BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 119, HONOLULU, HAWAII 96810

EUGENE S. IMAI
COMPTROLLER
MARY PATRICIA WATERHOUSE
DEPUTY COMPTROLLER

LETTER NO. PM-1162.5

APR 6 1995

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OFC. OF ENVIRONMENTAL
QUALITY CONTROL

Mr. Gary Gill
Director
Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Final Environmental Assessment (EA) for
Agricultural Science Facilities, Phase III
University of Hawaii at Manoa
D.A.G.S. Job No. 12-31-1519
TMK: 2-08-23:03, Honolulu, Oahu, Hawaii

The Department of Accounting and General Services (DAGS) did not receive any comments during the 30-day public comment period for the draft EA which began on "OEQC Bulletin of February 8, 1995."

We have determined that this project will not have a significant environmental effect and have issued a negative declaration. Please publish this notice on the April 23, 1995, OEQC Bulletin publication date.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

If there are any questions, please have your staff call Mr. Mike Miura of our Project Management Branch at phone no. 586-0719.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

MM/si
Encl.
c: PM (MM)
UH Facilities Planning Office (BK)
Design Lab (RC)

43

1995-04-23-OA-FEA - University of Hawaii Manoa Agricultural Science Facilities, Phase III

AGRICULTURAL SCIENCE FACILITIES, PHASE III
UNIVERSITY OF HAWAII AT MANOA

This document is prepared in accordance with:
Chapter 343, Hawaii Revised Statutes
Chapter 200, Department of Health Administrative Rules
Act 241, Session Laws of Hawaii

Proposing Agency and Accepting Authority

Department of Accounting & General Services

Final Environmental Assessment

April 1995

DesignLab
for
John Hara Associates Inc. • Sam Chang Architect and Associates • Joint Venture Architects

PROJECT SUMMARY

Project Name:	Agricultural Science Facilities, Phase III DAGS Job. No. 12-31-1519
Applicant & Accepting Authority	Department of Accounting & General Services, State of Hawaii
Project Location:	University of Hawaii, Manoa Campus, Oahu, Hawaii
Tax Map Key:	2-8-23: 03
Land Area:	300 acre-campus; 138' x 160' building footprint
Landowner	University of Hawaii (UH), Board of Regents
Gross Building Area:	96,790 GSF
Estimated Construction Cost:	$26.3 Million
Estimated Construction Time:	24 months
Existing Use:	Site of portable buildings used as faculty offices by various departments.
Land Use Designation:	Urban
Oahu General Development Plan:	Public Facility
Zoning Designation:	R-5 (Residential District)
Flood Zone Designation:	Zone X (outside of the 500 year flood plain)
Project Description:	A five-story building with laboratory areas surrounded by offices and support spaces.

Summary of Impacts: Short term impacts will result from construction related activities, such as dust, noise, and traffic. However, these impacts will only last during the construction phase. Mitigation measures will be taken whenever possible to minimize these impacts.

The City Council of the City and County of Honolulu approved through Resolution 89-411, CD-2 and amended by Resolution 92-286 CD-1, FD-1, 3-10-93, the Plan Review Use (PRU) Application submitted by the Board of Regents, University of Hawaii, to expand the University of Hawaii Manoa campus as described in the UH's Long Range Development Plan (LRDP). The project is in conformance with the location and design guidelines in the LRDP.

Resolution No. 89-411, CD-2 adopted by the City Council allocates parking requirements on a campus-wide basis, rather than on a building-by-building basis. Based on the ratio of one parking space for every 400 ASF of office space within a given building the proposed project needs to provide 55 parking spaces for the approximately 22,000 ASF of office space. Parking spaces are located in existing parking structures.

Long term environmental impacts resulting from the project are minimal. Safety and health measures will be taken to avoid contamination of public waste water lines. The UH has established programs and procedures to monitor the use, storage and disposal of radioactive and other hazardous materials. If deemed necessary by the State's Department of Health and the UH, the negative impact of gas and vapor emissions will be minimized with the use of mechanical filters or scrubbers. The use of these devices will also assure that the laboratory exhaust ducts will be kept at minimum height. Existing traffic conditions will remain the same. Noise conditions will also remain the same by installing sound attenuators on noise generating equipment.

AGRICULTURAL SCIENCE FACILITIES, PHASE III
Draft Environmental Assessment

Table of Contents

Chapter 1: Project Description

1.1 TECHNICAL CHARACTERISTICS

1.1.1 Project History. The Agricultural Science Facilities, Phase III, was proposed in the University of Hawaii's (UH) Long Range Development Plan (LRDP) published in 1987. This proposed facility follows Gilmore Hall and Sherman Laboratory (Phases I and II) as the latest addition to the facilities available to the College of Tropical Agriculture and Human Resources (CTAHR).

1.1.2 Proposed Users. The Agricultural Science Facilities, Phase III will house under one roof, four departments and related programs which are currently located in various facilities within the UH's Manoa campus. This consolidation is expected to improve the quality and efficiency of research, interdepartmental communication, and the quality of instruction for students. It will also enable the College of Tropical Agriculture and Human Resources (CTAHR) to revitalize research and attract and retain the Pacific Rim's top researchers and instructors.

The following departments and programs will be housed in the facility:

- Department of Food Science and Human Nutrition, including the Expanded Food and Nutrition Education Program (EFNEP)
- Department of Agricultural and Resource Economics, including the Pacific Agricultural Trade Center of Hawaii (PATCH)
- Department of Environmental BioChemistry
- Department of Animal Sciences
- IBSNAT/TropSoils/NifTAL projects
- Biotechnology Laboratory

1.1.3 Campus Location. The project site is southeast of the Biomedical Sciences Building and northeast of the Auxiliary Building within the Manoa campus of the University of Hawaii, on the island of Oahu. The existing access to the site is through East West Road. It is bounded by on-grade parking lots on the northeastern and southwestern directions. A dirt road separates the site from the fence line between the UH campus and St Francis School on the southeast. Five portable buildings are currently located on the project site. These buildings are used as faculty offices for various academic departments. Shown in Exhibit 1.1 are the map of the State of Hawaii and its geographical location. Exhibit 1.2 shows the proposed site and its immediate vicinity.

1.1.4 Concept Design. In accordance with the University of Hawaii's Long Range Development Plan (LRDP), a ground floor arcade will be incorporated in the design of the East West Road face of the building. The design of this arcade will be planned to accommodate future links with arcades to be provided on future adjacent buildings. Pedestrian access to the facility will occur primarily through the arcade. Therefore, the elevation of this floor will be planned to occur at or near grade to minimize the amount of ramping needed to assure barrier-free access to the building.

Service and vehicular access will occur from the future upper campus road, along the southeast side of the building. The loading area, trash bins, and other storage and service areas are to be accessed from that road. The service road will be established at existing grades. The facility's loading dock will be designed to respond to this condition.

The 138' x 160' building footprint fills the project site. The depth of this floorplate generates an interior block surrounded by a corridor providing access to a perimeter ring of spaces. The laboratories, which require constant and precise environmental controls, are placed within the interior block, maximizing efficiency in structural and mechanical characteristics and the use of energy. The perimeter ring is dedicated to office and miscellaneous support spaces, with priority given to the location of the faculty offices along the north and west walls to take advantage of views.

The second entry level, which is accessed from the East West Road contains departmental offices, instructional labs, classrooms, and loading dock The lowest grade level is used for the more industrial aspects of the program (e.g., the chemical and solvent storage areas, Thermal Food Processing Suite and Sample Drying and Grinding Suite) as well as the building's primary mechanical and electrical equipment room. The upper floors contain the research laboratories, offices and support spaces.

Exhibits 1.3 to 1.10 are schematic drawings of the project.

1.2 SOCIO-ECONOMIC CHARACTERISTICS

1.2.1 College of Tropical Agriculture and Human Resources (CTAHR) is a leading academic college in the Pacific Rim for tropical agriculture, food science, human nutrition and family resources. The college, with more than 200 faculty in 11 academic programs, is the largest land-grant agriculture college in the tropics. Given Hawaii's unique geographic location and ecological diversity, the CTAHR provides students and faculty with an opportunity to learn and teach in an environment which blends teaching, research and extension programs. The CTAHR's goals are:

- to provide first-class educational opportunities for students;
- to generate and apply scientific research and knowledge in support of Hawaii's need for a strong, viable agricultural economy;
- to provide the knowledge and skills needed by individuals, families and communities to improve their physical, social, and economic well-being;
- to provide the technology needed to protect Hawaii's physical environment and natural resources; and
- to excel as a leading academic institution for tropical and subtropical agriculture and human resources.

In order to achieve these goals, the CTAHR's facilities must be adequate in terms of numbers and types of spaces, and must contain state-of-the-art equipment to provide an environment which blends, supports and enhances the teaching, research and extension programs.

The new facility will consolidate four academic departments and two research programs which are currently housed in overcrowded and widely scattered locations throughout the Manoa

campus. The new facility will consolidate and enable the departments and programs to revitalize their instruction, research and extension activities and will raise the level of interaction between and among the production, food, biochemistry, nutrition, biotechnology and social science faculty. By providing opportunities for formal and informal interaction among faculty, staff and students, information can be shared and discussed. These discussions can lead to innovative programs and collaborative efforts on instruction programs and research and extension projects.

This sharing of ideas and resources is important to the College if a national Center for Tropical and Subtropical Agriculture (CTSA) is to be established and supported within the College. The Center will be an important repository of tropical and subtropical agricultural information. The mission of the Center will be to utilize the personnel, resources and facilities available within the college and to support and expand diversified agriculture on a national scale including the American Pacific. The objectives of the Center should lead to the expansion of agricultural exports and a reduction of the national trade deficit.

1.2.2 Impact on other UH Programs. The LRDP, adopted by the University's Board of Regents in 1987, will guide the development of the Manoa campus through the 1990's. The plan is relatively definitive in terms of siting and design criteria for projects in the 1987-1993 Capital Improvement Program (including this project) and it identifies general building sites for future projects. Construction of this proposed facility will have an impact on the ability of other projects to progress, including the following:

- **The School of Hawaiian, Asian, and Pacific Studies (SHAPS).** SHAPS will be the centerpiece of the University's key role as the education center for the Pacific Rim's diverse cultures. The existing site of Henke Hall cannot be demolished to make way for the SHAPS facility until the proposed Agricultural Science Facilities, Phase III is constructed and occupied by those CTAHR units currently occupying Henke Hall.

- **Krauss Hall Renovations.** CTAHR's programs such as IBSNAT, NifTAL and TropSoils currently housed in Krauss Hall will be moved to the new proposed Agricultural Science Facilities, Phase III.

1.3 PHASING AND PROJECT COSTS

The estimated construction costs have been based on Type I, non-combustible, fire resistive construction. In addition to building construction costs, estimates have been included for costs related to sitework, design contingency, construction cost escalation factor and a telecommunications allowance. It is estimated that the basic construction cost is $26.3 M while the total project cost, including design fees and contingencies is $31.3 M.

It is estimated that the construction of the project will require 24 months to complete. The project will not be phased.

1.4 SOURCES OF FUNDING

The project will be funded by both the Hawaii State and Federal governments, with each responsible for 50 percent of the total project costs.

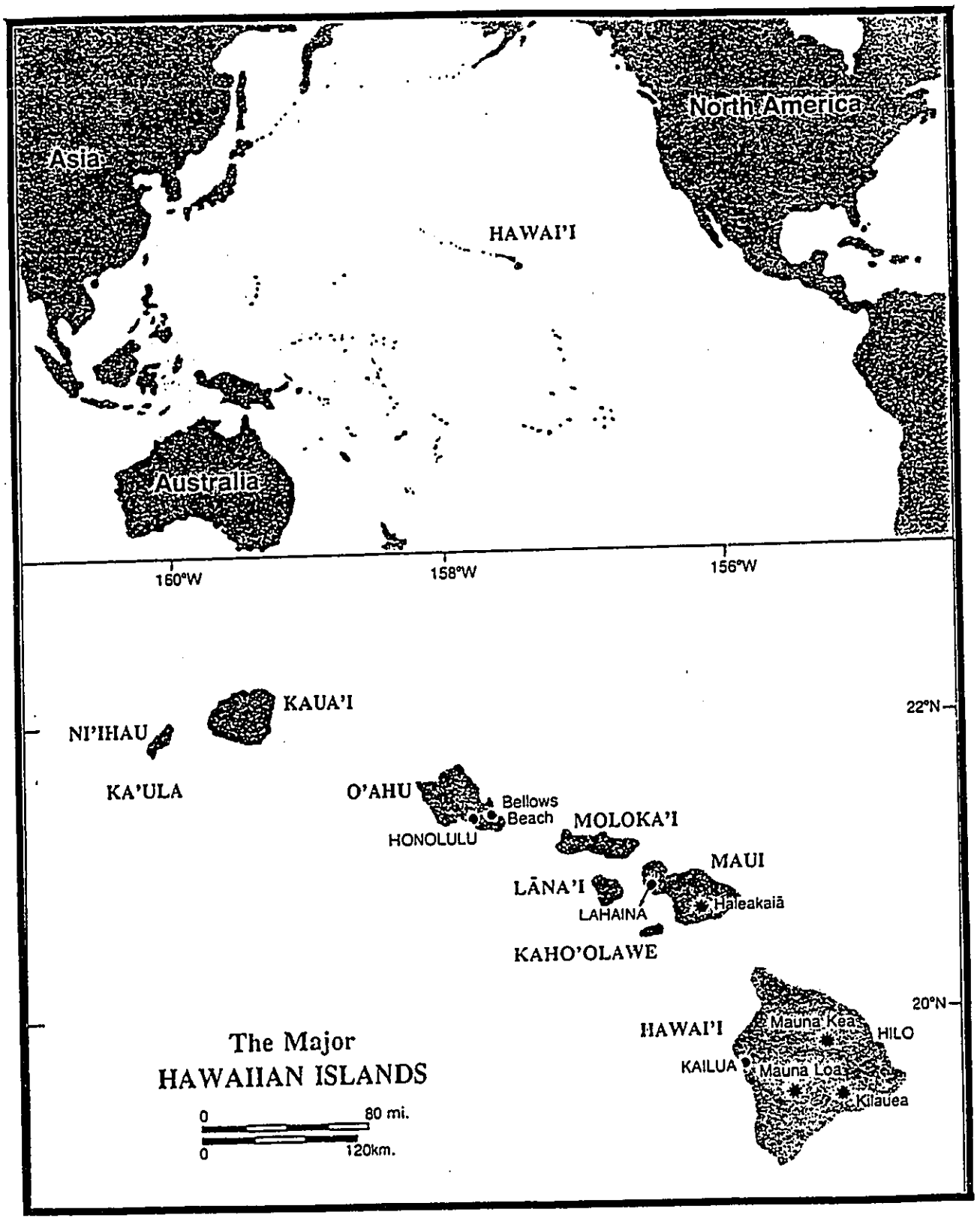


EXHIBIT 1.1
STATE OF HAWAII MAP
Source: Plants & Flowers of Hawaii and Atlas of Hawaii

LOCATION PLAN :Agricultural Science Facilities, Phase III (3/95)

Source: USGS Topographic Quadrangle (1983)

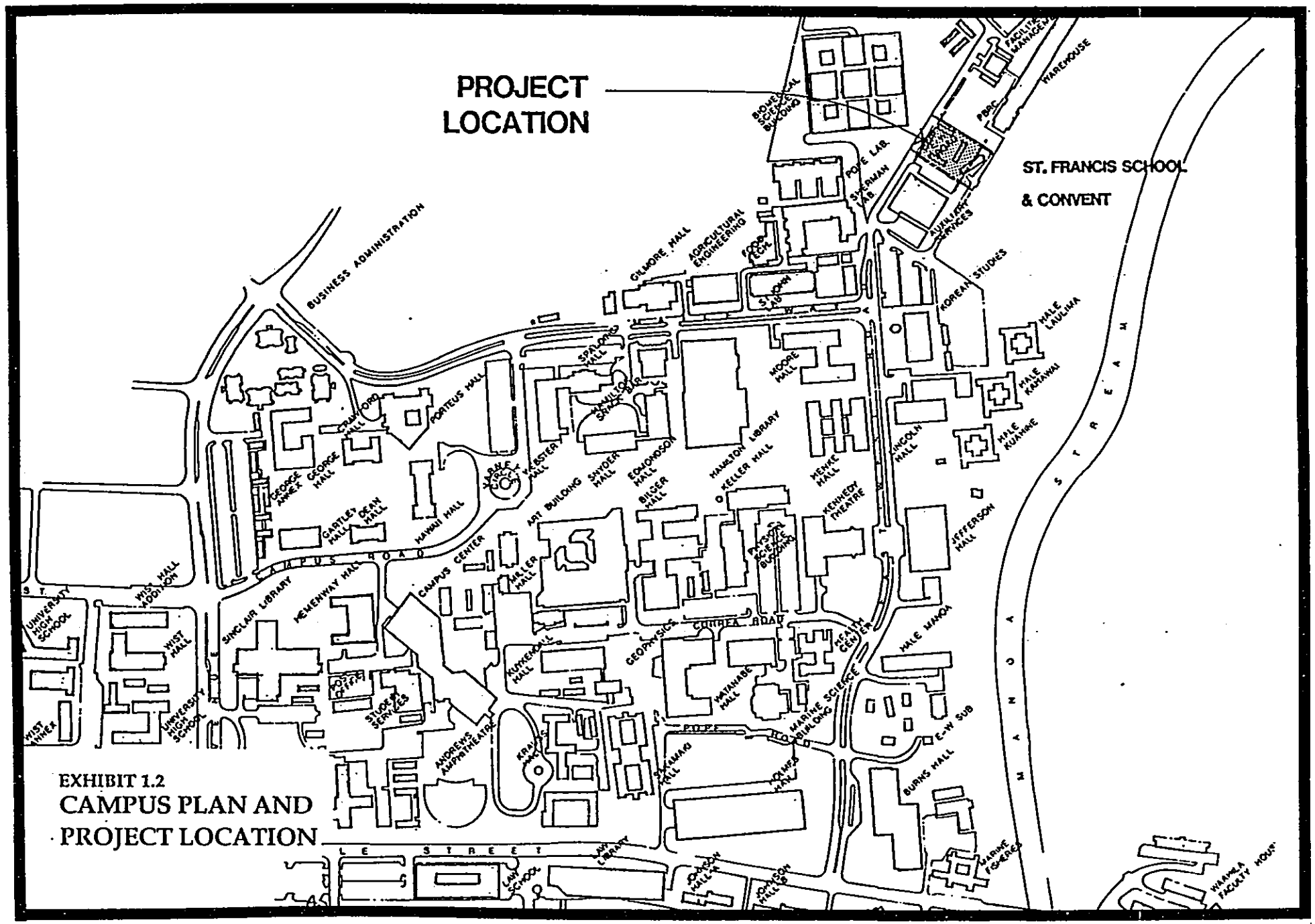
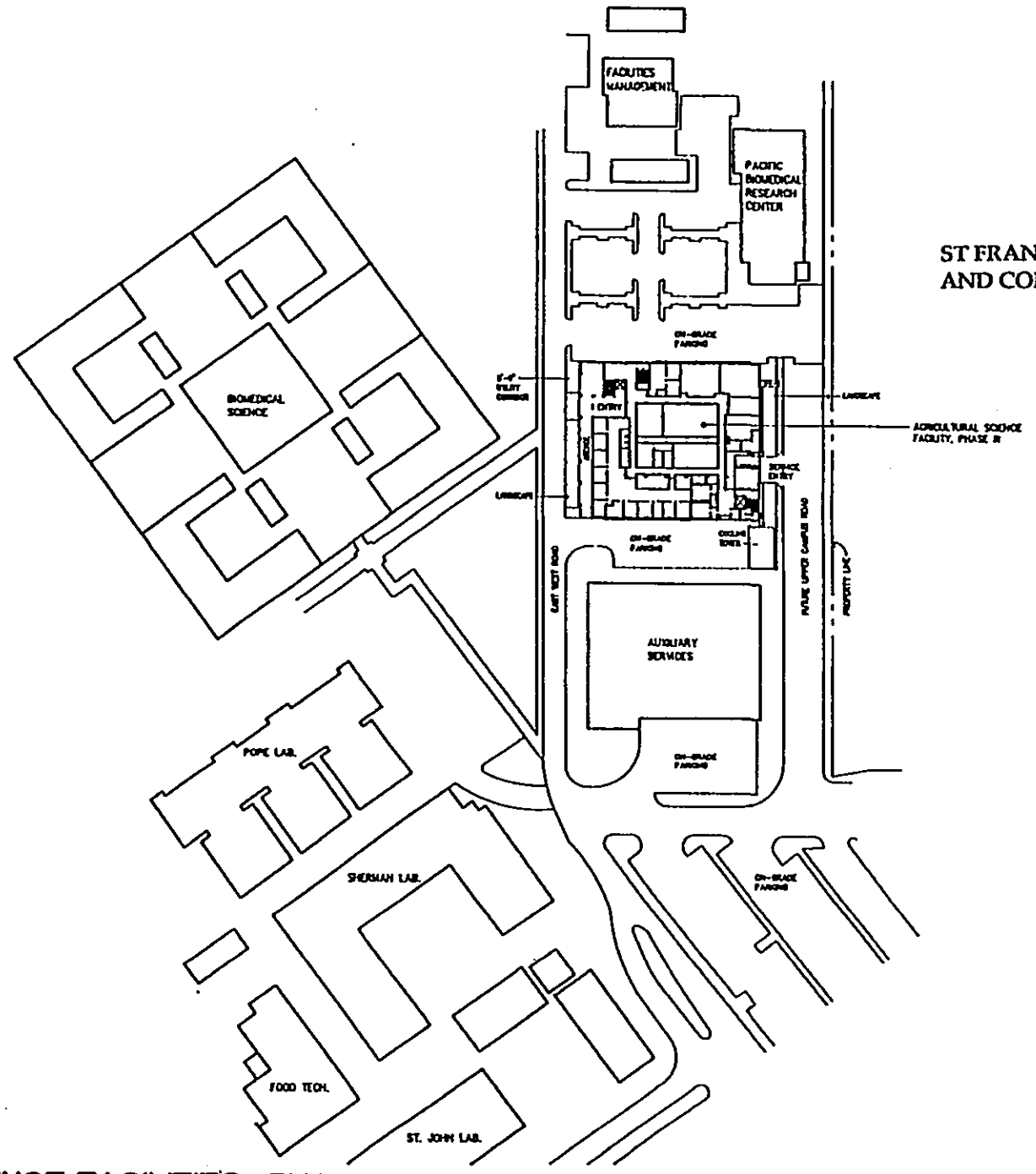


