be handled by separate septic tanks.

Final disposal of solid wastes (trash) could be handled by sanitary fills or possibly require the installation of incinerators. The treatment of waters from the slaughterhouse, hog pens, etc.. may require special consideration.

For information on other utilities/infrastructures refer to paragraph 1.3 of Section V of this report.

5. CAMPUS CORE

The campus core, located in the northern central area of the campus comprises 57 ha. Access to the core is via the main campus entry road. Functionally, this location was chosen due to the relationship of the other land uses with this centrally located area, its easy and direct access from the main entry road, and its low suitability for agricultural uses. Aesthetically, the location on the bank of the Rio Parismina is very pleasing.

A more in-depth look and analysis of the campus core design is provided in Section VIII of this report.

6. HOUSING

The faculty of the new college, its administrators, and staff will be provided permanent homes on campus in an area containing 54 ha. This area is located just south of the campus core, across the main entry road and a fork of the Rio Dos Novillos. Nestled in the fork of the river, this area contains natural amenities as well as a nearly centroidal relationship to the other functions. Housing of faculty, administrators, and staff is discussed further in Section IX of this report.

7. FIELD UNITS

7.1 General: The location of each agricultural use was based on existing operations on the farm, drainage, conservation and environmental concerns, Land Use Capacity Classes, and the proximity to local private farms.

The various Land Use Capacity Classes* found on the new college site offer a variety of conditions for experimentation and education of the students.

7.2 Commercial Banana Operations: Commercial banana operations currently exist on 323 ha. of the farm and are located in the areas best suited by Land Capacity Class for this use. The bananas are machine-picked and transported by padded trucks along glass-smooth farm roads to the existing on-site banana packaging plant.

The existing farm yields about 2,000 boxes of bananas per hectare, which is considered very good. No additional banana production areas are proposed.

7.3 Silviculture: The forest resources on the Bremen Ranch are now limited; however, according to Timothy G. O'Keefe of California Polytechnic State University, these resources are "fair to good with a considerable potential for development in an educational context."

As discussed in Section IV, Site Analysis Summary

The proposed Silviculture Unit is located on the north edge of the utilized area of the campus, within walking distance of the forest reserve. Close proximity to the core is not a priority due to the lack of intensive labor needed to pursue the production. Vehicular access to the unit is possible by a paved, six-meter wide primary farm road. As described in the program, this unit contains 90 m^2 of enclosed building area with 790 m^2 of covered open areas.

7.4 Dairy Unit: Located adjacent to and west of the Silviculture Unit, the Dairy Unit is well situated due to the relatively high and dry nature of the area which is appropriate for pastureland but poor for crops. The proximity of the Dairy Unit to the core is not within easy walking distance; however, access is provided by a paved, six meter wide primary farm road. The Dairy Production and Creamery Unit contain 470 m^2 of enclosed building area, 530 m^2 of gravel yard, and 300 m^2 of covered, open area.

7.5 Slaughterhouse/Beef Production Unit: Five thousand head of beef cattle now exist on the site and are part of a successful commercial operation. Currently, 2,330 ha. of the site are classified as pastureland. This unit was located within the bulk of that pastureland, approximately 1.5 kilometers east of the campus core. Access is provided by a new paved farm road. The slaughterhouse will contain 230 m^2 of enclosed building area and 150 m^2 of gravel yard area. The Beef Production Unit will contain 180 m^2 of enclosed building area, 1,150 m^2 of gravel yard, and 450 m^2 of covered, open area.

7.6 Poultry Farm/Swine Production Units: Located west of the campus core, these units are within walking distance of the student housing areas. This is necessary due to the labor intensity involved with these units. Additionally, a prevailing northeast wind places the units downwind of the populated areas of the campus. Access is provided by an existing farm road. The poultry unit contains 310 m^2 of enclosed building area and 600 m^2 of covered, open area. The Swine Production Unit contains 240 m^2 of enclosed building area, 1,200 m^2 of gravel yard, and 430 m^2 of covered, open area.

7.7 Field Crops: Located southwest of the campus core, the agricultural field crops comprise the largest additional land use planned for the new college. This area is correctly positioned with easy vehicular access on all four sides, good soil conditions, and minimal amounts of slope. The extent and varieties of crops grown here will depend upon the research and teaching objectives of the college.

7.8 Student Field Crops: This area is located immediately west of the Student Housing area within easy walking distance. Vehicular access is provided by an existing farm road. The extent and variety of crops grown here will depend upon the research and teaching objectives of the college.

VII ENVIRONMENTAL CONSIDERATIONS

1. GENERAL

To limit any potential irreversible adverse effects to local biota, careful environmental planning has been RS&H's primary objective. To develop an environmentally sound planning approach, a thorough understanding of the natural features and attributes of the biological systems to be developed was essential. An environmental management program using site specific scientific knowledge to enhance the quality of the development and to minimize any short- or long-term impacts to biological systems that may be associated with the development was implemented. Existing environmental and manmade conditions and functions were described previously in Section III of this report. The following section determines potential ecological impacts associated with development, if any, and provides resource management guideline recommendations.

2. ENVIRONMENTAL PLANNING APPROACH

The site plans and location of the proposed agricultural college will both manage the important inherent attributes of the indigenous flora and fauna and provide a well-planned educational facility within an aesthetically pleasing setting. From a review of the ecology of the Hacienda Bremen in terms of various value criteria (i.e., condition, species composition, sensitivity, and function), the forested wetlands and uplands, the nonforested wetlands, and the river courses are considered the most valuable site resources.

The adopted site planning approach gave special consideration to these valuable, important natural resources. The campus core is entirely situated on an elevated ridge of improved pastureland. The closest environmentally sensitive areas located below the core are marshy swales to floodplain forests to the Rio Parismina , proceeding along an elevational gradient. To protect the integrity of these natural resources from water pollution and stormwater runoff, a drainage plan will be incorporated to provide stormwater retention/detention.

Stormwaters will be held within retention/detention basins and then discharged into newly created and existing swale systems before waters are allowed to enter the forested floodplain and river. To promote good water quality within the rivers adjacent and contiguous to the property, and foster an appreciation for the remnant forest resource, the following management guidelines should be adopted.

2.1 Deforestation leads to increased sediment loads, more extensive flooding, and wildlife elimination; therefore, forest and tree clearing should be prohibited, except for construction within the core and access roads/paths within the forest preserve and river floodplains.

2.2 Drainage from banana plantations should be investigated to limit pollution of rivers by runoff of herbicides, pesticides, and excessive nutrients from fertilizers.

2.3 A system of percolation ponds should also be created and property utilized to limit human wastes discharged into the rivers.

2.4 River traffic should be regulated where possible.

2.5 Access paths and trails should be constructed within the forest preserve to facilitate the educational use of the forest.

Since the proposed agricultural college is to be constructed entirely within an area consisting of previously altered pasturelands, potential adverse environmental impacts are expected to be negligible. The remaining unaltered portions of the site (identified above as the most valuable site resources) are not expected to be adversely affected provided that appropriate management practices are utilized during both the construction and operational phases of the facility.

VIII CAMPUS CORE MASTER PLAN

1. LOCATION AND ACCESS

As designated by the Master Plan, the campus core area is located centrally between the Rio Destierro and Rio Parismina, on a plateau area approximately six kilometers northeast of the main entrance road from the Parismina - Siquirres Highway. This relatively flat plateau area, containing 57 ha., is ideally suited for the campus core affording a centralized location, panoramic views of the farm field units, prevailing breezes, and well drained soils. According to the recently surveyed topographic map of the campus core area by DYPSA at a scale of 1:1,000, there is a difference of seven meters between the highest point on the plateau and the improved pasturelands to the south.

The main entrance to the campus (see Figure G) is a boulevard radiating from the campus entrance road turnabout .5 kilometers southeast of the campus. This entrance road creates a dynamic visual entry to the campus core which is accentuated by the abrupt seven-meter grade change from the relatively flat improved pasture along the entry road to the campus core plateau. The terminus of the entrance road boulevard is on axis with the Administrative Building and the east-west loop road of the campus.