EXHIBIT 1.2
CAMPUS PLAN AND
PROJECT LOCATION



AGRICULTURAL SCIENCE FACILITIES • PHASE III

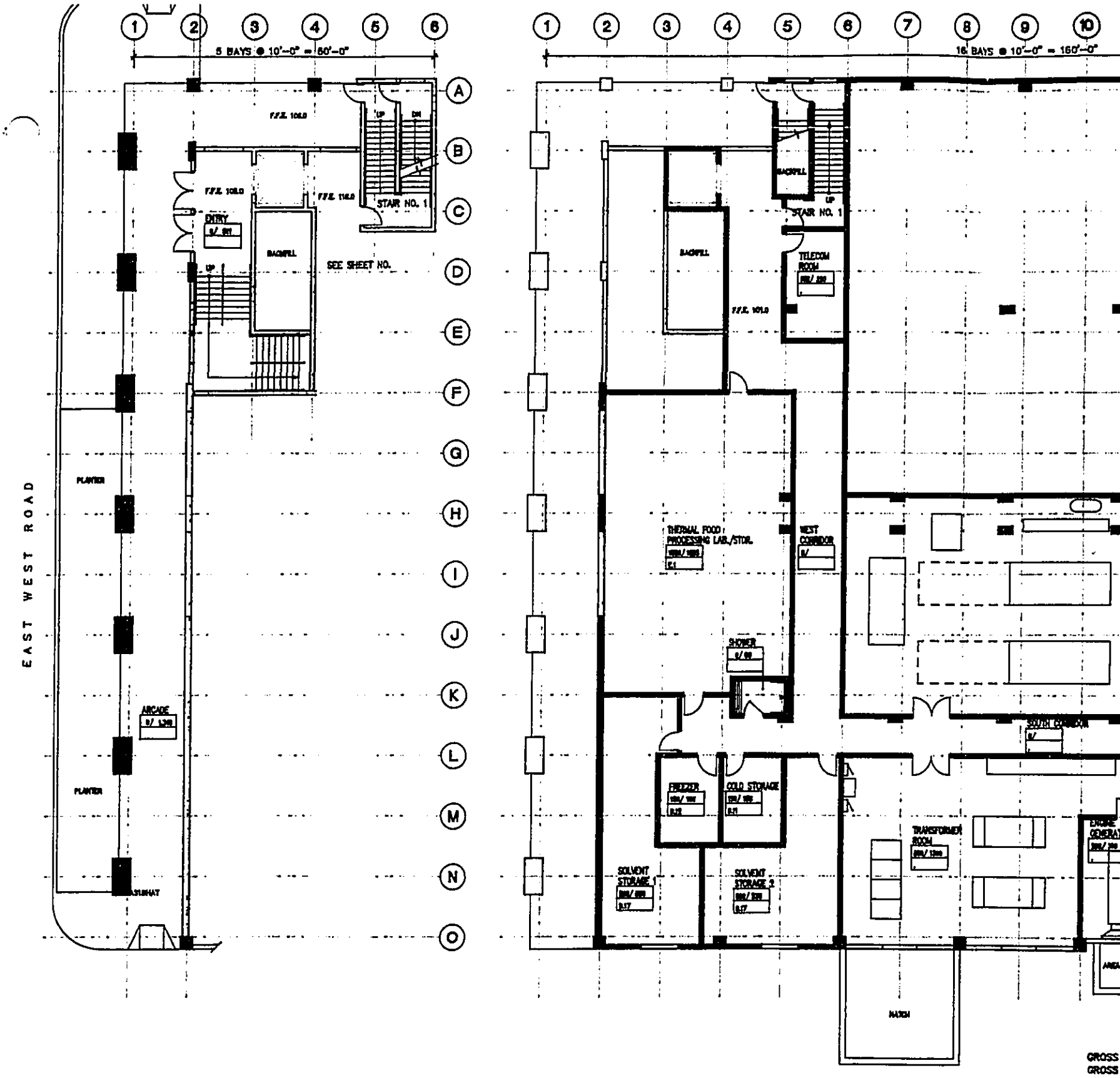
UNIVERSITY OF HAWAII AT MANOA JULY 15, 1993 DAGS JOB NO. 12-31-1518

SCHEMATIC DRAWINGS

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS

EXHIBIT 1.3

⊗ CONCEPTUAL SITE PLAN



AGRICULTURAL SCIENCE FACILITIES • PHASE III

UNIVERSITY OF HAWAII AT MANOA

AUGUST 15, 1994
REV: SEPTEMBER 28, 1994

DAGS JOB NO. 12-31-1519

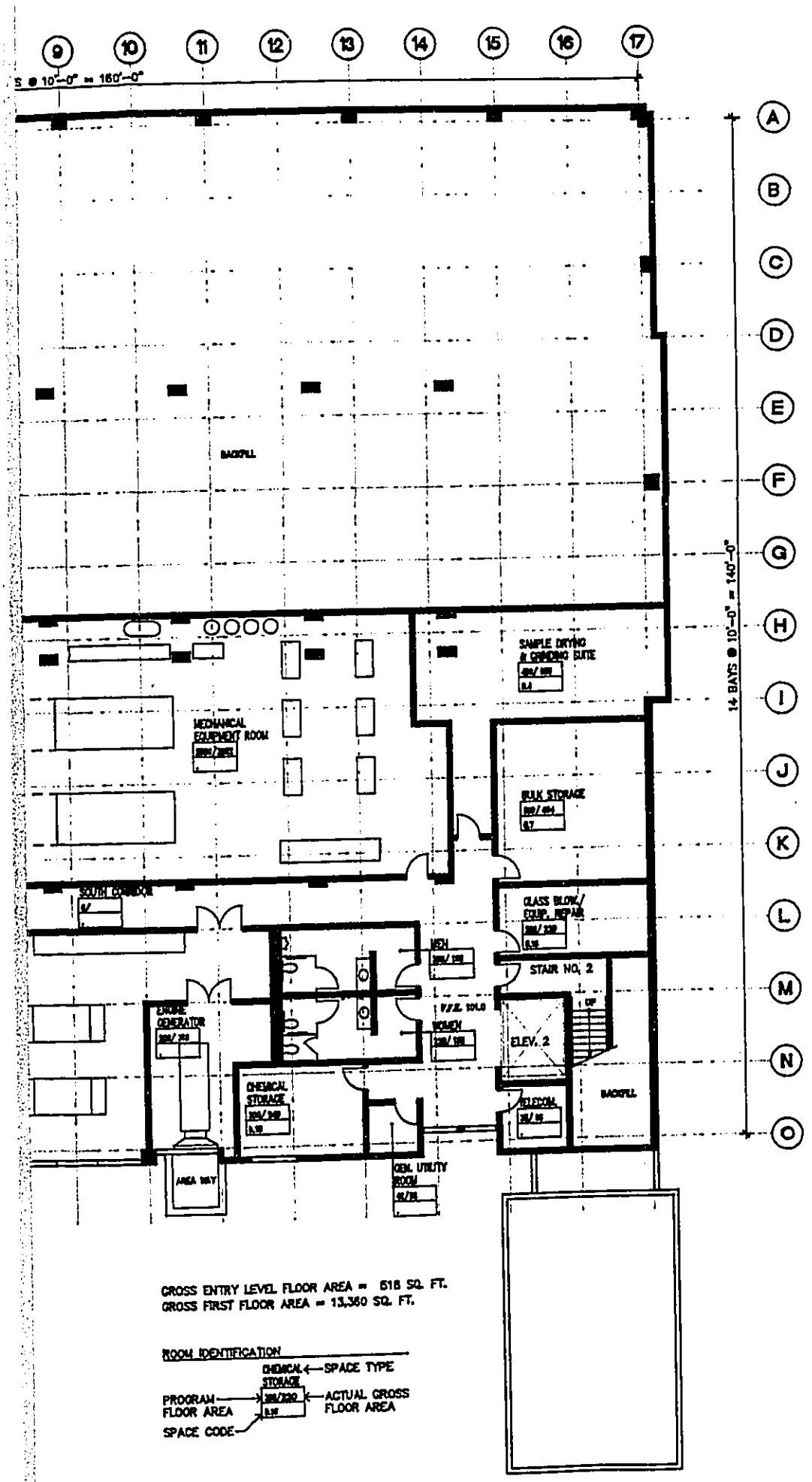
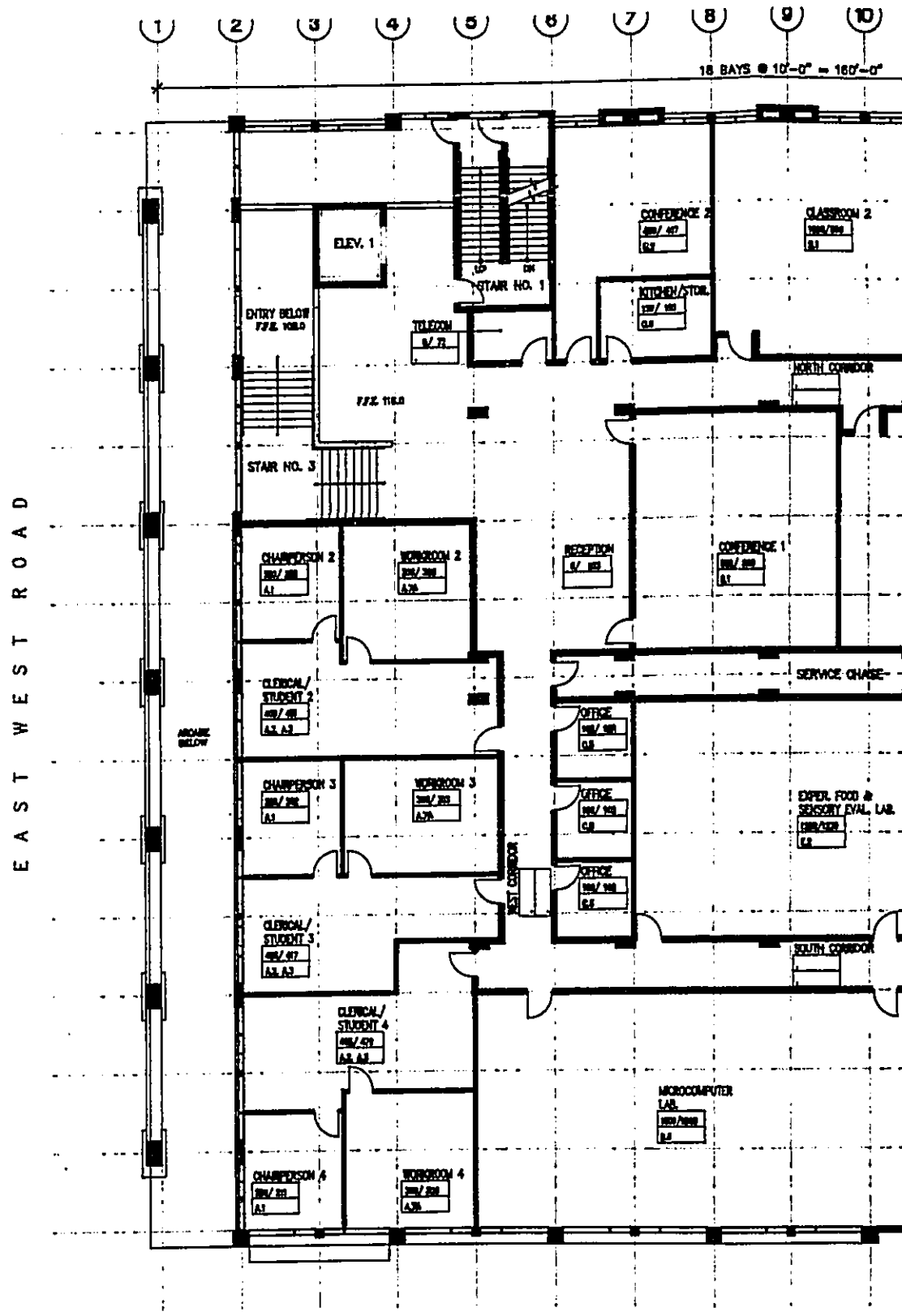


EXHIBIT 1.4

FIRST FLOOR PLAN 2

REVISED SCHEMATIC DRAWINGS

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS SC: 1/8"



AGRICULTURAL SCIENCE FACILITIES • PHASE III

UNIVERSITY OF HAWAII AT MANOA

AUGUST 15, 1994
REV: SEPTEMBER 28, 1994

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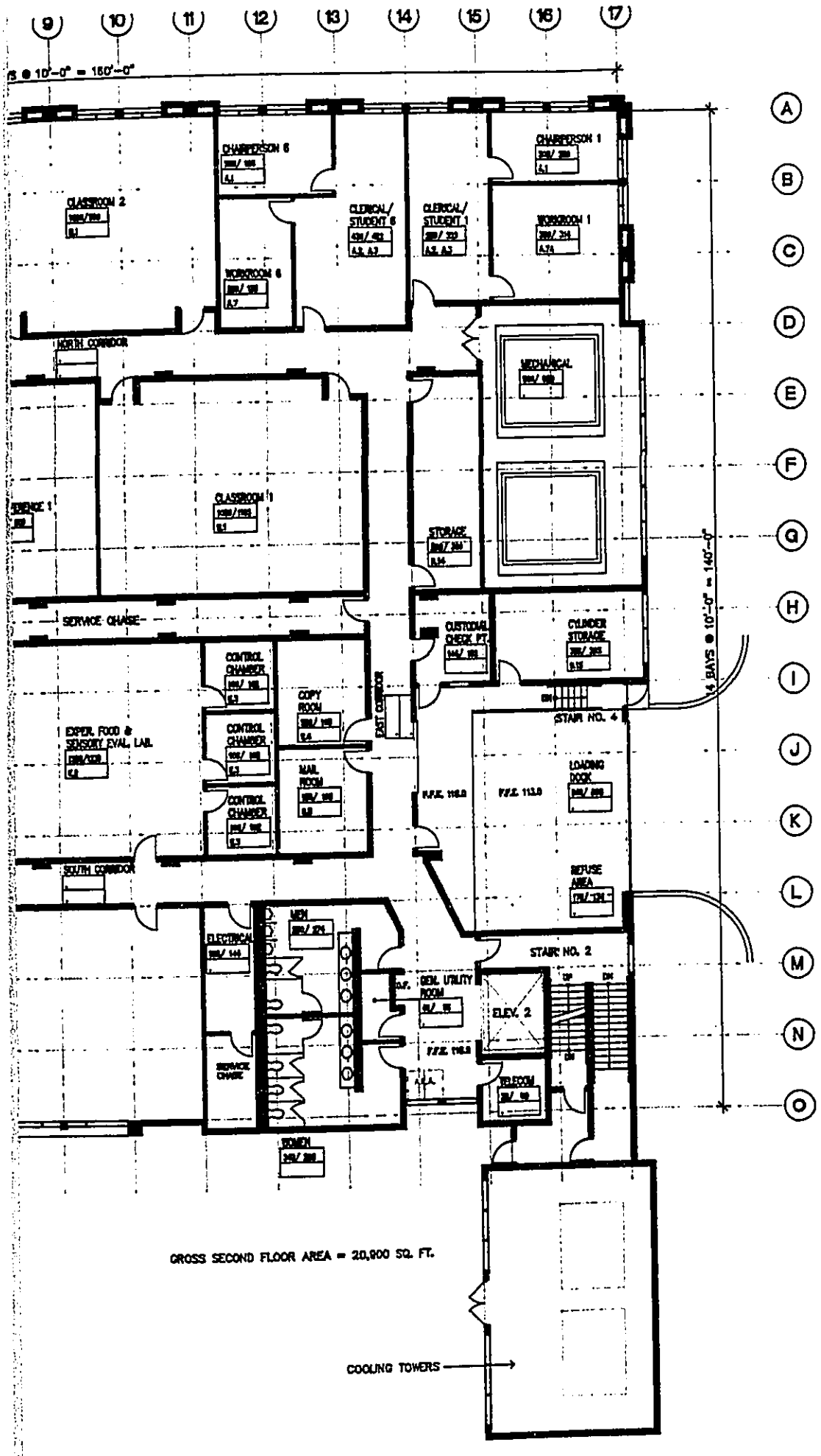
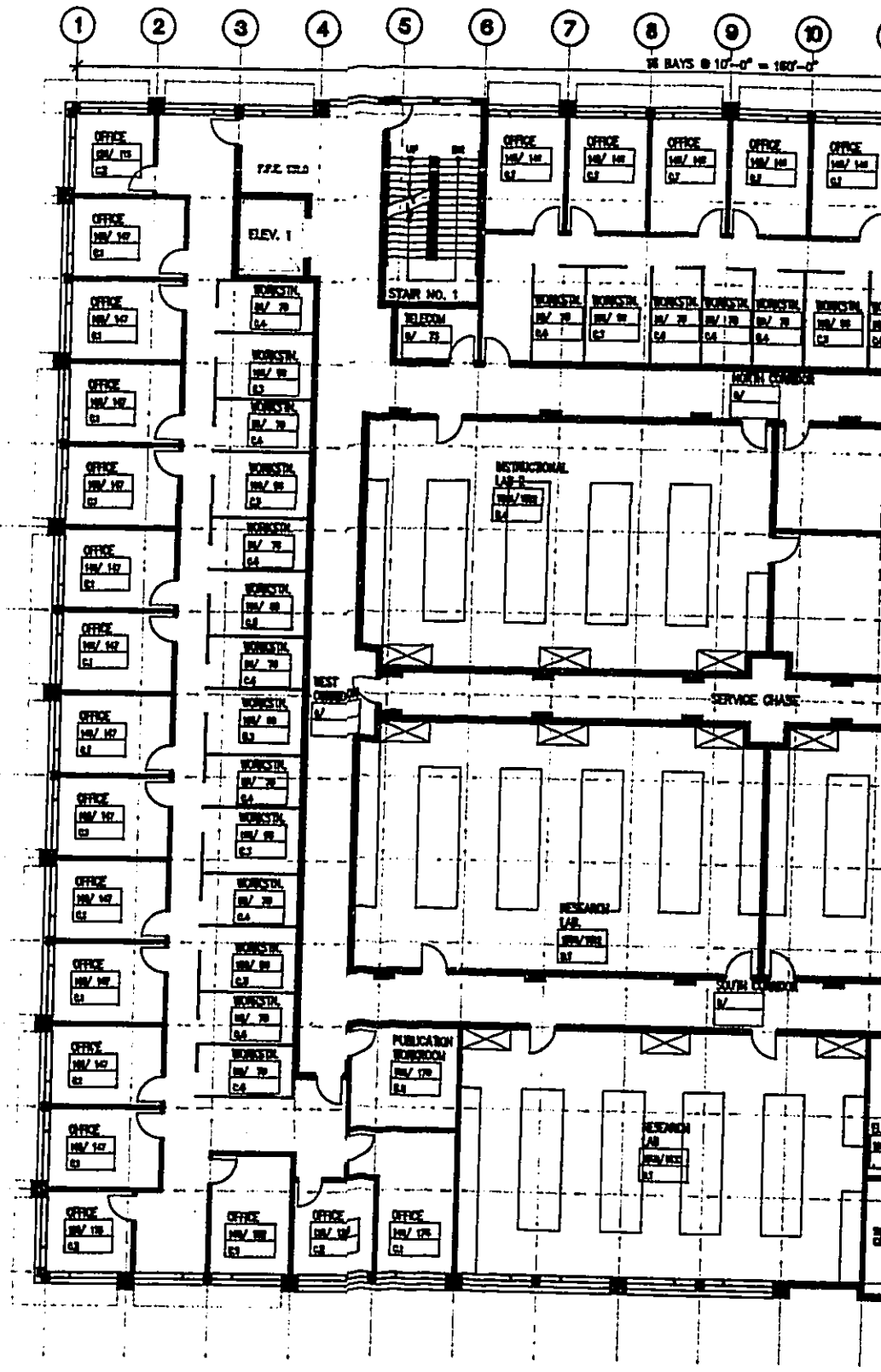


EXHIBIT 1.5

SECOND FLOOR PLAN 3

REVISED SCHEMATIC DRAWINGS

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS SC: 1/8"



AGRICULTURAL SCIENCE FACILITIES • PHASE III

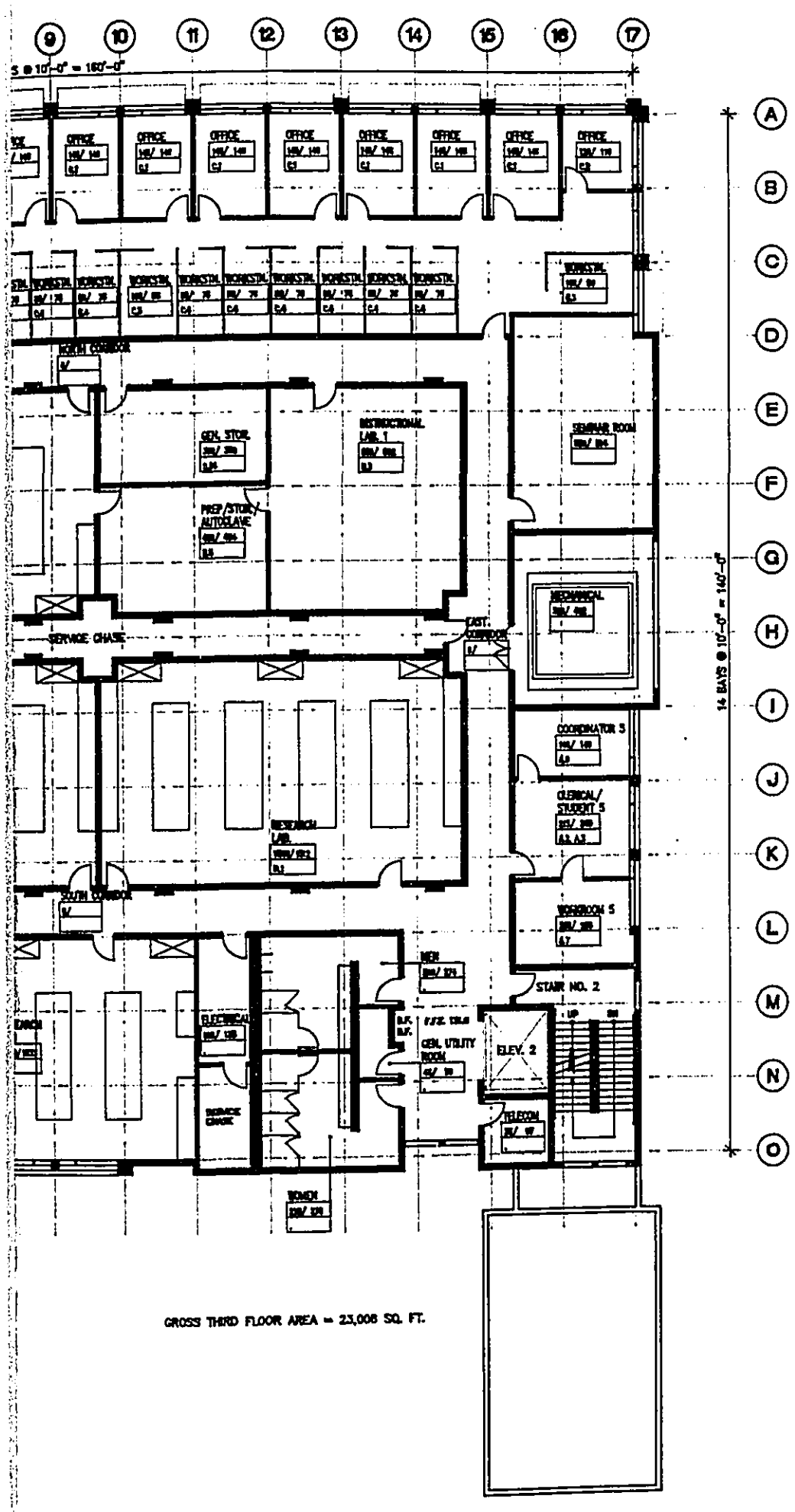
UNIVERSITY OF HAWAII AT MANOA

AUGUST 15, 1994
REV: SEPTEMBER 28, 1994

DAGS JOB NO. 12-31-1519

REVISED

JOHN HA



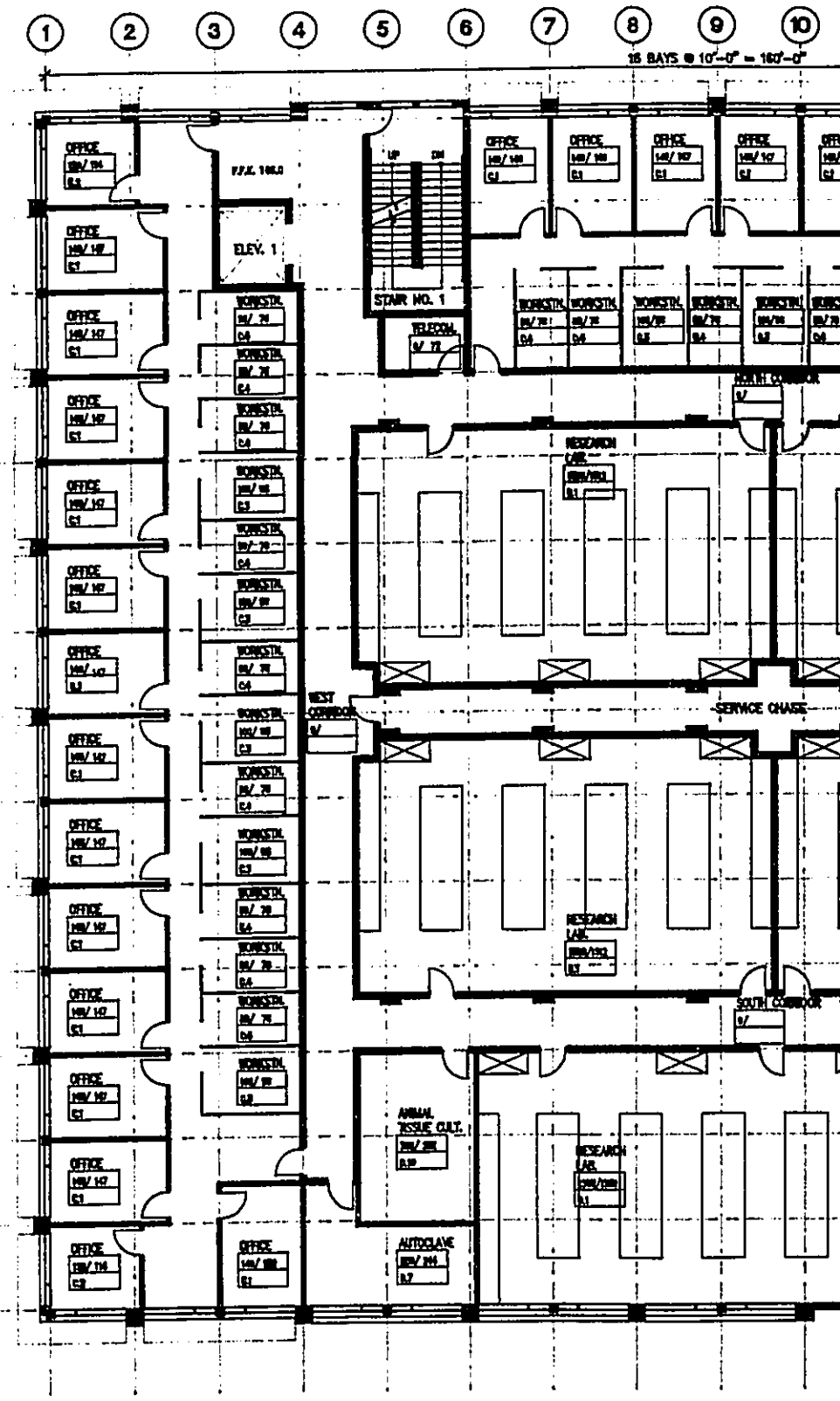
GROSS THIRD FLOOR AREA = 23,008 SQ. FT.

EXHIBIT 1.6

THIRD FLOOR PLAN 4

REVISED SCHEMATIC DRAWINGS

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS SCALE: 1/8"



AGRICULTURAL SCIENCE FACILITIES • PHASE III

UNIVERSITY OF HAWAII AT MANOA

AUGUST 15, 1994
REV: SEPTEMBER 28, 1994

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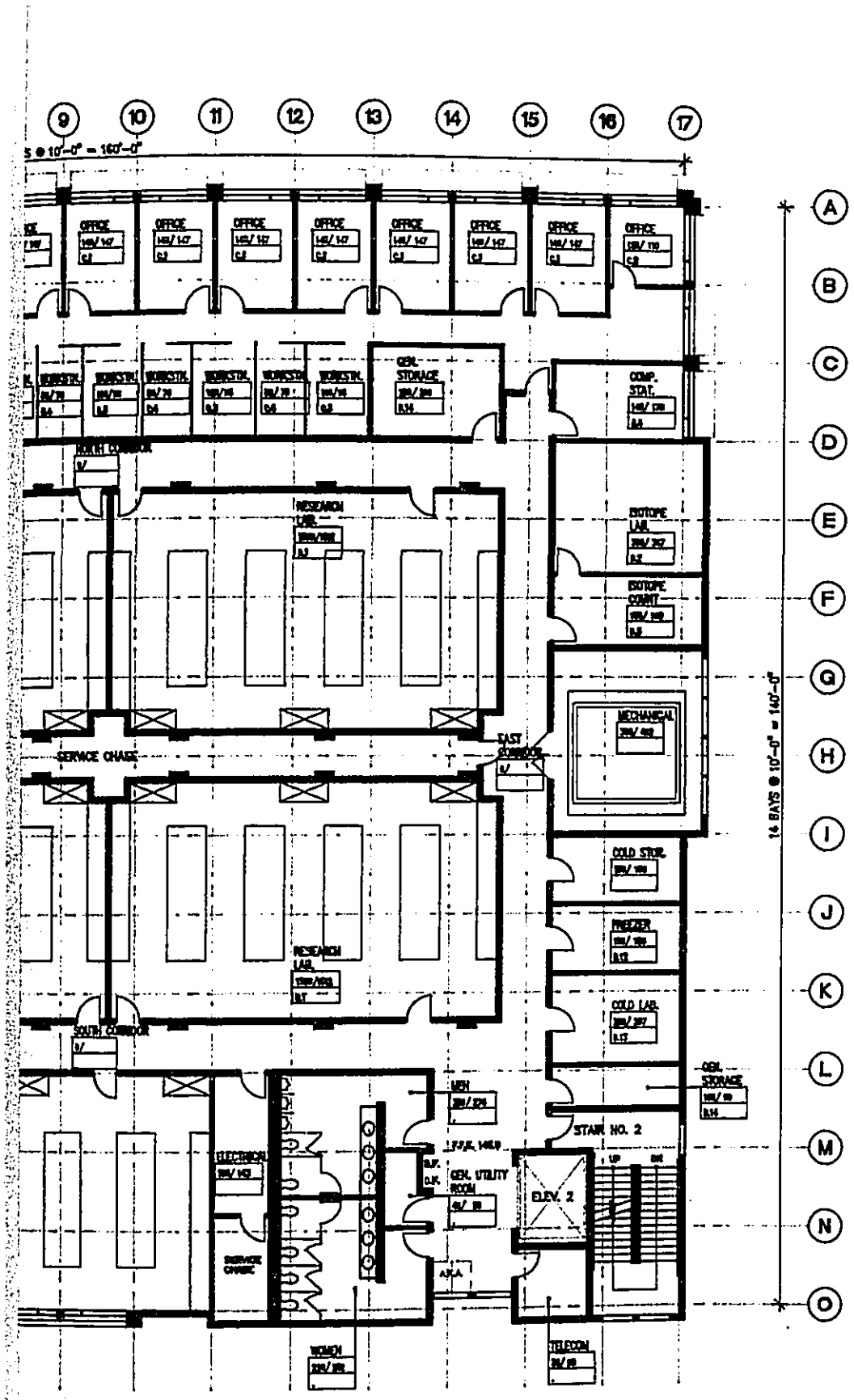


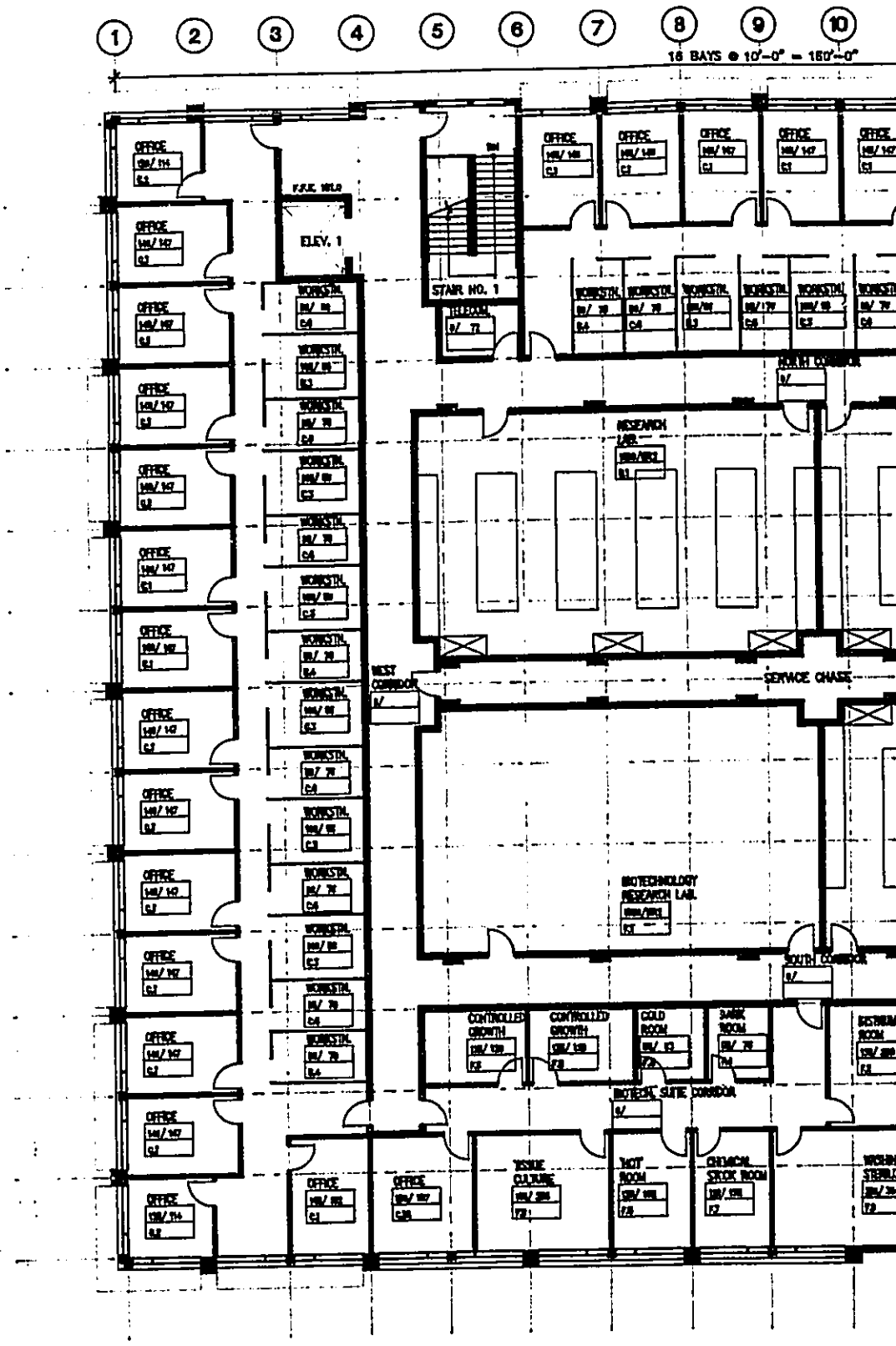
GROSS FOURTH FLOOR AREA = 23,006 SQ FT.

EXHIBIT 1.7

REVISED SCHEMATIC DRAWINGS

FOURTH FLOOR PLAN 5

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS SCALE 1/8"



AGRICULTURAL SCIENCE FACILITIES • PHASE III

UNIVERSITY OF HAWAII AT MANOA

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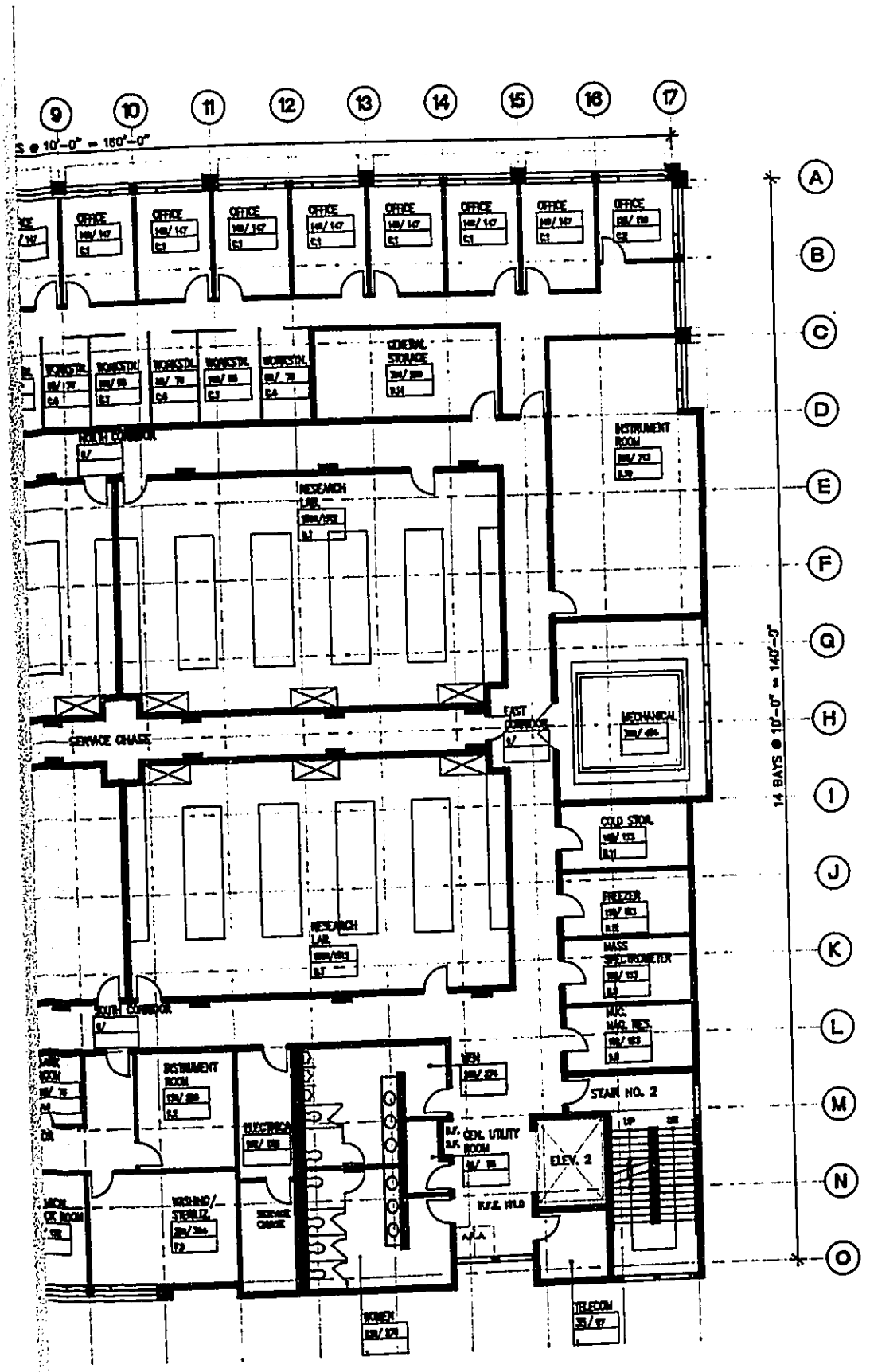


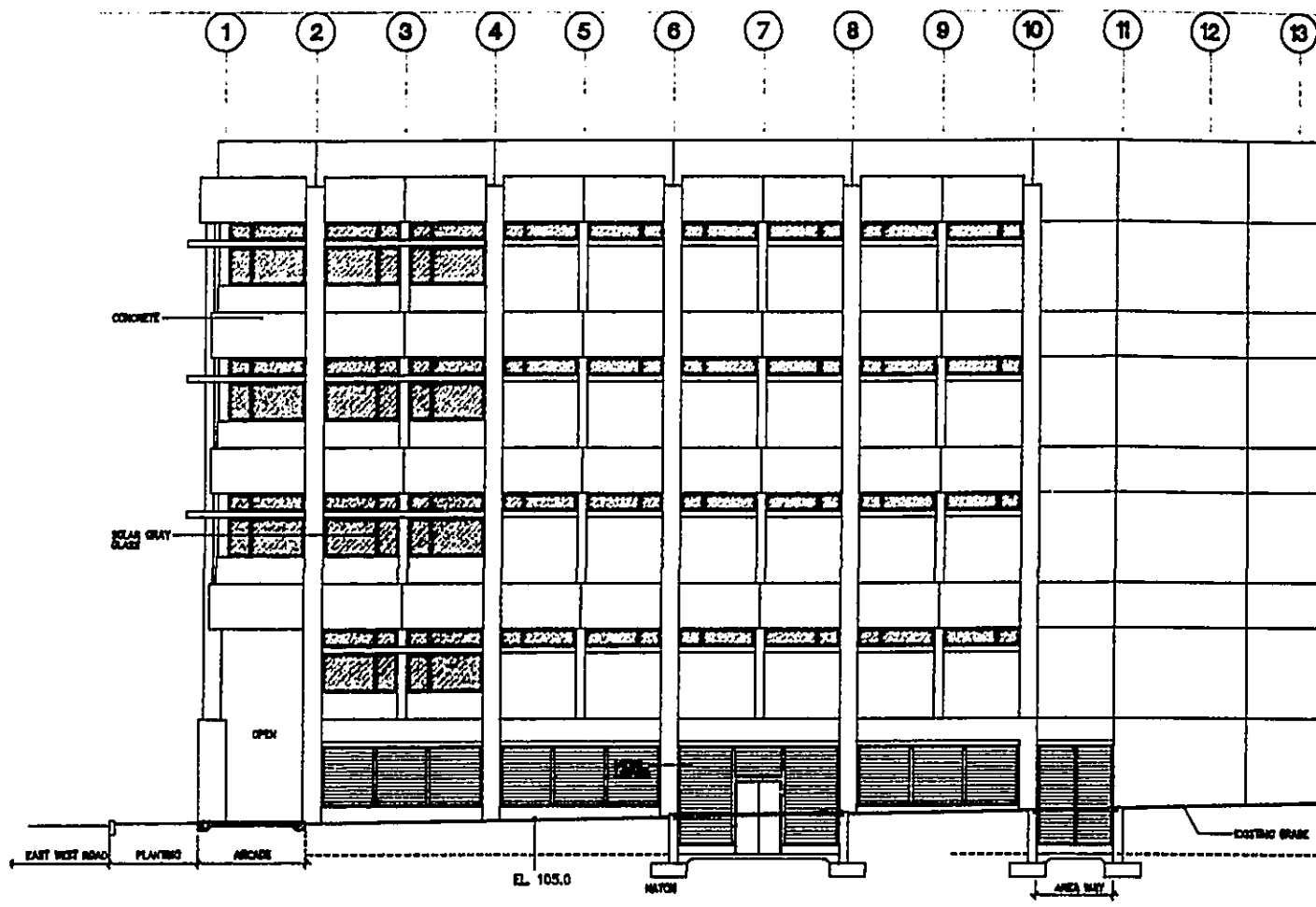
GROSS FIFTH FLOOR AREA = 23,006 SQ. FT.