2. INTERNAL VEHICULAR CIRCULATION AND PARKING

The internal vehicular circulation of the campus consists of a six meter wide paved road that skirts primarily on the south side of the campus along the plateau edge. This principal road has three termini (turnabouts).

The first terminus is located at the entrance in the form of a circular drop off which serves the Administrative Building. Adequate parking and a covered drop off enhance the Administrative Building as a visual and functional campus entry focal.

The second terminus is located east of the Administrative Building providing vehicular access to the campus elements and terminating at the Library Building with a covered drop off.

The third terminus is located west of the Administrative Building providing vehicular access west of the campus and terminating principally at the Dining Hall with a covered drop off.

Parking for the various elements in the campus core is provided along the main east-west loop road with relatively short walking distances to the various facilities. Secondary service roads radiate from the main east-west loop road, providing access and services to the campus elements which will be discussed in more detail in the following section. All areas designated as parking on the core plan are essentially green areas which can be used for parking if the eventuality arises and has been included as parking areas for Master Plan purposes only.

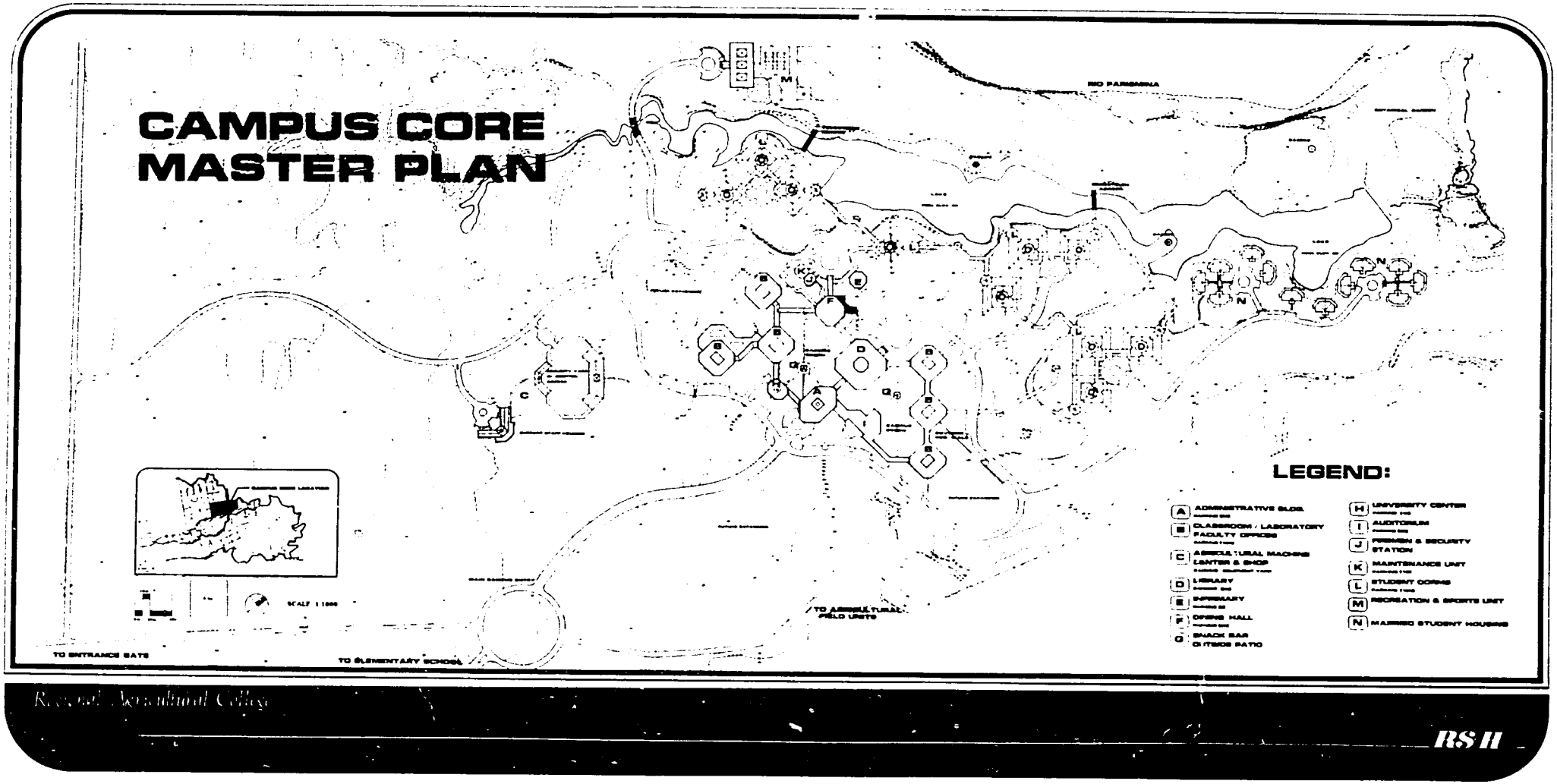

CAMPUS CORE
MASTER PLAN
RIO PARRENIA
LEGEND:
A ADMINISTRATIVE BLDG.
B CLASSROOM / LABORATORY FACULTY OFFICES
C AGRICULTURAL MACHINE LIMITER & SHOP
D LIBRARY
E INFIRMARY
F OFFICE HALL
G SNACK BAR CITIZEN PATIO
H UNIVERSITY CENTER
I AUDITORIUM
J FIREMEN & SECURITY STATION
K MAINTENANCE UNIT
L STUDENT DORMS
M RECREATION & SPORTS UNIT
N MARRIED STUDENT HOUSING
TO ENTRANCE GATE
TO ELEMENTARY SCHOOL
TO AGRICULTURAL FIELD UNITS
Rosenthal Agricultural College
RSH

FIGURE G

3. ELEMENTS OF THE CAMPUS CORE PLAN

3.1 General: The Master Plan for the campus core area provides the build out facilities necessary to accommodate 800 students. These elements are broken down into three primary functional areas:

Academic Unit:

- o Administrative Building
- o Library
- o University Center
- o Auditorium
- o Classrooms

Support Services:

- o Dining Hall
- o Snack Bar
- o Infirmary
- o Maintenance Unit
- o Firemen and Security Station

Housing:

- o Student Dormitory Unit
- o Married Student Housing

Recreational Sports Unit:

- o Gymnasium/lockers and swimming pool
- o Field sports