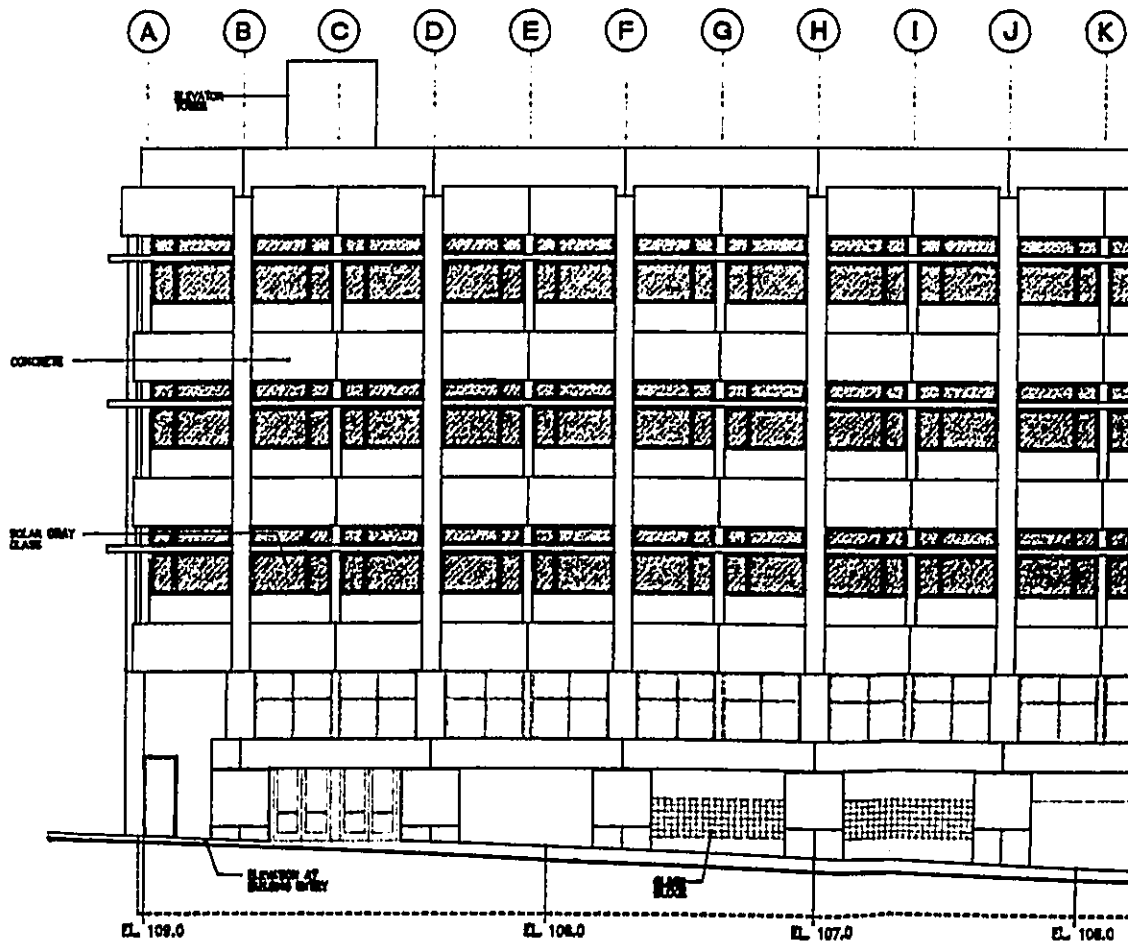
EXHIBIT 1.8

FIFTH FLOOR PLAN 6

REVISED SCHEMATIC DRAWINGS

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS SC: 1/8"





AGRICULTURAL SCIENCE FACILITIES • PHASE III

UNIVERSITY OF HAWAII AT MANOA

AUGUST 15, 1993
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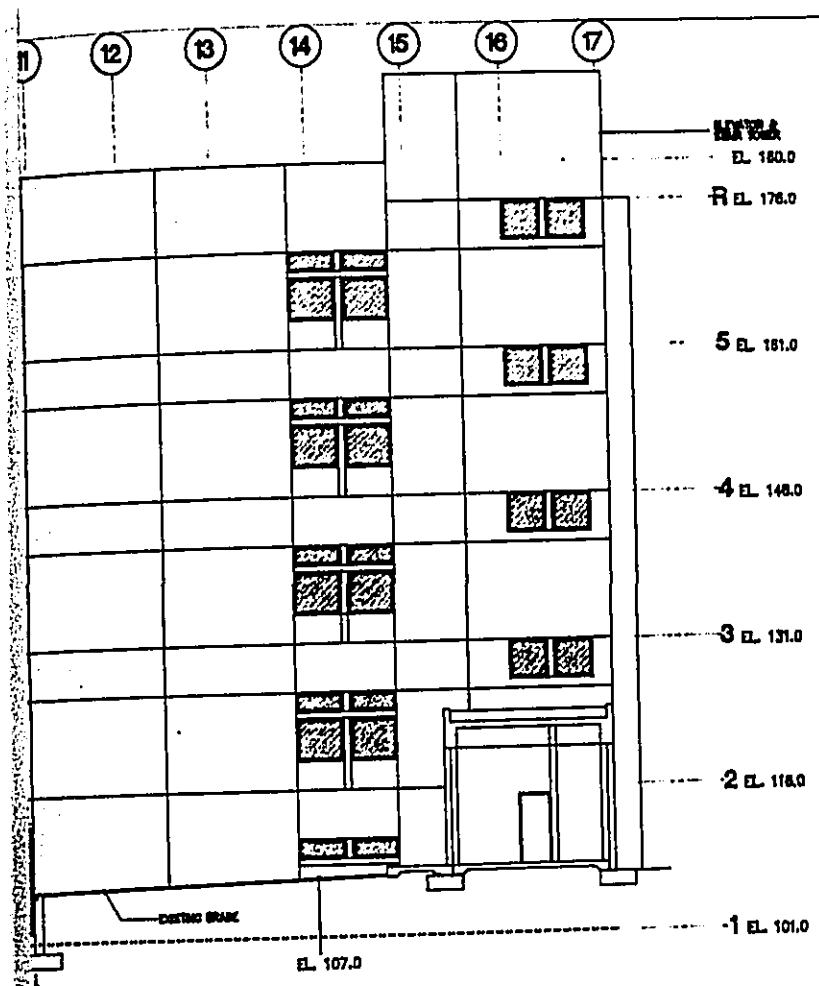
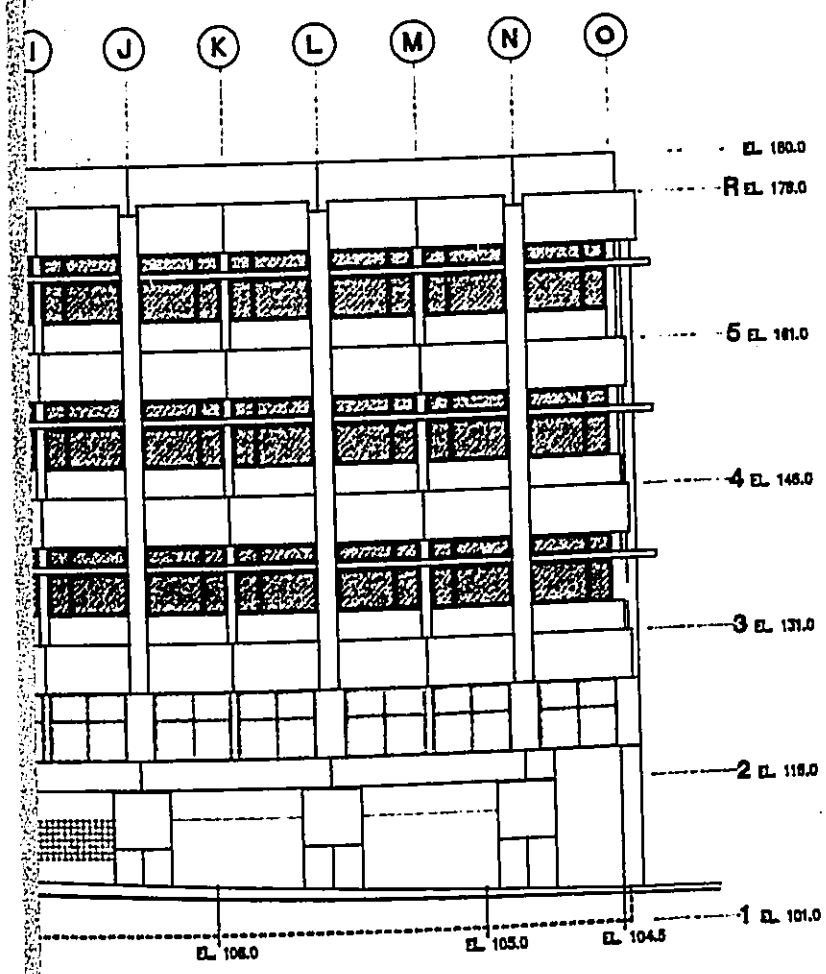


SOUTH ELEVATION



WEST ELEVATION

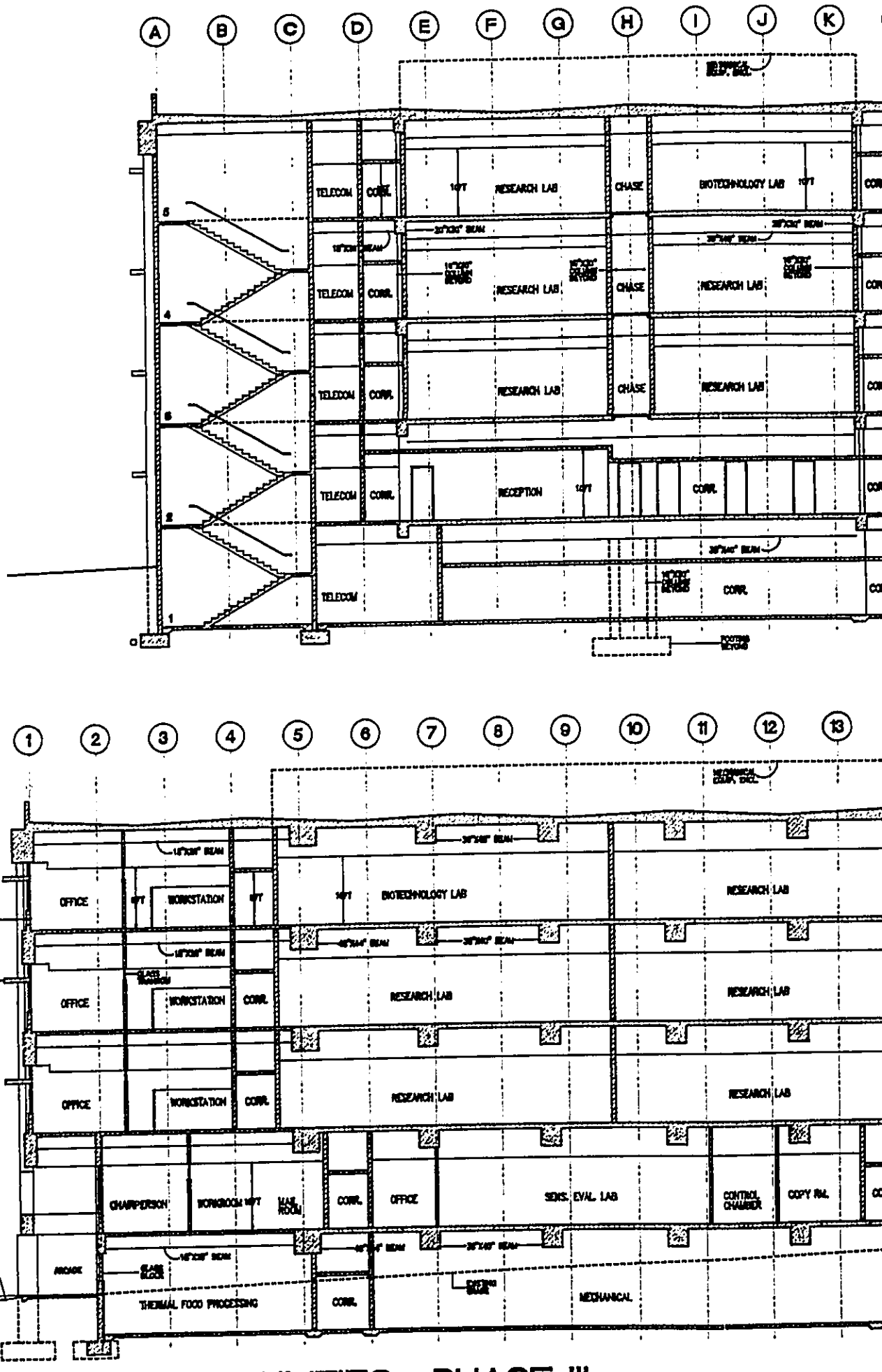
EXHIBIT 1.9

EXTERIOR ELEVATIONS

REVISED SCHEMATIC DRAWINGS

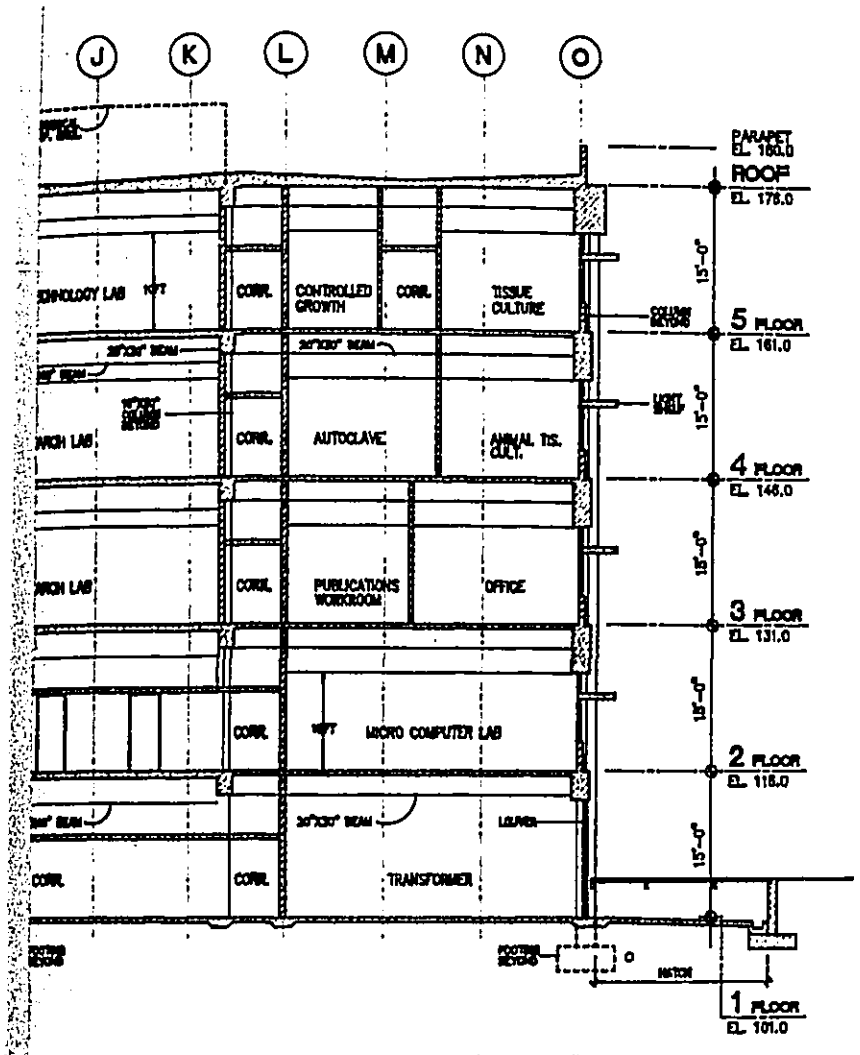
JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS

SCALE 1/8"

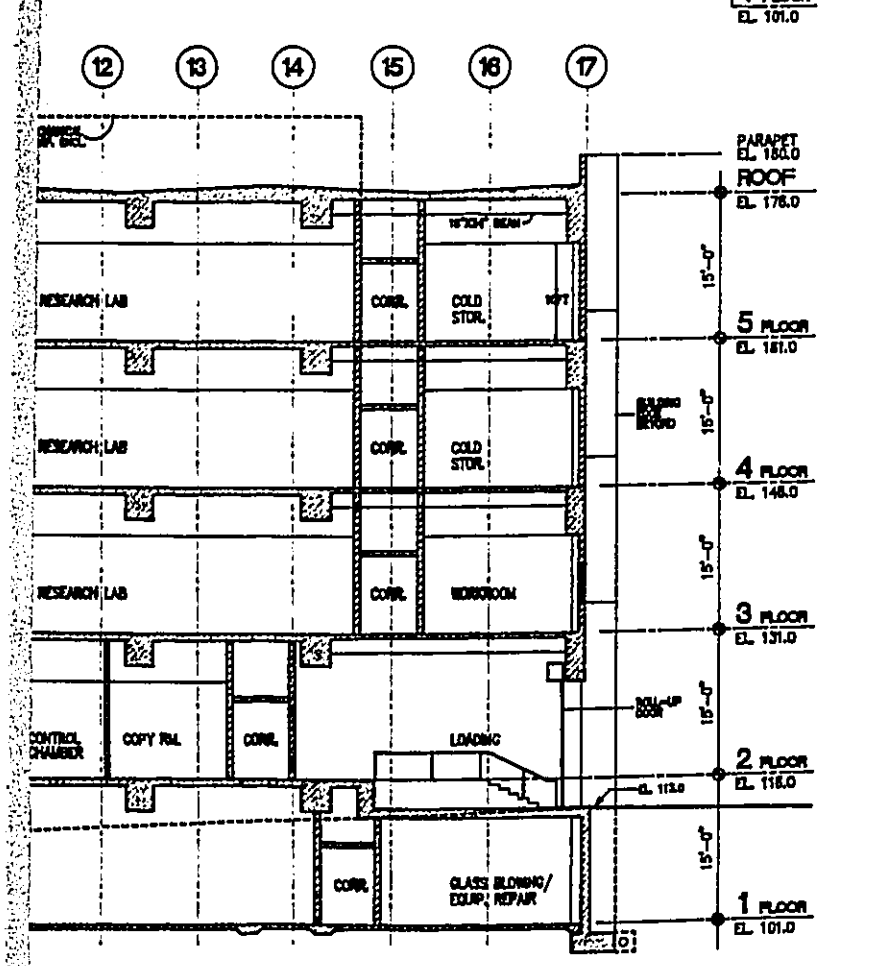


AGRICULTURAL SCIENCE FACILITIES • PHASE III

UNIVERSITY OF HAWAII AT MANOA AUGUST 15, 1994 DAGS JOB NO. 12-31-1519



CROSS SECTION
(Grid 5-6)



LONGITUDINAL SECTION
(Grid 1-7)

EXHIβIT 1.10

BUILDING SECTIONS

REVISED SCHEMATIC DRAWINGS

JOHN HARA ASSOCIATES INC. • SAM CHANG ARCHITECT AND ASSOCIATES, INC. • JOINT VENTURE ARCHITECTS 1/8"

Chapter 2: Physical Characteristics

2.1 PROPERTY OWNERSHIP

The project site is part of the 300 acres of land comprising the UH Manoa campus. The project site is administered by the UH Board of Regents, the recorded fee owners.

2.2 SITE TOPOGRAPHY AND DESCRIPTION

The site for this project (Exhibit 2.1) generally slopes from a high point of over 115 feet in elevation at the eastern corner to a low point of just under 104 feet at the western corner. The site is bordered on both the northeastern and southwestern sides by on-grade parking lots; on the northwestern side by East West Road; and on the southeastern side by the right of way for future upper campus road and the property occupied by St. Francis School and the Sisters of St. Francis Convent. Five portable wooden buildings are presently located on the site and are connected by a network of elevated wooden walkways as shown in Exhibit 2.2.

2.3 SOIL/GEOLOGICAL CONDITION

Test borings reveal that the site is generally underlain by three different geologic formations, consisting of a thin surface mantle of fill and residual silts, an intermediate erratic rock formation of volcanic cinders and sand-and-gravel-sized volcanic rock fragments, and a base formation of hard, massive basalt. This basalt layer, varying in elevation, generally appears to slope down toward the southwestern side. A subsurface investigation report was compiled by Fewell Geotechnical Engineering, Ltd. of Honolulu. This report recommends that the excavation or removal of the hard basalt layer be limited since the removal of a significant thickness of this layer would result in some excavation difficulties and increased costs. This factor has been considered in determining the depth and extent of the proposed ground floor level. The report is attached in Appendix B.

2.4 CLIMATE

The mean temperatures in the vicinity range from 69.4 degrees Fahrenheit during the "winter" months (October to April) to 75.2 degrees Fahrenheit during the "summer" months (May to October). Relative humidity varies from 72 percent to 56 percent. The prevailing northeasterly trade winds are approximately 11.4 miles per hour. The vicinity has an average annual rainfall of approximately 30 inches.

2.5 FLOOD PLAIN MANAGEMENT

The Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map, panel 120C indicates that the site is within Zone X. The area is outside of the 500 year flood plain as shown in Exhibit 2.3.

2.6 TSUNAMI INUNDATION

The project site is outside the tsunami inundation area as shown in the Civil Defense maps (GTE Hawaiian Telephone Directory 1994-95).

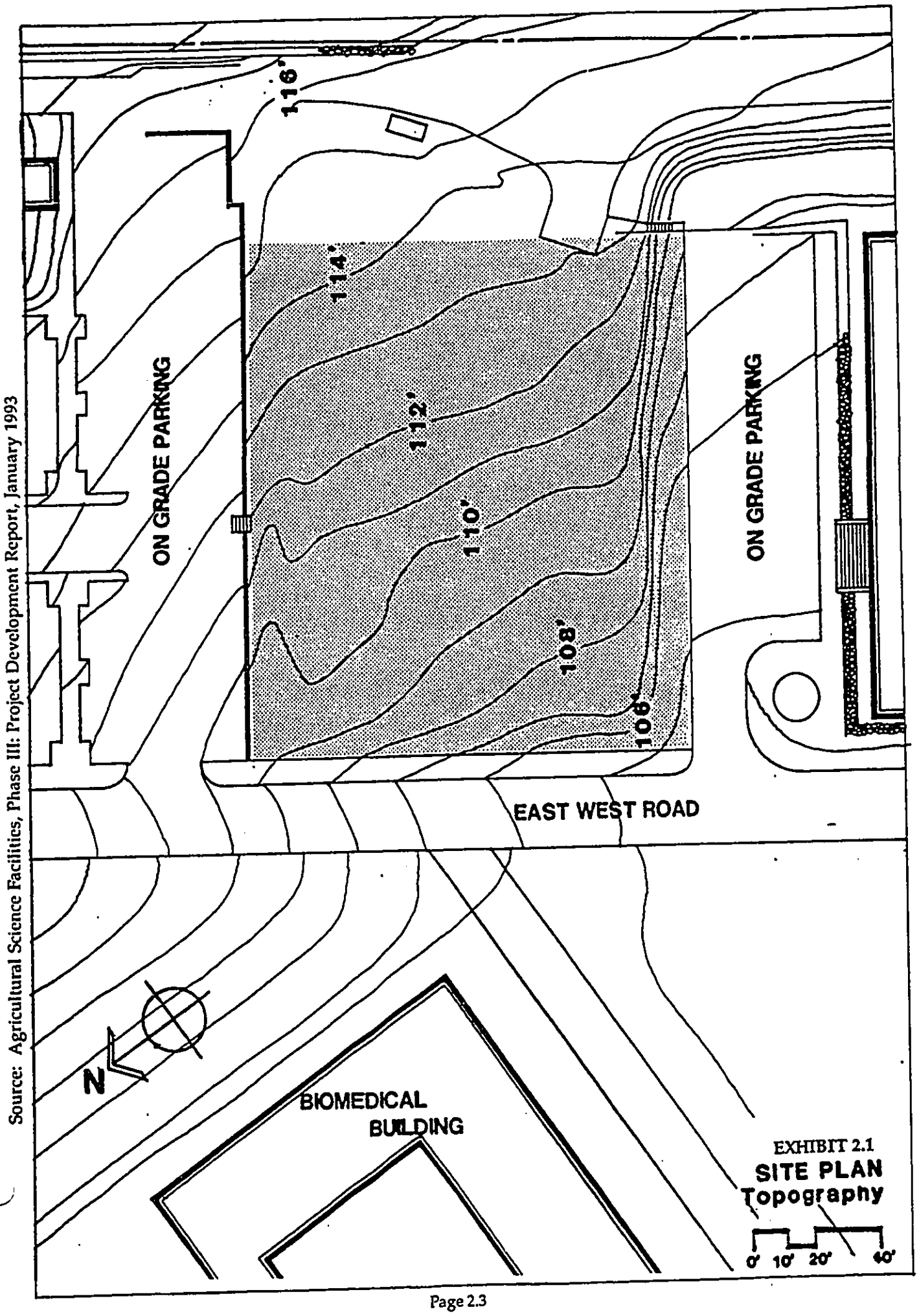
2.7 PLANT AND ANIMAL AQUATIC LIFE

Trees and shrubs currently found on the site will be removed or relocated, and the existing grass and other ground cover will be removed. The unoccupied portions of the site will be replanted based on a landscape plan in accordance with the LRDP and HRS 103-24.6 which recommends the use of indigenous plants. It is anticipated that the proposed landscaping plan will not have any significant impacts.

No endangered birds or animals are known to exist on the site.

2.8 HISTORICAL BUILDINGS/ARCHAEOLOGICAL REMAINS

The Historic Preservation Division of the State Department of Land and Natural Resources has stated that there are no known historic sites at the project location but the area has not been inventoried for subsurface historic sites. Subsurface sites may include prehistoric habitation or agricultural features or human burials frequently found during the routine construction activities in Manoa Valley, including the University of Hawaii campus. If such a discovery should occur, consultations will be sought from agencies entrusted with protecting the state's archaeological, cultural and historical resources.



Source: Agricultural Science Facilities, Phase III: Project Development Report, January 1993

Source: Agricultural Science Facilities, Phase III: Project Development Report, January 1993

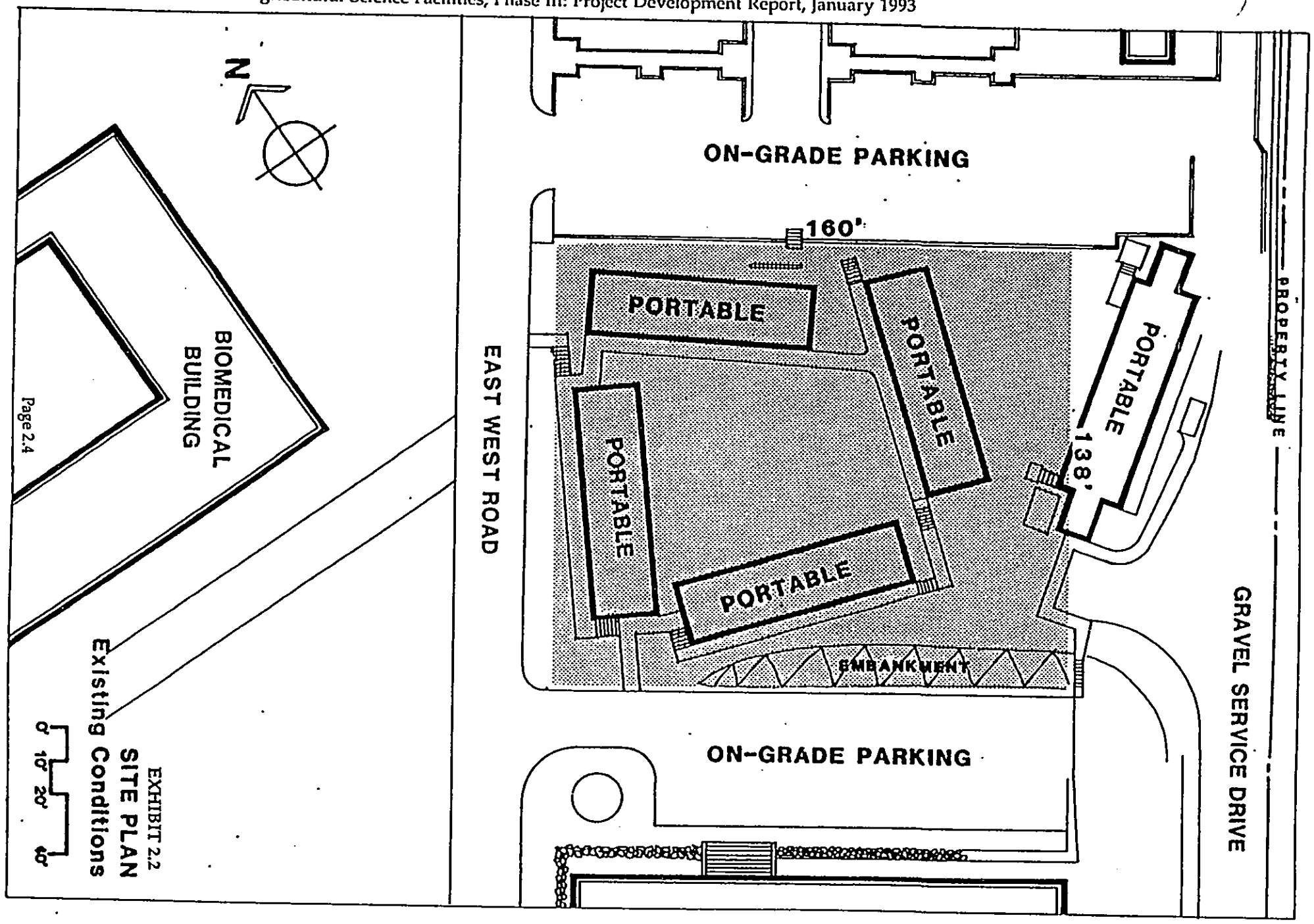


EXHIBIT 2.2
SITE PLAN
Existing Conditions

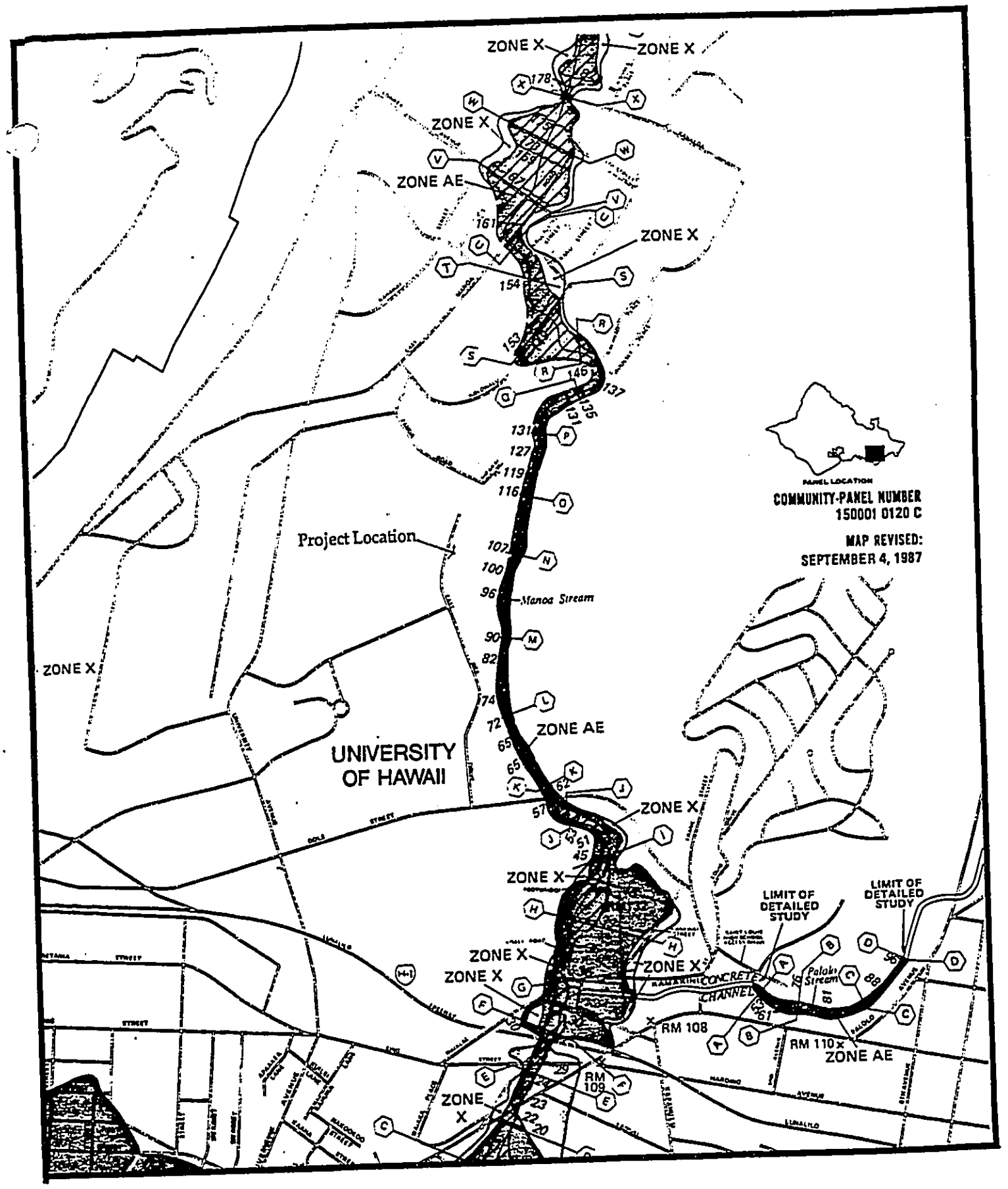


EXHIBIT 2.3

FEDERAL INSURANCE RATE MAP

Source: Federal Emergency Management Agency (Panel 120; Revised 9/4/87)

Chapter 3: Infrastructure and Utilities

3.1 PEDESTRIAN ACCESS AND ROADWAYS

The main pedestrian route will be along the proposed pedestrian mall which will replace East West Road. The proposed facility will have its primary entrance from this mall. Another footpath will connect the building directly to the Biomedical Sciences Building. The majority of pedestrian traffic will be from the central campus and from the adjacent future multi-story parking structure northeast of the project. (Exhibit 3.1)

The proposed building will incorporate a pedestrian arcade along the northwestern side. The arcade can link the facility with a proposed parking structure on the northeast, and a proposed instructional facility on the southwest.

Design of all pedestrian routes will address the requirements set forth in the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for buildings and facilities.

Vehicular circulation will occur on the southeastern side of the site along the proposed upper campus roadway. The existing service road, which will be resurfaced, will provide vehicular access until the upper campus roadway improvements are constructed.

3.2 WATER SYSTEM AND FIRE PROTECTION

The building site is located in the upper central campus area, and will be serviced by the existing Board of Water Supply's "High Service System" with reservoirs located at an elevation of 405 feet. Recent improvements to this area include the extension of an 8-inch water main from the vicinity of the Facilities Management Office to the Hazardous Waste Facility. This system is adequate to accommodate the needs of the proposed facility. Sherman Laboratory, which was recently constructed less than 300 feet from the project site, is connected to this system and receives adequate water pressure. Fire flow water pressure has not been a problem along this portion of East-West Road, directly across from the site.

3.3 SANITARY SEWER SYSTEM

There is adequate capacity in the existing sanitary sewer system to accommodate the anticipated flows from the proposed project. An 8-inch sewer pipe runs adjacent to the site along the existing East West Road alignment. The UH Utilities Master Plan recommends that an 8-inch sewer connection be provided and pipes realigned. Sewer conection will be coordinated with the City and County of Honolulu's Wastewater Department and the State of Hawaii's Department of Health.

3.4 STORM WATER DRAINAGE

The building will be serviced by the existing campus storm drainage system. An 18-inch drainage pipe runs along the East West Road alignment less than thirty feet from the site.

3.5 ELECTRICAL SYSTEM

With the completion of construction and on line operation in 1994 of the new electrical substation on the Lower Campus adjacent to the ROTC buildings, the critical shortage of

electrical power has been eliminated. There is adequate reserve power on the campus for newly constructed facilities such as the Special Events Arena, the Architecture Building and the Student Services Center Building.

The campus electrical system is distributed through underground ducts and manholes. This system will be extended through concrete encased underground ducts from an adjacent manhole to primary switch gear and transformers located in a utility space within the proposed facility. Transformers will be provided and will be installed within the building enclosure for weather protection and operational safety.

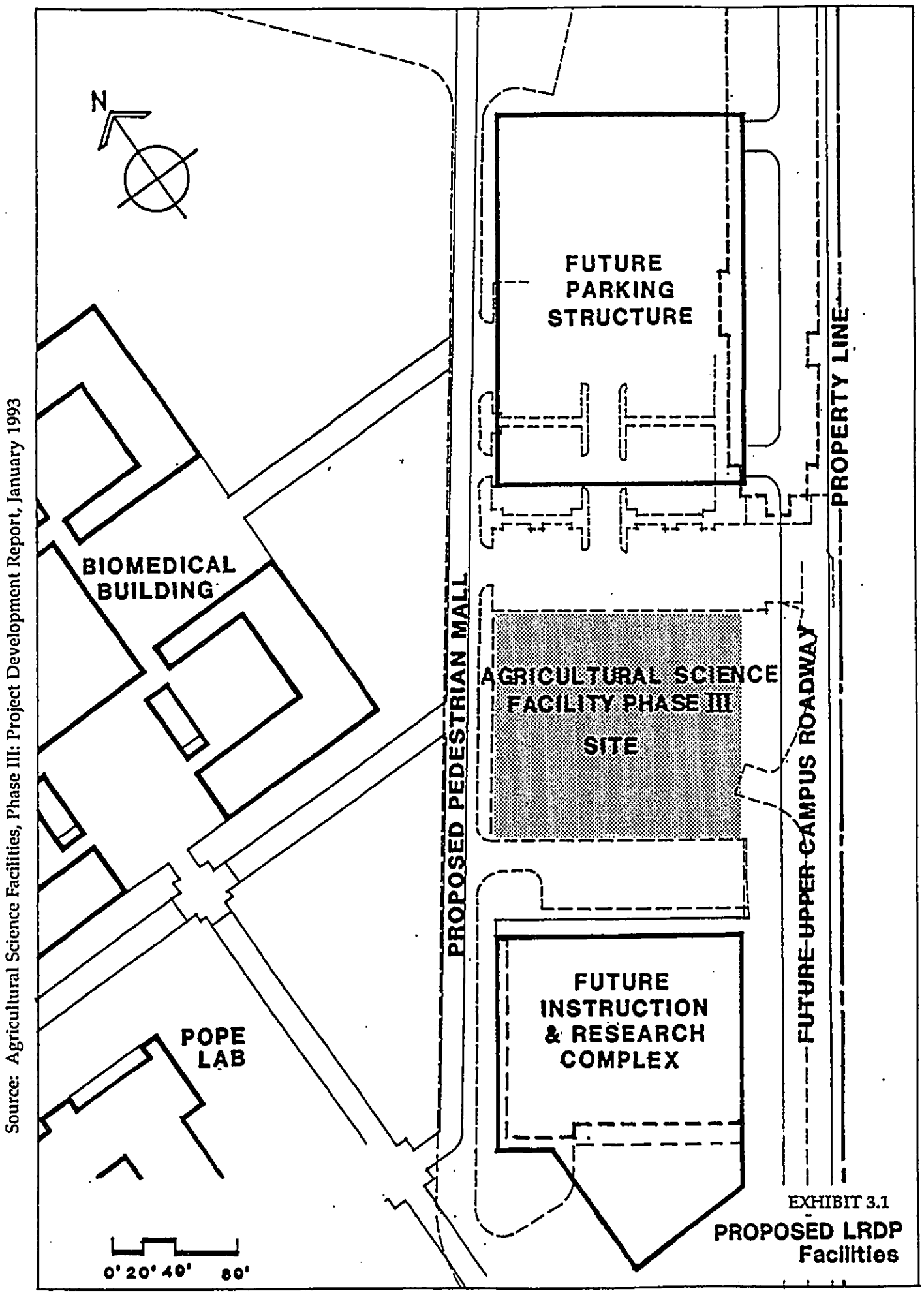
3.6 TELECOMMUNICATIONS

The University has installed its own telecommunications system, which has adequate capacity to service this building. The telecommunications lines will follow the present underground cables which service the portable buildings currently located on the project site.