- o Passive recreation areas

A description of these elements is as follows.

3.2 Academic Unit:

A. Administration: This building is the focal entry point element to the campus core from the main entrance boulevard to the campus. At this point the visitors' drop off turnabout and parking (20 spaces) are provided. Total buildout of this facility is 1,020 m^2. The location of this facility is in the center of campus with access to the Library to the north and campus elements to the east and west. In addition, this location provides equal walking distance to the major academic campus units.

B. University Center: This facility is located immediately west of the Administrative Building in a central location with easy pedestrian access to the campus facilities. Vehicular access and parking are provided by the west loop road. A total of 20 parking spaces are provided. The total buildout for this facility is 720 m^2.

C. Auditorium and Nondenominational Chapel: This major facility is located immediately east of the Administrative Building in a central location providing immediate pedestrian access from the campus facilities. Vehicular access and parking are provided by the east loop road. A total of 50 parking spaces are provided not only for the campus needs, but also for community activities and events. The total buildout for this facility will be 1,637 m^2. It is envisioned that, because of the magnitude of a facility of this type, it will be built in the latest stages of the implementation of the campus plan.

D. Library: This facility is on the direct access north of the Administrative Building. This places the facility in the center of the campus core. This location provides equal walking distance from the classroom complexes to the east and west and the Administrative Building to the south. The measurements used for this facility as indicated in the program are for Master Plan purposes only and will require further analysis before a final measurement is determined.

E. Classrooms: This facility consists of six classroom nuclei symmetrically located at the eastern and western accesses of the campus plan. This location provides additional space to the east and west for future expansion inside the campus loop roads. In addition, these locations provide equal pedestrian access to the major academic facilities: Administrative Building and Library. Vehicular access and parking is provided by the east and west campus loop road. A total of 100 parking spaces are provided for the six nuclei. The total buildout for the six nuclei is 9,888 m^2.

3.3 Support Services:

A. Dining Hall: This facility is located northwest of the Administrative Building between the western classroom facilities and the Library. In addition, this location places the Dining Hall in a central location between the student dorm areas and the academic units of the campus core area. Located here is the western terminus of the west campus loop road where a turnabout, covered drop off, and parking are provided. A common service yard (with access from the west loop road) provides service to this facility as well as the Maintenance Unit and Firemen and Security Station. This area is also screened from view by a perimeter wall which can be richly landscaped to reduce the visual impact of this facility as well as provide ample security. A total of 20 parking spaces are provided for this facility in addition to the service area and loading dock. Total buildout for this facility is 850 m^2 and is planned for multiple use in the early stages of the campus development until the Auditorium can be built.

B. Infirmary: This facility is located immediately northeast of the Dining Hall with vehicular access and parking from the western loop road terminus turnabout. This location places the facility within easy pedestrian access from the dormitories and the campus core. A total of five parking spaces are provided. The total buildout of this facility is 329 m^2. Ambulance parking will be provided in the Maintenance Unit as discussed below.

C. Maintenance Unit/Firemen and Security Station: These two facilities are located in the service area immediately northwest of the Dining Hall. Vehicular access and visitor parking is provided by the western campus loop road terminus turnabout. This location is ideally suited for these two facilities combining service requirements with the Dining Hall. A total of ten parking spaces, excluding the loading dock for the Maintenance Unit, are provided. A total of two parking spaces are provided for the Firemen and Security Station in addition to the garage parking requirements for the 1,500 gallon fire truck. There will be fire lines and hydrants along all major roads. The proposed lake is to be used for fire water supply along with a reserve water tank in the above ground potable water tower. Total buildout for the Maintenance Unit is 240 m^2 and a 220 roofed area. Total buildout for the Firemen and Security Station is 250 m^2.

D. Snack Bar: Two Snack Bars are located east and west of the Library - Administrative Building axis in the center of "the campus green" created by the various campus facilities. This location places the two Snack Bars in the centroid of this space with immediate pedestrian access from all of the campus facilities. These two facilities will function as the common meeting ground for student interaction on the campus. Total buildout is 25 m^2 for building and 100 m^2 for outdoor eating.

E. Agriculture Machine Center and Shop: This complex is located immediately south of the western campus loop road. Since a portion of this facility will be utilized as a teaching classroom, this location provides relatively easy pedestrian access from the main campus core.

The existing east-west farm road, which originates at the airstrip, provides vehicular access from the south. This road will provide farm vehicle access to the maintenance facility in the Agriculture Machine Center. This would also alleviate farm equipment traffic within the campus loop road system. A security wall and fence is provided around the entire complex to provide control of vehicular access and pedestrian entry into the facility. Additional parking is provided outside of the facility on the entrance road.

Facilities within this complex will include: Agriculture Machine Shop, Farm Equipment Maintenance/Gas Station, sleeping quarters for two students, canopied area for motor pool and farm equipment, and a centralized open yard area.

Immediately adjacent to the main Agriculture Machine Center and Shop is the support staff housing. This separation gives this facility its own identity, entrance area, and parking, but also controls pedestrian and vehicular access to the Agriculture Machine Center and Shop.

Total buildout for all of these facilities will be 1,959 m^2, covered buildings 900 m^2 and a central yard area of 2,000 m^2.

3.4 Housing:

A. Student Dormitory Unit: A total of ten dormitory nuclei containing 80 students each are planned along the natural ridge areas immediately north of the campus core area. This location places these facilities within reasonable walking distance as well as creating a visual separation from the campus core giving each nucleus a sense of individual identity. Vehicular access to the dormitories will be by way of secondary service roads radiating from the east and west campus loop roads. These roads will terminate at a turnabout which will provide parking for the individual dormitory nuclei. From the parking areas, pedestrian walkways will be drawn into centralized courtyards containing single loaded corridors to the individual dormitory rooms. The measurements used for these units as indicated in the program are for Master Plan purposes only and will require further analysis before a final measurement is determined.