3.7 GAS SERVICE SYSTEM

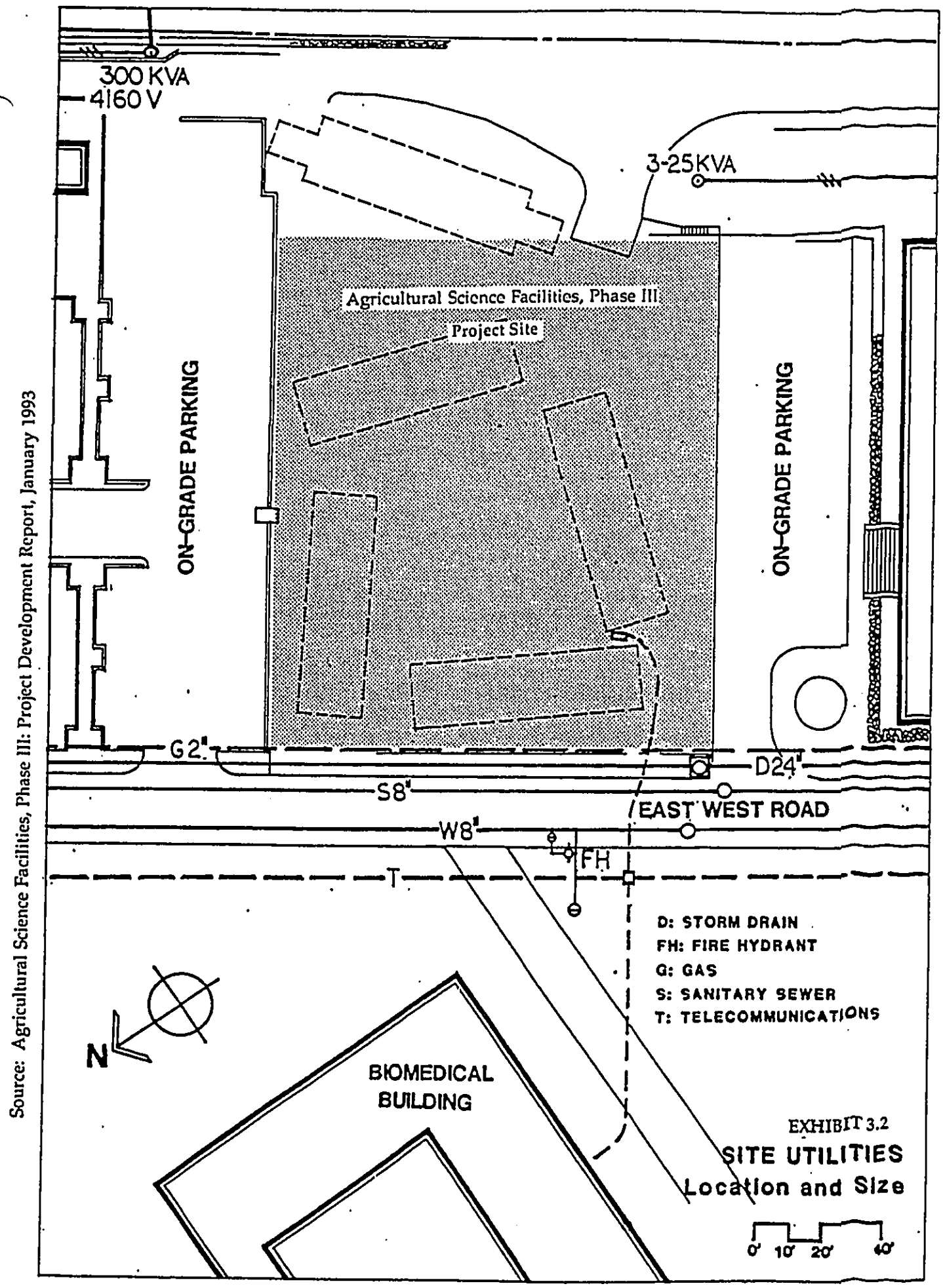
The site is served by a two-inch gas line along the present East West Road alignment adjacent to the site. Gas is supplied by The Gas Company, and design and connection to the gas lines will be coordinated with the gas company.

Exhibit 3.2 shows the location and sizes of utility lines on the site and surroundings.



Source: Agricultural Science Facilities, Phase III: Project Development Report, January 1993

EXHIBIT 3.1
PROPOSED LRDP
Facilities



Source: Agricultural Science Facilities, Phase III: Project Development Report, January 1993

Chapter 4: Public Facilities and Amenities

4.1 FIRE PROTECTION

According to the Fire Department, fire protection services will be provided from the Manoa and McCully engine companies with ladder service located at McCully. Access for fire apparatus, water supply and building construction will be in conformance with existing codes and standards.

4.2 POLICE AND SECURITY

The University's campus security will continue to handle all routine security patrols, and whenever necessary, the Honolulu Police Department (HPD) will be called in to assist. The building will be designed to incorporate appropriate security measures. The project site lies within District 7, Central Patrol Bureau. The Contractor will be required to take all necessary safety precautions during construction.

4.3 PARKING AND PUBLIC TRANSPORTATION

The Land Use Ordinance (Resolution No. 89-411), adopted by the City Council allocates parking requirements on a campus-wide basis, rather than on a building-by-building basis. The location of parking structures and surface lots which will accommodate the total number of spaces required by the LUO have been identified within the LRDP. This ratio requires provision of one parking space for every 400 ASF of office space within a given building. Application of that ratio to this facility produces an effective requirement for providing 55 parking spaces for the approximately 22,000 ASF of office space to be located in this structure.

With the completion of Parking Structure Phase IIA project (900 stalls) and a restripping program on existing parking facilities, there are 5,379 parking spaces on the Manoa Campus in Fall 1994. An additional 223 parking stalls currently under construction with building projects will boost the parking inventory to 5,602 spaces by Fall 1995. During the planning period covered by FY 1993-94 to FY 1998-99, four additional parking structures providing a total of 1,555 parking stalls are proposed. The construction of these parking structures, however, are subject to funding by the State of Hawaii. The ultimate number of parking spaces proposed for the Manoa Campus in the 1994 LRDP is 7,500 spaces.

Just as Honolulu cannot rely on the automobile for its future transportation needs, neither can the University. Among the proposals in the 1987 LRDP which have been implemented with favorable results were: ride sharing; shuttle service to and from "remote" parking areas; use of mopeds, motorcycles and primarily bicyles; and improvement of bus service to the University.

4.4 EMERGENCY MEDICAL SERVICES

The on-campus emergency medical service is at the Student Health Center. Off-campus facilities are located at Queens Medical Center located at Punchbowl Street and Straub Hospital located at South King Street.

4.5 STAFF/STUDENT AMENITIES

A food service facility is expected to be built between Moore Hall and the Hamilton Library. The hours of operation for the proposed facility will be from 6:30 AM to 11:30 PM. With its

dining areas expected to accommodate 500 users, it will be the nearest food facility to the Agricultural Science Facilities, Phase III.

4.6 NONHAZARDOUS SOLID WASTE DISPOSAL

The volume of nonhazardous solid waste to be generated per day is estimated using a standard of one cubic yard per 25,000 square feet of assignable building space. Given this facility's assignable area of 60,399 square feet, it is anticipated that 2.24 cubic yards of solid waste will be generated each day. The university uses standard two cubic yard containers; therefore, this building will require two two-cubic yard containers. All nonhazardous solid waste will be collected by university staff and will be disposed of at City & County sanitary landfills or incinerated at the H-POWER facility in accordance with applicable Federal, State and City laws and regulations.

To reduce non-hazardous solid waste, the UH Building and Grounds Management Office has continued a paper recycling program initiated by graduate students within the campus. White and colored waste paper are collected at designated sites on campus three times a week. These are brought over to the nearest public school campus which provide recycling bins for surrounding neighborhoods.

4.7 HAZARDOUS WASTE DISPOSAL

Disposal of hazardous wastes is the responsibility of the University of Hawaii's Environmental Health and Safety Office (EHSO), which maintains a disposal program licensed by the Federal Resource Conservation and Recovery Act and Title 40, Chapter 261 of the Code of Federal Regulations. The University employs three basic methods of waste disposal, including:

- **Disposal in a sanitary sewer or landfill.** Use of this method is restricted to disposal of non-hazardous chemical wastes.
- **Neutralization of simple acids and bases.** Simple corrosives are neutralized to pH7 and are disposed of through the sanitary sewer system with excess water.
- **Packing and shipment to an EPA-permitted facility on the US Mainland.** These facilities may bury, incinerate, recycle or re-use waste materials.

The University is subject to stringent regulations concerning the handling, storage, and disposal of hazardous waste. The UH is covered by the State of Hawaii's Occupational Safety and Health Standards (OSHS) regulations regarding employee protection during the handling of hazardous waste. Storage and disposal regulations are set forth in the Resource Conservation and Recovery Act and enforced by the U.S. Environmental Protection Agency and the State of Hawaii's Department of Health (DOH) Hazardous Waste Branch.

Transportation and packaging of hazardous wastes are regulated by the U.S. Department of Transportation. Regulations concerning radioactive wastes are specified in the University's license to use radioactive materials from the U.S. Nuclear Regulatory Agency.

These regulations form the core of the "Procedures and Requirements for Sorting, Packaging, and Preparation for Shipment of Hazardous Waste Materials" issued by the UH's EHSO which monitors operations involving hazardous waste . The manual's table of contents based on the March 1982 version is shown in Exhibit 4.1.

EXHIBIT 4.1
TABLE OF CONTENTS
"Procedures and Requirements for Sorting, Packaging, and Preparation for Shipment of Hazardous Waste Materials

EXHIBIT 4.1 (Continued)
TABLE OF CONTENTS
"Procedures and Requirements for Sorting, Packaging, and Preparation for Shipment of Hazardous Waste Materials

TABLE OF CONTENTS

Chapter 5: Planning Policies and Regulations

5.1 FEDERAL POLICIES AND REGULATIONS

Since this project is partly funded by the Cooperative State Research Service (CSRS), U.S. Department of Agriculture (matching 50% of Hawaii State project funds), it is mandatory that CSRS receive sufficient documentation relating to potential impacts on the environment. This Environmental Assessment will be sufficient in providing the required information to assist CSRS in complying with the National Environmental Policy Act (NEPA), as amended, 42 U.S.C. 4321 et seq., and implementing regulations promulgated by the Council on Environmental Quality at 40 CFR Parts 1500-1508 and the U.S. Department of Agriculture at 7 CFR 1b.

5.2 HAWAII STATE POLICIES AND REGULATIONS

State Land Use Plan. The State Land Use Map designates the project site for urban use.

Hawaii State Plan. *The Hawaii State Plan serves as Hawaii's guideline for future long term* development. The 12 State Functional Plans comprise the guidelines, with each involving a resource allocation decision-making process. The objectives for the state's educational system involves the provision of educational opportunities, development of employable skills, and the efficient use of the facilities.

The subject project ensures the provision of adequate and accessible educational facilities which are designed to meet individual and community needs.

5.3 CITY &COUNTY OF HONOLULU

Development and Public Facilities Plan. The Development Plan Map identifies the project area as a Public Facility (PF). The Public Facilities Map classifies the site to be outside of the public facilities improvement boundaries.

Zoning Designation. The LUO Map identifies the site as R-5, Residential District as shown in Exhibit 5.1. Although the building heights in R-5 are limited to 25 feet, the City's Department of Land Utilization (DLU) has recognized the provisions of the LRDP which allow for the development of a five-story structure on the site. (Four stories above and one story below the East West Road grade level).

Plan Review Use. The City Council of the City and County of Honolulu approved through Resolution 89-411, CD-2 and amended by Resolution 92-286 CD-1, FD-1, 3-10-93, the Plan Review Use (PRU) Application submitted by the Board of Regents, University of Hawaii, to expand the University of Hawaii Manoa campus. Approval of the PRU authorizes the University of Hawaii to proceed subject to conditions which include:

- that the development of sites must be in accord with the LRDP as adopted by the Board of Regents; (the LRDP was updated in 1994 and adopted by the Board of Regents on May 20, 1994).
- that preliminary plans for a five-year master plan for water, sewerage disposal, and drainage be submitted;
- that a traffic mitigation plan be submitted;

- that any modification be submitted to the Department of Land Utilization;
- that the plan remain open to the location of a mass transit station within it and that before closing the Varsity/Kalo Place gate, the concurrence of the Department of Transportation Services be obtained.

The Agricultural Science Facilities, Phase III is in conformance with the location and design guidelines in the LRDP. The University is in the process of completing an Updated Utilities Master Plan which will be submitted to the Board of Water Supply and the Department of Public Works for review prior to the issuance of a building permit. A traffic and circulation systems and mitigation measures will be implemented, as required, based on findings and recommendations. Therefore the Agricultural Science Facilities, Phase III will be in compliance with the LRDP and the PRU conditions as specified in Resolution 89-411, CD-2 and amended by Resolution 92-286 CD-1, FD-1, 3-10-93.

5.4 LONG RANGE DEVELOPMENT PLAN (LRDP)

In accordance with the provisions of the LRDP, the proposed facility will assume a relatively low profile with respect to the Biomedical Sciences Building, to maintain that building's prominence in the Upper Central Campus and to maintain the sense of open space provided by the courtyard/mall fronting that building.

An arcade can be incorporated into the ground level of the facility along the existing East West Road alignment as recommended in the LRDP. This arcade could be designed to face the proposed pedestrian mall to be developed along that alignment.

The upper Central Campus roadway parallel to the property lot line along the southeastern boundary will be landscaped with uniform species of trees to provide a coordinated campus appearance. The setback from the property line is shown in Exhibit 5.2.

The LRDP also implies that the proposed facility will have a courtyard with landscape treatment including canopy trees, planters, seat walls and special paving. However, the courtyard scheme will limit considerably the amount of office and lab spaces for the CTAHR. Therefore, the courtyard scheme was replaced with a more efficient rectangular footprint.

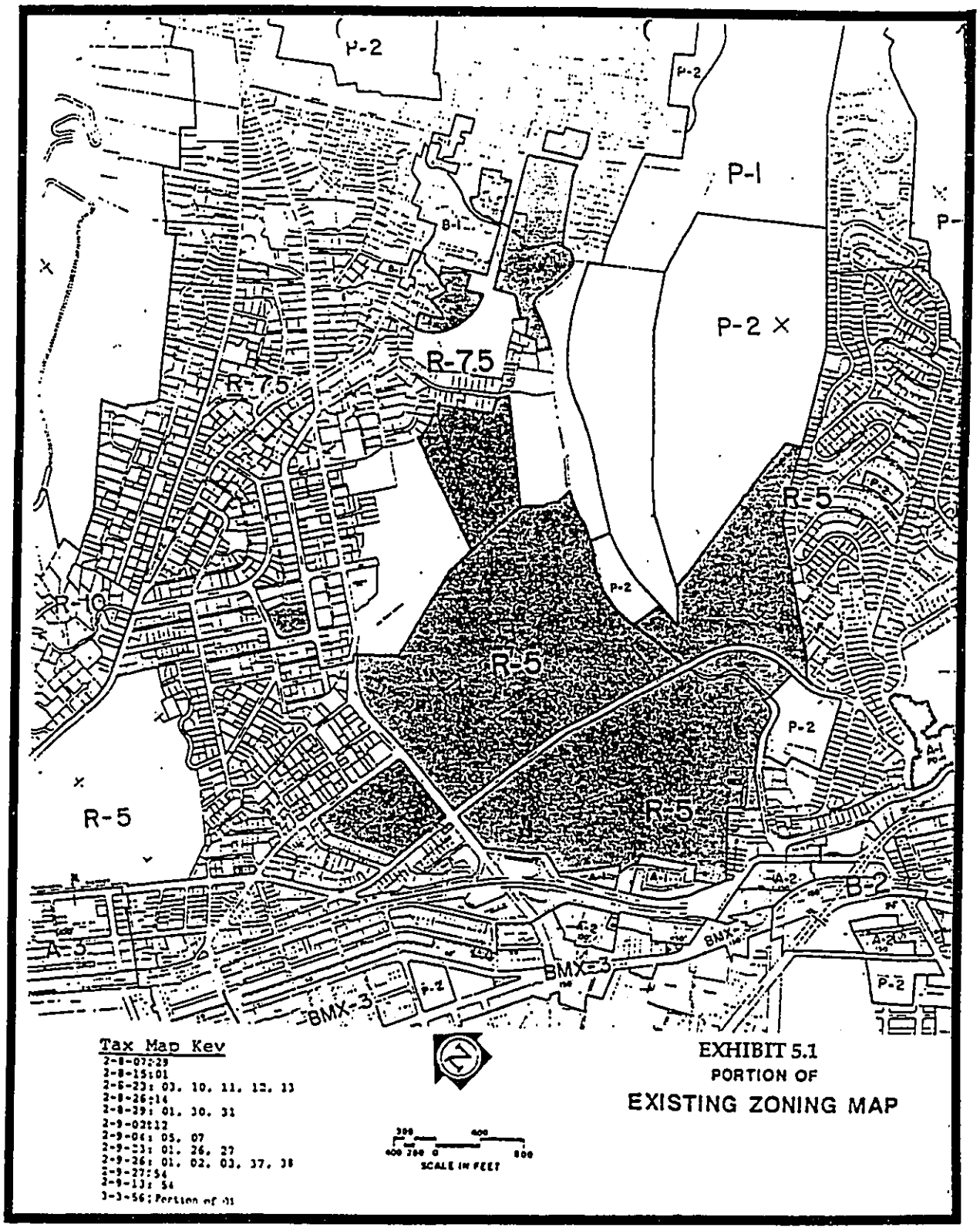


EXHIBIT 5.1
PORTION OF
EXISTING ZONING MAP

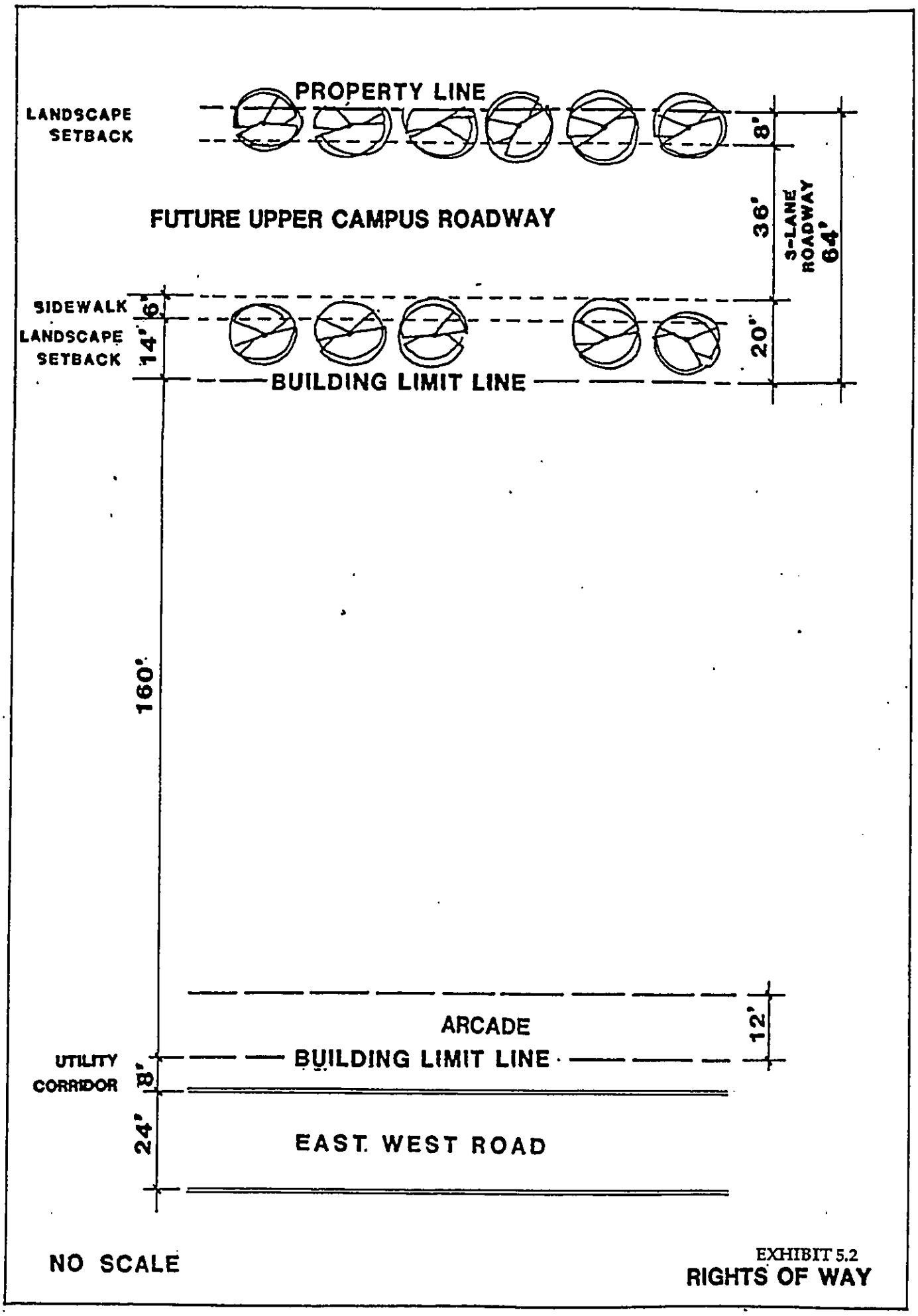


EXHIBIT 5.2
RIGHTS OF WAY

Source: Agricultural Science Facilities, Phase III: Project Development Report, January 1993

Chapter 6: Summary of Major Impacts

6.1 LAND FORM

Basaltic rock from the original volcanic flow formation underlies the site approximately ten to twenty feet below the surface. Although the rock is capable of storing groundwater, no activity occurring in the Agricultural Science Facilities, Phase III is expected to impact this groundwater resource. Excavation of the basaltic rock, however, will be required to allow construction of the foundations and basement. The amount of such excavation will be minimized and measures will be taken to assure no unnecessary disruption and displacement of ground matter.

Erosion due to construction activities is not expected to be significant. At the commencement of construction, erosion and sedimentation measures will be designed and implemented as necessary to mitigate pollution impacts. However, ground contours will be changed to accommodate the building footprint and excavations for foundations and the basement.

6.2 LAND USE

The UH Manoa Campus site is urban. The project site and its surroundings are developed with educational uses. The project will not substantially alter existing land use. The proposed building is expected to have a useful life of at least 30 years.

The project site is located on the floor of the valley drained by Manoa Stream, and is approximately 110 feet above sea level and more than two miles from the ocean. The building site is not located in a wetland or aquatic area governed by the Coastal Zone Management Act of 1972 nor the State of Hawaii Law HRS 205-A. No national or state wild or scenic river, as defined by the Federal Wild and Scenic Rivers Act, will be impacted by this facility. The Federal Endangered Species Act of 1973 and the Fish and Wildlife Coordination Act of 1958 are not applicable to this project

6.3 AIR QUALITY

The major potential sources of air pollution from this facility are the fume hoods. Up to 47 fume hoods will be installed in this building. Other minor specialized ventilation systems will also be provided as necessary. Fume hoods and laboratory exhausts will be ducted to dedicated vertical shafts. Emissions from these systems dispersed into the air will be small and ambient air quality is anticipated to remain well within acceptable State and Federal levels.

The quantity of air pollutants emitted by the fume hoods is not expected to be significant. State Department of Health's regulations (§ 11-60.1-62 [12]) exempt stationary sources of air pollutants emitted by laboratory equipment used exclusively for chemical or physical analyses. However, some of the chemicals to be used by the future occupants may be listed in § 11-60.1-172 "List of Hazardous Air Pollutants."

This facility will comply with applicable State air pollution laws. Prior to receiving a building permit, the plans for this building and the proposed activities involving use of, as well as, list and quantities of chemicals, will be reviewed by the Clean Air Branch of the State Department of Health (DOH), which will approve the project or require modifications for such approval. Wind studies will be conducted to derive optimum emission dispersal if deemed necessary by the State DOH and the University.

Depending on the nature of impacts and risks identified, including the presence of objectionable odors, various mitigation measures will be considered such as the use of various types of controls including filters, scrubbers, or other absorption/adsorption units. Other measures include collecting the hazardous gases and vapors within the building and recycling or disposing of them in a safe manner away from the campus.

Because this facility will be in compliance with State air pollution and regulations, therefore, it will also comply with Federal laws and regulations.

Air movements, humidity, or temperature will not be altered.

6.4 WATER QUALITY

Release of Polluted Wastewater. The only potential for pollution of State waterways or oceans by this facility is posed by its discharges into the sanitary sewer system. The university complies with City and County wastewater discharge requirements and will complete the "long form" industrial wastewater permit and will receive approval prior to application for a building permit. The facility's compliance with Honolulu wastewater discharge provisions ensures compliance with State and Federal water pollution standards.

The sanitary sewer system ultimately discharges treated water into State waterways or the ocean. Therefore, Honolulu's Industrial Wastewater Discharge Provisions are designed to ensure compliance with the Hawaii Revised Statutes Chapter 342 and the rules and regulations of the State DOH (approved by the administrator of the Federal Environmental Protection Agency). This facility's compliance with the City and County's wastewater discharge provisions ensures compliance with State and Federal water pollution standards.

Stormwater Runoff into Manoa Stream. The stormwater drainage system which will serve this site empties into Manoa Stream. This new building will increase the amount of impervious area that must be served by this system, but the increase is expected to be on the order of less than one percent of system capacity. Therefore, this project is not expected to significantly increase stormwater runoff into Manoa Stream.

The Hawaii DOH's water pollution control regulations (Title 11, Chapter 55) do not require application for a National Pollution Discharge Elimination System (NPDES) permit for this project, since only stormwater runoff will be discharged directly into a State waterway. The stormwater runoff will contain typical, minimal sediments and debris, which will be collected in drains.

6.5 PLANT LIFE AND ANIMAL AQUATIC LIFE

No adverse effects to plant life are expected. The site is currently occupied by five portable buildings which will be relocated prior to construction of the new facility. The site is not considered a critical or protected area; no Federally listed threatened or endangered species have been found on the site. The Federal Endangered Species Act of 1973 and the Fish and Wildlife Coordination Act of 1958 are not applicable to this project.

Trees, shrubs and groundcover existing on the site will be removed and/or relocated to accommodate construction of the facility and the site will be replanted in accordance with a landscape plan. None of the existing plantings are threatened or endangered species under protection by the State of Hawaii law HRS 195-D.

6.6 NATURAL RESOURCES AND ENERGY

Energy Conservation: The design and operation of the project will incorporate energy conservation measures to optimize life-cycle costs as much as practical. The proposed five-story building has a footprint of approximately 138 feet by 160 feet and will locate research laboratories and support facilities at the core, with staff and faculty offices along the building's perimeter. The concept of locating the technical spaces at the building core presents a cost effective and energy efficient structure which can accommodate the program requirements of the identified building users.

Zoned Air Conditioning: Spaces with similar environmental requirements and use patterns will be grouped into zones. Typically, lab areas will utilize individual fan coil units to segregate air conditioning from other spaces; classrooms and offices will be using a central energy efficient variable air volume system. The temperature and air supply to each zone will be controlled by an individual thermostat. Because this system supplies conditioned air only to those zones *requiring such supply at any time, cost and energy savings may be effected during after-hours* operations.

Power Load Distribution: Electrical power circuits will be designed to create generally equal load distribution conditions across branch circuits.

Low-Emissivity Glazing: Use of low-emissivity glazing has been proposed for this building. This glazing typically consists of two panes of glass separated by a space filled with an inert gas; a thin, transparent silver coating is applied to the inside surface of one of the panes of glass. This assembly reduces the transmission of ultraviolet light but permits most visible light to penetrate, thereby reducing heat gain without tinting the glass.

Solar Orientation: While the solar orientation of the proposed building is perhaps less than ideal, the relatively compact plan will act effectively to minimize solar heat gain. Trees and shrubs planted in the area adjoining the building perimeter will be selected to absorb heat energy and intercept reflected glare.

6.7 NOISE AND LIGHT

Noise Pollution. Mechanical equipment notably the cooling tower which will be installed along the side of the building close to St. Francis School may increase existing noise levels. These equipment will be provided with sound attenuators to ascertain that the building does not exceed noise levels allowable by code. (Land Use Ordinance 3.100-2 and Title 11 Administrative Rules DOH Chapter 43 *Community Noise Control for Oahu*).

Basaltic rock underlies the site approximately 10 to 20 feet below the surface. Excavation of parts of the rock may be required to allow construction of the foundations and first floor. The amount of such excavations will be avoided or minimized. However, if the excavations become necessary, rock drilling, which may take approximately two weeks to complete, may produce excessive noise. The generation of excessive noise can be scheduled at hours convenient to the other campus users and the surrounding neighborhood.

In accordance with the City and County Land Use Ordinance, reflective mirror glass will not be used on this building.

6.8 ENVIRONMENTAL HEALTH

Dangerous and Hazardous Materials. Some of the research, instructional and extension programs will use various chemicals and/or radioactive materials. Waste products resulting from these activities will be small-to-moderate in volume and will consist primarily of spent chemicals such as acids, solvents and pesticides used in experiments and tests; chemicals which have exceeded their shelf lives; and materials produced as the result of research projects. These wastes are currently being produced in other facilities on campus by programs that are scheduled to be relocated to the new facility. Since the research activities are not expected to vary significantly from present practices, the volume of waste produced will be essentially unchanged from the actual values shown in Appendix D. Appendix D is a list of hazardous wastes generated by the proposed users of the facility (based on 1990 data).

Environmental and Occupational Health and Safety: The University has in place environmental and occupational health and safety programs which monitor the use, storage and disposal of radioactive and other hazardous materials. The proposed building also will comply with applicable building and safety codes to minimize risks to users, visitors and the community. The design and operation of this building will incorporate numerous systems to ensure safe handling of hazardous materials.

Emergency Procedures: Because relatively small amounts of chemicals and other potentially hazardous materials will be used in this building, accidental spills are not likely to cause more than localized damage. Staff will be trained to properly clean up spills and, if necessary, will contact the University's Environmental Health and Safety Office (EHSO) for assistance. Throughout the building, where people may be exposed to chemicals or vapors, emergency deluge showers and eye flushes will be provided according to standards prescribed by the Occupational Safety and Health Act.

6.9 UTILITIES

The utility systems required by the facility have sufficient capacity to support the building. Required alterations to the systems will not be extensive and will take the form of connections to the building.

6.10 TRANSPORTATION AND PARKING

Parking. No parking currently exists on the project site. However, the site is bounded by existing on grade parking lots on both the northeastern and southwestern sides. The LRDP recommends replacing these lots with open landscaped areas and has selected a site northeast of the project for a multi-story parking garage which would replace the lost on grade parking capacity. New parking demand generated by this building will be accommodated in a multi-level parking structure on an adjacent site as proposed by the LRDP.

One or both of these on-grade parking facilities will be required to serve as staging areas during construction of the facility.

6.11 PUBLIC SERVICES

Four academic departments and two research programs, which are now located in overcrowded facilities in various parts of the campus, will be consolidated, enhancing the research and instructional capabilities of the U.H. This facility will enable the CTAHR to revitalize research and to attract and retain the Pacific Rim's top researchers and instructors.

6.12 POPULATION/ECONOMICS

Five portable buildings used as faculty offices by various academic departments are currently on the project site. A relocation site for these facilities will be designated.

6.13 COMMUNITY REACTION

The project is not expected to be controversial. Neither is it in conflict with locally adopted environmental and economic development plans and goals.

6.14 ARCHAEOLOGICAL, CULTURAL AND HISTORICAL

The project is is not in conflict with traditional religious practices or beliefs of any ethnic groups. There are no known historic sites at the project location, but the area has not been inventoried for subsurface historic sites. Subsurface sites may include prehistoric habitation or agricultural features or human burials frequently found during routine construction activities in Manoa Valley. If such a discovery should occur, consultations will be sought from agencies entrusted with protecting the state's archaeological, cultural and historical resources.

6.15 AESTHETICS

Implementation of this project will result in construction of a five-story building that may alter public views and vistas; however, the scale and design of this project will be consistent with the surrounding context and the provisions of the LRDP. Exhaust ducts which will be located at the building's center spine will be kept at a minimum height; rather than increase the duct height to mitigate impact of air emissions, the ducts will be equipped with a device to allow the ducts to maintain a limited height.

6.16 WATER SYSTEM AND FIRE PROTECTION

The building site is located in the upper central campus area, and will be serviced by the existing Board of Water Supply's "High Service System" with reservoirs located at an elevation of 405 feet. Recent improvements to this area include the extension of an 8-inch water main from the vicinity of the Facilities Management Office to the Hazardous Waste Facility. This system is adequate to accommodate the needs of the proposed facility. Sherman Laboratory, which was recently constructed less than 300 feet from the project site, is connected to this system and receives adequate water pressure. Fire flow water pressure has not been a problem along this portion of East West Road, directly across from the site.

6.17 NONHAZARDOUS SOLID WASTE DISPOSAL

The volume of nonhazardous solid waste to be generated per day is estimated using a standard of one cubic yard per 25,000 square feet of assignable building space. Given this facility's assignable area of 60,399 square feet, it is anticipated that 2.24 cubic yards of solid waste will be generated each day.

The university uses standard two cubic yard containers; therefore, this building will require two two-cubic yard containers. All nonhazardous solid waste will be collected by university staff and will be disposed of at City & County sanitary landfills or incinerated at the H-POWER facility in accordance with applicable Federal, State and City laws and regulations.

To reduce non-hazardous solid waste, the UH Building and Grounds Management Office has continued a paper recycling program initiated by graduate students within the campus. White and colored waste paper are collected at designated sites on campus three times a week. These are brought over to the nearest public school campus which provide recycling bins for surrounding neighborhoods.

Exhbit 6.1 is based on Attachment B, Section VI: Preconstruction Environmental Assessment issued by the Cooperative State Research Service (CSRS) U.S. Department of Agriculture as a checklist in analyzing the potential impacts on the environment.

Exhibit 6.1

Environmental Impacts of Project or Activity Checklist

This checklist, is provided to ensure that all potential areas of environmental impact are considered adequately in the evaluation of the proposed construction/renovation project. Where an item may be answered "no" with reasonable certainty, further action on that item is unnecessary; however, all "yes" or "maybe" answers must be accompanied by an explanation.

1. LAND FORM: Will the project result in:	Yes	Maybe	No	Comments
• Unstable slopes or embankments?	[ ]	[ ]	[x]	
• Extensive disruption to or displacement of the soil?	[x]	[ ]	[ ]	See Note 1.1

Note 1.1: Excavation will be required to allow construction of the foundations and basement. The amount of such excavation required will be minimized and measures will be taken to assure no unnecessary disruption/displacement of soil.

• Impact to land classified as prime or unique farmland?	[ ]	[ ]	[x]	
• Changes in ground contours, shorelines, stream channels, or riverbanks?	[x]	[ ]	[ ]	See Note 1.2

Note 1.2: Ground contours will be changed to accommodate the building footprint and excavations for foundations and the basement.

• Destruction, covering, or modification of unique physical features?	[ ]	[ ]	[x]	
• Increased wind or water erosion of soils?	[ ]	[ ]	[x]	

2. LAND USE: Will the project:	Yes	Maybe	No	Comments
• Impact a component of the National Park System, the National Wildlife Refuge system, the National Wild and Scenic River system, the National Wilderness system, or National Forestland?	[ ]	[ ]	[x]	
• Foreclose long-term future uses of site?	[x]	[ ]	[ ]	See Note 2.1

Note 2.1: In accordance with the University's approved Long Range Development Plan (LRDP), implementation of this project involves construction of a multi-story building with a useful life of at least thirty years.

• Substantially alter the present or planned use of an area in the vicinity?	[ ]	[ ]	[x]	

3. AIR/CLIMATOLOGY: Will the project result in:	Yes	Maybe	No	Comments
• Air pollutant emissions which will exceed Federal or State standards or cause deterioration of ambient air quality (e.g., radon gas, automotive exhaust)?	[ ]	[ ]	[x]	

Based on Attachment B, Section VI: Preconstruction Environmental Assessment issued by the CSRS

• Objectionable odors?	[ ]	[x]	[ ]	See Note 3.1

Note 3.1: The fume hoods of laboratories which may produce emissions with objectionable odors will be equipped with filters to minimize these odors, if deemed necessary by the State DOH and the University. Wind studies will be conducted to ensure that emissions will be properly dispersed, only if deemed necessary by the State DOH and the University

• Alteration of air movements, humidity, or temperature?	[ ]	[ ]	[x]	
• Emissions of hazardous air pollutants regulated under the Clean Air Act?	[ ]	[x]	[ ]	See Note 3.2

Note 3.2: Included among the chemicals used by the UH programs are those listed as "hazardous air pollutants" in Subchapter 9 of the Department of Health's Hawaii Administrative Rules 11-60 (10/29/93). Fume hoods of laboratories where these hazardous chemicals are used will be equipped with filters to assure non-contamination of the immediate surroundings if deemed necessary by the State DOH and the University.

4. **WATER:** Will the project result in:	Yes	Maybe	No	Comments
• Discharge to a public water system?	[x]	[ ]	[ ]	See Note 4.1

Note 4.1: The university complies with City and County water discharge requirements and will complete the "long form" industrial waste water permit and will receive approval prior to application for a building permit. The facility's compliance with Honolulu wastewater discharge provisions ensures compliance with State and Federal water pollution standards.

• Changes in currents or water movement in marine or fresh water?	[ ]	[ ]	[x]	
• Changes in absorption rates, drainage patterns. Or the rate/ amount of surface water run off?	[ ]	[x]	[ ]	See Note 4.2

Note 4.2: The stormwater drainage system which will serve this site empties into Manoa Stream. The project will increase the amount of impervious area which must by served by the system, but the increase is expected to be on the order of less than one percent of the system capacity.

• Alterations or impediments to the course or flow of flood waters?	[ ]	[ ]	[x]
• Impoundment, control, or modification of any body of water equal to or greater than 10 acres in surface area?	[ ]	[ ]	[x]
• Discharge into surface water or alteration of surface water quality including, but not limited to, temperature and turbidity, or biologic oxygen demand?	[ ]	[ ]	[x]
• Sedimentation of streams, lakes, or other water?	[ ]	[ ]	[x]
• Withdrawal of groundwater?	[ ]	[ ]	[x]
• Alteration of the direction or rate of flow of groundwater?	[ ]	[ ]	[x]
• Consumptive use of groundwater or surface water?	[ ]	[ ]	[x]

• Alterations in groundwater quality?	[ ]	[ ]	[x]	
• Contamination of public water supplies?	[ ]	[ ]	[x]	
• Violation of State Stream Quality Standards, if applicable?	[ ]	[ ]	[x]	
• Location in a riparian or coastal floodplain?	[ ]	[ ]	[x]	
• Exposure of people or property to water-related hazards such as flooding?	[ ]	[ ]	[x]	
• Location in a State's coastal zone and subject to consistency with that State's Coastal Zone Management Plan	[ ]	[ ]	[x]	
• Impact on or construction in a wetland or inland floodplain?	[ ]	[ ]	[x]	

5. **PLANT LIFE:** Will the project:	Yes	Maybe	No	Comments
• Change the diversity or productivity of species or the number of any species of plants including trees, shrubs, grass, crops, microflora, and aquatic plants?	[ ]	[x]	[ ]	See Note 5.1

Note 5.1: Trees and shrubs currently found on the site will be removed or relocated, and the existing grass and other groundcover will be removed. The unoccupied portions of the site will be replanted according to a landscape plan, but it is probable that the number of plants will have been reduced from current levels; it is anticipated such reduction will not have significant impacts.

• Reduce the numbers or affect the habitat of any State or Federally designated unique, rare, or endangered species of plants? (check list of endangered species)	[ ]	[ ]	[x]	
• Reduce the acreage or create damage to agricultural crop?	[ ]	[ ]	[x]	
• Introduce new species into the area, create a barrier to the normal replenishment or existing species, of modify the hereditary traits of plants?	[ ]	[ ]	[x]	

6. **ANIMAL/AQUATIC LIFE:** Will the project:	Yes	Maybe	No	Comments
• Reduce the habitat or numbers of any State or Federally designated unique, rare, or endangered species of animals? (Check State and Federal list of endangered species and Migratory Bird Treaty Act.)	[ ]	[ ]	[x]	
• Introduce new species of animals into an area, create a barrier to the migration or movement of animals or fish, or modify the hereditary traits of animals	[ ]	[ ]	[x]	
• Change the diversity or productivity of aquatic species, including sport fish, waterfowl, and pest species?	[ ]	[ ]	[x]	
• Cause attraction, entrapment, or impingement of animal life?	[ ]	[ ]	[x]	

• Harm or change existing fish and wildlife habitats?	[ ]	[ ]	[x]	
• Cause immigration resulting in human-wildlife interaction problem	[ ]	[ ]	[x]	

7. NATURAL RESOURCES: Will the project:	Yes	Maybe	No	Comments
• Increase the rate of use of any natural resource?	[ ]	[ ]	[x]	
• Substantially deplete any nonreusable natural resource?	[ ]	[ ]	[x]	
• Be located in an area designated as or being considered for wilderness, wild and scenic river, national park, or ecological preserve?	[ ]	[ ]	[x]	

8. NOISE/LIGHT: *Will the project:*	Yes	Maybe	No	Comments
• Increase existing noise levels?	[ ]	[x]	[ ]	See Note 8.1

Note 8.1: Mechanical equipment notably the cooling tower which will be installed along the side of building close to St Francis School may increase existing noise levels. These equipment will be provided with sound attenuators to ascertain that the building does not exceed noise levels allowable by code (Land Use Ordinance 3.100-2)

• Expose people to excessive noise?	[ ]	[x]	[ ]	See Note 8.2

Note 8.2: Basaltic rock underlies the site approximately 10 to 20 feet below the surface. Excavation of parts of the rock may be required to allow construction of the foundations and first floor. The amount of such excavations will be avoided or minimized. However, if the excavations become necessary, rock drilling, which may take approximately two weeks to complete, may produce excessive noise. Activities which produce excessive noise can be scheduled at hours convenient to the other campus users and the neighborhood.