A total of 100 parking spaces for cars are provided for the ten dormitory nuclei. Total buildout for the ten nuclei is 19,200 m^2.

Basic concept of the dormitory nuclei will be outward oriented for the views toward the proposed lake which will function as a retention/detention area. These units are also envisioned as being two-story buildings which reduces the amount of area taken up by the building footprint as well as taking advantage of the natural views toward the north.

The game room is envisioned as being the centrally located facility within the individual dorm nuclei and will function as a vertical architectural element upon entering the courtyard area. Pedestrian access from individual dorm nuclei would be generally along the proposed lake to the campus core and the Dining Hall.

B. Married Student Housing: A total of 20 units will be located east of the Student Dormitory cluster.

Conceptually, these units are envisioned as being duplex units with individual entrance areas and viewing decks toward the proposed lake area to the north.

Orientation is similar to that of the student dormitory clusters on the natural bluffs. Vehicular access and parking area for 20 cars are provided by a secondary road from the eastern campus loop road. Total buildout for the 20 units is 1,440 m^2.

3.5 Recreation and Sports Units:

A. General: This facility is located northwest of the campus core area. Vehicular access and service is provided by a secondary road from the west campus loop road. This location places this facility on a relatively flat, narrow ridge that runs basically east-west between the Rio Parismina and the proposed lake. It is within relatively easy walking distance from the dormitory clusters with access across the lake provided by small wooden bridges.

B. Facilities: Specific facilities include Gymnasium and Lockers, Swimming Pool, Soccer and Track Field, Tennis Courts, Basketball Court, Volleyball, and Baseball Field.

A turnabout and drop off is provided immediately in front of the proposed Gymnasium. Parking for ten cars, as well as service to the building will be provided.

Total buildout for these facilities will be 1,380 m^2 for the Gymnasium and Lockers, as well as 30 m^2 for a cabana area adjacent to the Swimming Pool.

Other considerations include: jogging trails along the ridge, nature trails along the Rio Parismina, gazebos at high points along the ridge, and a botanical garden located on the extreme eastern portion of the ridge adjacent to the Rio Parismina.

4. DESIGN CONSIDERATIONS

- Architectural elements: Because of the humid tropical environment in Costa Rica, certain architectural elements will be considered for these campus facilities. Among these are: Orientation to prevailing breezes; orientation to on- and off-site campus views; protected pedestrian colonnades; and drop off points at key building elements. Other considerations will include openness in overall design and the incorporation of skylights wherever practical.

- Hard surface walkways and decks: All campus core walks will be hard surface. Sufficient access is provided by means of pedestrian bridges and walkways from perimeter core facilities such as the Dormitories and Sports Unit. The occurrance of vehicular and pedestrian conflicts has been minimized.

- Wherever practical, viewing decks and student congregation areas will be incorporated into the plan. The Master Plan provides for these amenities adjacent to the Dining Facility and the westernmost classroom nucleus.

- Covered internal pedestrian circulation: All buildings within the core will be designed to include a covered corridor or colonnade for protection from inclement weather. These colonnades also serve to frame the interior campus green spaces and to take full advantage of any on or off campus vistas. Provisions will also include the extention of covered walkways to the student dorm nuclei.

- Gazebos: The careful placement of these facilities affords students viewing areas and secluded study locations.

- Water tower: It is suggested that this facility be incorporated into the auditorium as a visual focal point of the campus. It would stand alone serving as the campus campanilli until construction of the Auditorium. The harmonious blending of the architectural style of the water tower and the future Auditorium will be considered.

Campus lake: As indicated on the Master Plan, a meandering lake will intertwine throughout the northern perimeter of the campus core. This lake, which will have a pool elevation of 25 meters, will not only create a visual amenity, but will also function as a retention/ detention area for the stormwater runoff from the campus core. A secondary consideration will be the utilization of the lake as a fire protection reservoir.

Existing swales and low areas: These areas present unique opportunities for student research pertaining to low, wet environments as well as the potential for creating botanical gardens and a pleasing campus environment.

IX PROFESSORS' LODGING UNIT

1. GENERAL

As designated in the Campus Master Plan, the Professors' Lodging Unit is located in the center of the campus at the confluence of the Rio Dos Novillos, approximately .5 kilometers east of the campus core (see Figure H). This 54 ha. area is accessed by the main campus entrance road. Internal circulation consists of paved roads six meters wide. The 16 meter rights-of-way are laid out in a continuous linear configuration with the exception of one cul-de-sac terminating at the Faculty Club. These rights-of-way will provide the necessary shoulders and swales for an efficiently designed system. All of the .5-ha housing sites have direct access to the proposed roadways. A secondary/emergency exit for vehicles is provided south of the area for access to the main campus entrance road. The program elements to be incorporated into this portion of the design are as follows:

- o Faculty Housing (Rector/Provost/Professors)
- o Administration and Staff Housing:
- o Grammar School/Nursery
- o Faculty Club

2. FACULTY HOUSING

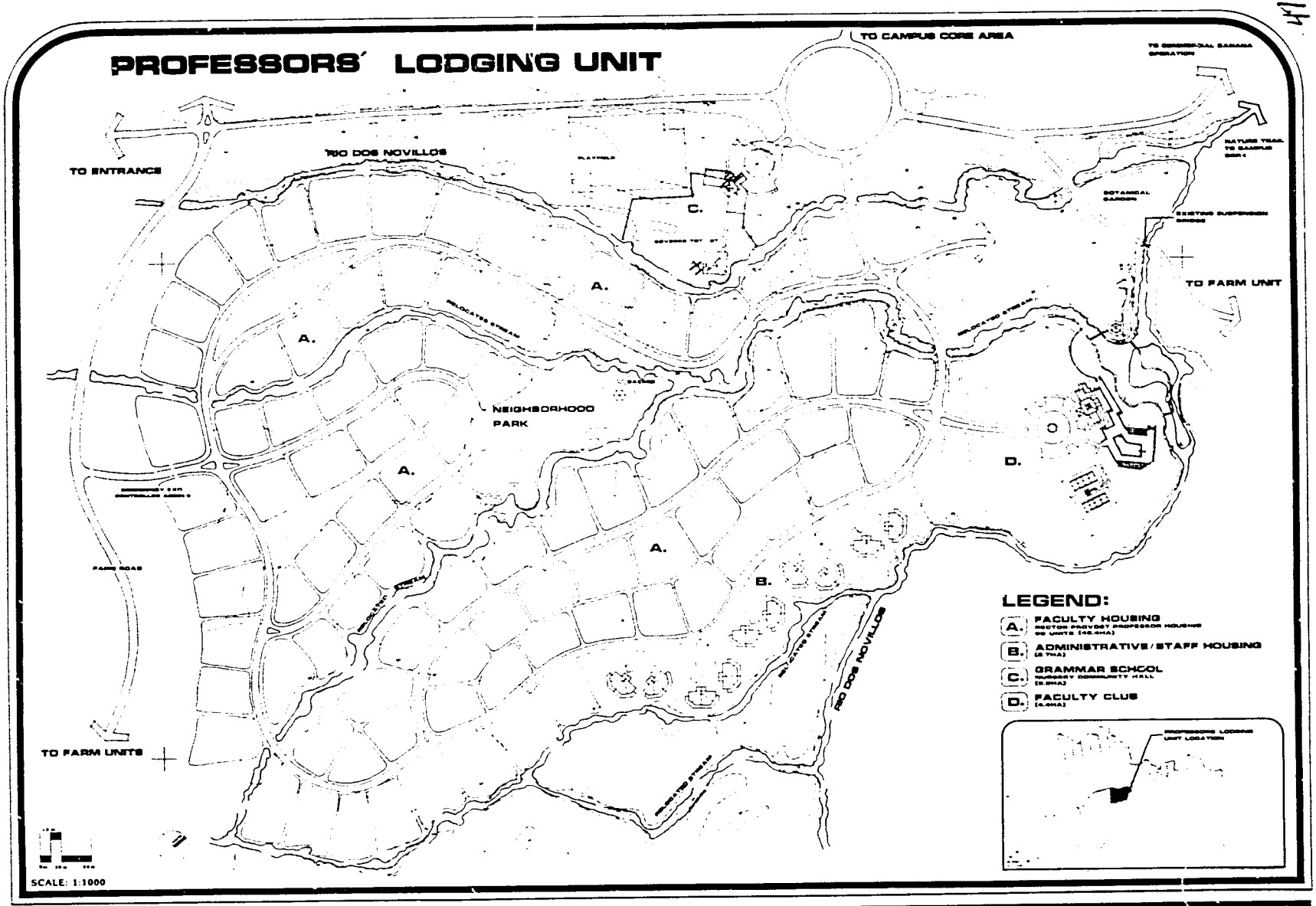
Faculty Housing, with an area of 48.4 ha., comprises the major portion of the Professors' Lodging Unit. This zone, intended for single family detached housing, is shown as 90 separate building sites, each approximately .5 ha. in area.

Faculty Housing is broken down into several types of dwelling units. The Rector and Provost have been designated for units of 350 m^2 each, with carports. Housing for professors includes 5 4-bedroom (260 m^2 each) units with carports and 83 3-bedroom units (230 m^2 each) with carports.

Tributary streams from the Rio Dos Novillos have been relocated within this area to provide drainage for the property as well as an amenity around which a majority of the building sites are located. This provides a greenfinger of visual relief and buffer for many of the homes similar to the pleasant stream setting along the Rio Dos Novillos.

3. ADMINISTRATION AND STAFF HOUSING

Administration and Staff Housing contains ten duplex structures affording a total of 20 dwelling units. Although the square meter area of these units is relatively small (60 m^2), their location along the eastern fork of the Rio Dos Novillos and relocated tributary stream provides an incredible view to which all of the units are oriented. An ample buffer zone separates this housing type from the adjacent Faculty Housing. This location also provides a pleasant walk to the Faculty Club along the river's edge immediately to the northwest.



Regional Agricultural College

RS-H

FIGURE H

4. GRAMMAR SCHOOL AND NURSERY

The Grammar School and Nursery is located in the westernmost area of the Professors' Lodging Unit on the turnabout and main entrance road between the Faculty Housing and the campus core. Easy vehicular access is provided via the turnabout and the internal circulation of the Professors' Lodging Unit. The facilities will include 400 m^2 of enclosed building area and 150 m^2 of covered playground; parking is provided for five cars.

A neighborhood park, centrally located in the Professors' Lodging Unit, is within easy walking distance of the grammar school with the aid of the pedestrian bridge over the western fork and a relocated stream of the Rio Dos Novillos.

5. FACULTY CLUB

The Faculty Club serves as the hub of social activity for the faculty, administrative personnel, staff, and visitors to the college. Located on the north side of the main housing area loop road on a cul-de-sac, the Club area is surrounded on three sides by flowing waterways which create an easily accessible yet remote, relaxing, and pleasing atmosphere. The enclosed facilities of the club are contained in 370 m^2 of building area; parking for 20 cars is provided. Amenities include a dining room with seating capacity for 150 persons, a swimming pool, cabana, barbeque area, and two tennis courts. A sand beach area is also included along the Rio Dos Novillos. Pedestrian bridges and paths will provide access to the campus core which is northwest, approximately six kilometers away.

PARTICIPATING STAFF
at
REYNOLDS, SMITH AND HILLS
Architects-Engineers-Planners, Incorporated

J. Todd Deming, AIA, AICP	Associate Vice President Division Manager - Planning Division
Bernard L. Walsh, ASLA	Associate Vice President Department Head - Planning Division
Christopher D. Flagg, ASLA	Project Planner III
Susan R. Cobb, ASLA	Project Planner II
Charlotte E. Gillis, ASLA	Project Planner I
Bruce A. Robbins, ASLA	Project Planner I
David Rast, ASLA	Project Planner I
Mia B. Reece	Secretary
Paul G. Kirby	Assistant Manager of Reprographics
Thomas A. Pacetti	Graphic Layout
Richard Weaver	Graphic Layout