• Create glare from any reflective surface, including those that are off-site?	[ ]	[ ]	[x]	

9. ENVIRONMENTAL HEALTH: Will the project:	Yes	Maybe	No	Comments
• Create any health hazard or potential health hazard?	[ ]	[ ]	[x]	
• Expose people or animals to potential health hazards?	[ ]	[ ]	[x]	
• Generate significant solid waste or litter?	[x]	[ ]	[ ]	See Note 9.1

Note 9.1: It is anticipated this facility will generate approximately 2.42 cubic yards of solid waste per day. This waste will be disposed of in accordance with applicable Federal, State and City laws and regulations.

• Involve the generation, transport, storage, or disposal of any regulated hazardous waste (e.g., asbestos, if demolition or building alteration is involved)?	[x]	[ ]	[ ]	See Note 9.2

Note 9.2: Appendix D lists the types and volumes of hazardous wastes that have been produced in the recent past by the activities to be housed in this facility; these wastes are currently being produced in other facilities on campus. Because this facility is seen primarily as a replacement for the existing facilities, the volume of wastes generated is not expected to significantly increase. The University has established programs and procedures to monitor the use, storage and disposal of radioactive and other hazardous materials.

• Involve the risk of explosion or release of potentially hazardous substances including but not limited to, oil, pesticides, chemicals, radiation, or other toxic substances, in the event of an accident or an "upset" condition?	[ ]	[x]	[ ]	See Note 9.3

Note 9.3.: It is always possible that an "upset" condition may occur. Because the amount of chemicals and other potentially hazardous materials to be used in this building is relatively small, accidents are not likely to cause more than localized damage. Staff will be trained to properly respond to such accidents and will contact the University's Environmental Health and Safety Office for assistance.

• Involve the release of organisms with deliberately modified hereditary traits	[ ]	[ ]	[x]	

10. ENERGY: Will the project:	Yes	Maybe	No	Comments
• Use substantial amounts of fuel or energy?	[x]	[ ]	[ ]	See Note 10.1

Note 10.1: Lighting and air conditioning of interior spaces will involve use of substantial amounts of energy; the design of this building will incorporate measures to optimize energy expenditures. Due to the incorporation of these measures, it is anticipated that the amount of energy expended to support the housed activities will be reduced from that used in the facilities currently housing those activities.

• Substantially increase the demand on existing sources of energy?	[ ]	[ ]	[x]	
• Affect the potential use of solar energy by adjacent properties or by adjacent facilities located on the same property?	[ ]	[ ]	[x]	

11. UTILITIES: Will the project result in a need for new utility systems or alterations to the following:

• Power or natural gas	[x]	[ ]	[ ]	See Note 11.1
• Communications systems?	[x]	[ ]	[ ]	See Note 11.1
• Water?	[x]	[ ]	[ ]	See Note 11.1
• Sewer or septic tanks?	[x]	[ ]	[ ]	See Note 11.1
• Storm sewers?	[x]	[ ]	[ ]	See Note 11.1

Note 11.1: Each of the systems listed has sufficient capacity to support this building; required alterations to the systems will not be extensive and will take the form of connections to the building.

12 TRANSPORTATION: Will the project result in:	Yes	Maybe	No	Comments

• Substantial impact(s) on existing transportation systems?	[ ]	[ ]	[x]	
• Adverse effects on existing parking facilities or demands for new parking?	[x]	[ ]	[ ]	See Note 12.1

Note 12.1: Portions of one or both of the surface parking facilities adjacent to the site will be required to serve as staging area(s) during construction of the facility; the area(s) used for this purpose will be returned to parking use upon completion of construction activities or as the need to provide such staging is abated. New parking demand generated by this building will be accommodated in a multi-level parking structure on an adjacent site as proposed by the LRDP.

• Movement of additional vehicles?	[ ]	[ ]	[x]	
• Alterations to present patterns of circulation or movement of people and/or goods?	[x]	[ ]	[ ]	See Note 12.2

Note 12.2: The design of this building will respond to the circulation patterns proposed by the LRDP.

• Increased traffic hazards to motor vehicles, bicyclists, or pedestrians?	[ ]	[ ]	[x]
• Construction of new roads or substantial improvements to existing roads, e.g., connector roads, building of additional lanes	[ ]	[ ]	[x]

13. PUBLIC SERVICE: Will the project have an effect on, or result in a need for, new or altered governmental services in any of the following areas:

	Yes	Maybe	No
• Fire protection?	[ ]	[ ]	[x]
• Police protection?	[ ]	[ ]	[x]
• Emergency medical care?	[ ]	[ ]	[x]
• Schools?	[ ]	[ ]	[x]
• Other governmental services?	[ ]	[ ]	[x]

14. POPULATION/ECONOMICS Will the project:	Yes	Maybe	No	Comments
• Alter the location or distribution of human population in the area?	[ ]	[ ]	[x]	
• Create or destroy any housing units, particularly low-income housing?	[ ]	[ ]	[x]	
• Disrupt human social interactions in the community?	[ ]	[ ]	[x]	
• Displace any existing designated or informal recreational areas?	[ ]	[ ]	[x]	
• Have any adverse effect on local or regional economic conditions, e.g., tourism, local income levels, land values,				

or employment?	[ ]	[ ]	[x]	

15. COMMUNITY REACTION: Is the project:	Yes	Maybe	No	Comments
• Potentially controversial?	[ ]	[ ]	[x]	
• In conflict with locally adopted environmental or economic development plans and goals ?	[ ]	[ ]	[x]	

16. ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL: Will the project:	Yes	Maybe	No	Comments
• Alter archaeological, cultural, or historical sites, structures, objects or buildings, either in or eligible for inclusion in the National Register of Historic Places (e.g., be subject to the Historic Preservation Act of 1974)?	[ ]	[ ]	[x]	
• Be in conflict with the traditional religious practices or beliefs of any ethnic group?	[ ]	[x]	[ ]	See Note 16.1

Note 16.1: *Such conflicts are not anticipated, but the diversity and possible obscurity of such practices and beliefs is so great that conflicts may occur.*

17. AESTHETICS: Will the project:	Yes	Maybe	No	Comments
• Change the scenic vista or view open to the public?	[ ]	[x]	[ ]	See Note 17.1

Note 17.1: *Implementation of this project will result in construction of a five-story building that may alter public views and vistas; however, the scale and design of this project will be consistent with the surrounding context and the provisions of the LRDP. Exhaust ducts which will be located at the building's center spine will be kept at a minimum height; rather than increase the duct height to mitigate impact of air emissions, the ducts will be equipped with a device to allow the ducts to maintain a limited height.*

• Create an aesthetically offensive site open to the public view (e.g., one that is out of place with the character or design of the surrounding area)?	[ ]	[ ]	[x]
• Significantly change the visual scale or character of the vicinity?	[ ]	[ ]	[x]

Chapter 7: Conclusion

7.1 ALTERNATIVES CONSIDERED

7.1.1 Not Constructing the Proposed Facility. This option will preserve the site and retain use of the five portable buildings but it fails to accommodate the acute space needs of the College of Tropical Agriculture and Human Resources, and leaves the site greatly underutilized. In addition, if the proposed facility is not built, the buildings occupied by the CTAHR departments to be housed in the facility, could not be demolished. Consequently, the new SHAPS building would have to find an alternate site.

7.1.2 Constructing a Portion of the Facility Program. All of the programmed spaces are urgently needed. A portion of the current programmed spaces for the facility (Phase III) was carried over from Phase II (which was reduced from 42,000 to 29,000 ASF due to budget constraints).

7.1.3 Constructing at an Alternative Site. The University adopted its Long Range Development Plan (LRDP) in December 1987 (subsequently adopting the 1994 LRDP update in May 1994). The LRDP was developed by a private planning consultant, and coordinated with the University's Six-Year Capital Improvements Program. Based upon earlier considerations and proposals by the University's administration for providing more spaces for the CTAHR, the LRDP planning participants chose the present site for the proposed Agricultural Science Facilities, Phase III.

The City's Plan Review Use procedures have been followed to legitimize the LRDP as a land use plan, and it has been approved, subject to certain conditions, by the City Council (Resolution No. 89-411/CD-2 and amended by Resolution 92-286 CD-1, FD-1 3-10-93).

An alternative site for the facility on the Manoa campus may conflict with other LRDP provisions, or may not be in close proximity to existing CTAHR facilities which would provide greater accessibility and convenience to the building's users.

A location away from the Manoa campus would certainly defeat the purpose of the facility to bring together a variety of closely related disciplines for more effective interaction without unnecessary duplication of resources.

7.1.4 Constructing at the LRDP Prescribed Site. Due to the considerations described above, the Agricultural Science Facilities, Phase III should be constructed on the site as originally conceived in the LRDP.

7.2 REASON FOR NEGATIVE DECLARATION

Findings. The construction of the Agricultural Science Facilities, Phase III is not expected to have any significant environmental impact. Therefore, no Environmental Impact Statement is required.

In the context of the significant criteria listed in Chapter 343, H.R.S., the State of Hawaii Department of Health Administrative Rules (11-200-12), and the regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA), the proposed relocation of the portable buildings on the site and the construction of the Agricultural Science Facilities, Phase III does not constitute a significant environmental impact.

- The proposed project does not involve an " irrevocable commitment or destruction of any natural or cultural resource."
- The range of beneficial uses of the environment will not be curtailed.
- There is no conflict with the State's long term environmental standards and goals expressed in Chapter 344, Hawaii Revised Statutes, nor with the University's long term environmental policies.
- The economic and social welfare of the community or State of Hawaii is not detrimentally affected.
- Public health is not substantially affected. Elaborate safety and health measures will be taken to avoid contamination of public waste water lines with hazardous substances.
- Various mitigation measures such as the use of mechanical scrubbers and filters will be initiated to minimize the negative impact of gas and vapor emissions from the proposed facility's fumehoods if deemed necessary by the State's DOH and the University.
- The building will comply with State of Hawaii Department of Health (DOH) environmental protection laws and regulations.
- A substantial degradation of environmental quality is not involved.
- Secondary impacts are not substantially involved.
- A commitment for larger actions is not involved, nor will there be cumulative impact.
- Rare, threatened, or endangered species are not affected.
- Environmentally sensitive areas, such as flood plains, tsunami zones, erosion prone areas, or coastal waters will not be affected.

APPENDIX A

CONSULTATION LETTERS

LIST OF AGENCIES/GROUPS CONSULTED

Name of Agency/Group	Response Received on:
State Department of Land & Natural Resources	January 16, 1992
American Lung Association	December 20, 1991
Board of Water Supply (C&C Honolulu)	December 30, 1991; October 30, 1991
Department of Land Utilization (C&C Honolulu)	November 12, 1991
State Department of Health	November 22, 1991
Department of Transportation Services (C&C Honolulu)	November 15, 1991
Hawaiian Electric Company	October 25, 1991
Department of Parks & Recreation (C&C Honolulu)	October 18, 1991
State Office of Environmental Quality Control	October 15, 1991
State Department of Agriculture	October 29, 1991
Housing Finance and Development Corporation	October 14, 1991
State Dept. of Business, Economic Development & Tourism	October 24, 1991
State Department of Education	October 17, 1991
Office of State Planning	October 25, 1991
Department of Public Works (C&C Honolulu)	October 25, 1991
Fire Department (C&C Honolulu)	October 21, 1991
Police Department (C&C Honolulu)	October 16, 1991
Neighborhood Board No. 5	No written response
GTE Hawaiian Telephone	No written response
PRI Environmental Technologies International	No written response
Dept. of Housing & Community Dev. (C&C Honolulu)	No written response
Office of the City Clerk (C&C Honolulu)	No written response
Neighborhood Board No. 7	No written response
US Army Corps of Engineers	No written response
State Office of Hawaiian Affairs	No written response
Saint Francis School	No written response
Sisters of Saint Francis Convent	No written response
Malama 'O Manoa	No written response

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

MANABU TAGOMORI
Dan T. Kochi
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:OCEA:SKK

JAN 16 1992

FILE NO.: 92-374
DOC. NO.: 2426E

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

SUBJECT: Preparation of an Environmental Assessment (EA) for the Agricultural Science Building Phase III - University of Hawaii, Manoa

Thank you for giving our Department the opportunity to comment on this matter. We have reviewed the materials you submitted and have the following comments.

HISTORIC PRESERVATION DIVISION CONCERNS:

There are no known historic sites at the project location, but the area has not been inventoried for subsurface historic sites, so these may be present. The history of the project location is not clear from the letter to Mr. Paty, so it may be that previous construction activities have destroyed sites, if any, that were present. If subsurface sites are present they might include prehistoric habitation or agricultural features, or human burials. Human burials are frequently found during routine construction activities in Manoa Valley, including the University of Hawaii campus.

The environmental assessment should make clear the construction history of the project location, and assess the likelihood that subsurface historic sites remain. If it is likely that subsurface sites remain, then a subsurface inventory survey to determine the presence or absence of sites should be completed and a proposed burial treatment plan worked out with the O'ahu Island Burial Council, as needed.

Please feel free to call me or Sam Lemmo at our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions or are in need of assistance.

Very truly yours,

WILLIAM W. PATY

245 North Kukui Street, Honolulu, Hawaii 96817, Telephone (808) 537-5966

AMERICAN LUNG ASSOCIATION *of Hawaii*
The Christmas Seal People®

December 20, 1991

Ms. Rose Cruz Churma
DesignLab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Agricultural Sciences Building, Phase III
UH Manoa

Thank you for sending us a copy of the EIS Preparation Notice for the subject project. We have a few suggestions concerning assessment of the project.

It is our understanding that the laboratories that are an integral part of this project may at times release volatile chemicals. If these are to be released into the ambient air through vents, then an air quality impact analysis should be conducted to insure that persons downwind of the building will not be adversely affected. This is particularly important since the proposed building is upwind (in terms of the prevailing NE trade winds) of a number of other occupied UH buildings. The analysis should not only address groundlevel receptors but also the ventilation intakes on these downwind buildings. Depending on exactly what volatile agents may be released, risk assessment may be necessary.

Depending on the nature of impacts and risks identified in the analysis, various mitigation measures may be considered. These could be various types of controls including filters, scrubbers, or other absorption/adsorption units. It may also be necessary to prohibit such emissions and insure that chemical vapors and gases are collected within the building and either recycled or disposed of in a safer manner.

Thank you for providing the opportunity to comment on this EISPN. Please call us at 537-5966 if you have any questions concerning these comments.

Sincerely yours,

James W. Morrow
Director
Environmental Health

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

December 30, 1991

Ms. Rose Cruz Churma
Design Lab
Manoa Market Place, Suite 5-211
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Your Letter of October 9, 1991 Relating to the Environmental Assessment (EA) for the Agricultural Sciences Building, Phase III at University of Hawaii at Manoa, TMK: 2-9-04: 05

Thank you for the opportunity to review and comment on the EA for the proposed Agricultural Sciences Building Phase III.

We have the following comments to offer:

1. A water allocation from the State Department of Land and Natural Resources (DLNR) is required for any increase in water service. The University of Hawaii will be required to pay our Water System Facilities Charges for transmission and daily storage.

2. The construction plans should be submitted for our review and approval.

3. Board of Water Supply (BWS) approved reduced pressure principle backflow prevention assemblies (RPBPA) will be required at each service connection to the building. The Utility Master Plan showing the installation of RPBPA's after all BWS meters serving the campus should be submitted for our review and approval.

Very truly yours,

FOR KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
Ralph Horii (University of Hawaii)
Mike Miura (Department of Accounting and General Services)

Pure Water . . . man's greatest need – use it wisely

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

October 30, 1991

Ms. Rose Cruz Churma
Design Lab, Suite 5-211
Manoa Marketplace
2752 Woodlawn Drive
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: YOUR LETTER OF OCTOBER 9, 1991 ON THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT FOR THE AGRICULTURAL SCIENCES BUILDING, PHASE III AT THE UNIVERSITY OF HAWAII, MANOA - TMK: 2-9-4: 05

We are still evaluating the proposed project and will complete our review by November 7, 1991.

If you have any questions, please contact Bert Kuioka at 527-5235.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

Pure Water . . . man's greatest need – use it wisely

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

DONALD A. CLEGG
DIRECTOR

LORETTA K. C. CHEE
DEPUTY DIRECTOR

88/PRU-3(ASK)

November 12, 1991

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive, Ste. 5-211
Honolulu, Hawaii 96822

Dear Ms. Churma:

Environmental Assessment
University of Hawaii (Manoa)
Agricultural Science Building Phase III
Tax Map Key 2-8-23: 3

This responds to your October 9, 1991 letter relative to an environmental assessment for the Agricultural Sciences Building Phase III at the University of Hawaii in Manoa.

This facility is shown on the five-year master plan, which was approved by Council Resolution 89-411 on December 13, 1989. Information contained in the Director's Report, dated August 6, 1989 indicated that the structure would be five stories high. Appendix B of the Director's Report describes the estimated gross area to be 90,000 square feet with an estimated 20,000 square feet of administrative office space. Based on these areas, the required parking was reported to be 50 spaces.

Your letter indicates that the building will be four stories high and located within the foot print shown on the approved five-year master plan. Based on the information provided, the proposal appears to be generally consistent with the approved plan. Prior to building permit approval we will review construction plans for compliance with the approved five-year master plan.

We note that the structure is located on the proposed upper campus roadway. The University of Hawaii Long Range Development Plan states that the upper central campus roadway should be landscaped with a uniform species of tree to provide a coordinated campus appearance. The design of the building should accommodate this uniform planting strip.

Should you have questions regarding the above, contact Ardis Shaw-Kim of our staff at 527-6274.

Very truly yours,

Donald Clegg

DONALD A. CLEGG
Director of Land Utilization

DAC:lg
88pru3.lag

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:

November 22, 1991

91-385/epo

Ms. Rose Cruz Churna
Design Lab
2752 Woodlawn Drive, Suite 5-211
Manoa Market Place
Honolulu, Hawaii 96822

Dear Ms. Churma:

SUBJECT: ENVIRONMENTAL ASSESSMENT
AGRICULTURAL SCIENCES BLDG., PHASE III
UNIVERSITY OF HAWAII, MANOA, OAHU

Thank you for the opportunity to review and comment on the subject project. We have examined the material and have the following comments to offer:

Noise

1. Noise from stationary equipment, such as air conditioning units and exhaust fans, must be attenuated to comply with the provisions of Department of Health Administrative Rules, Chapter 11-43, Community Noise Control for Oahu.

2. Constructions activities must comply with the provisions of Department of Health Administrative Rules, Chapter 11-43, Community Noise Control for Oahu.

   a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules.

   b. All equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers.

   c. The contractor must comply with the requirements specified in the rules and conditions issued with the permit.

3. Traffic noise from heavy vehicles travelling to and from construction sites must be minimized near existing residential areas and must comply with the provisions of

Department of Health Administrative Rules, Chapter 11-42, Vehicular Noise Control for Oahu.

If you should have any questions about this section, please call Mr. Jerry Haruno of the Noise and Radiation Branch at 548-3075.

Wastewater

The subject project is located within the City sewer service system. As the area is sewered, we have no objections to the proposed agricultural sciences building provided that the project is connected to the public sewers.

If you should have any questions, please contact Mr. Lori Kajiwara of the Wastewater Branch at 586-4290.

Very truly yours,

Bruce S. Anderson for

JOHN C. LEWIN, M.D.
Director of Health

c: Noise and Radiation Branch
Wastewater Branch

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

William A. Bonnet
Manager
Environmental Department

October 25, 1991

Ms. Rose Cruz Churma
DesignLab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, HI 96822

Dear Ms. Churma:

Subject: Environmental Assessment (EA) for
Agricultural Sceience Building Phase III at
UH Manoa

We have reviewed the subject EA, and request that electrical drawings for the proposed project be submitted for review by HECO Engineers. HECO shall reserve further comments pertaining to the protection of existing powerlines bordering and servicing the development area until construction plans are finalized.

Sincerely,

An HEI Company

D. .RTMENT OF TRANSPORTATION SERV .S
CITY AND COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU HAWAII 96813

FRANK F. FASI
MAYOR

JOSEPH M. MAGALDI JR.
DIRECTOR

AMAR DAPPAL
DEPUTY DIRECTOR

TE-5598
PL91.1.370

November 15, 1991

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive, Suite 5-211
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Agricultural Science Building Phase III, UH Manoa
Preparation of Environmental Assessment
TMK: 2-8-23

This is in response to your letter of October 25, 1991 informing us of your intent to prepare an environmental assessment for the subject project.

The assessment should include information regarding the impact this project will have on the existing traffic conditions. We have no further comments to offer at this time.

Should you have any questions, please contact Lance Watanabe of my staff at 523-4199.

Sincerely,

JOSEPH M. MAGALDI, JR.
Director

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALTER M. OZAWA
DIRECTOR

ALVIN K.C. AU
DEPUTY DIRECTOR

October 18, 1991

Ms. Rose Cruz Churma
DesignLab
Manoa Marketplace
2752 Woodlawn Drive, Suite 5-211
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Environmental Assessment for the Proposed Agricultural Sciences Building Phase III at the University of Hawaii at Manoa

We have reviewed the preliminary information for the proposed project and have no comment to offer.

Thank you for the opportunity to review this project.

Should you have any questions, please contact Lester Lai of the Advance Planning Branch at 523-4696.

Sincerely,

For WALTER M. OZAWA, Director

WMO:ei

JOHN WAIHEE
Governor

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813

BRIAN J. J. CHOY
Director

October 15, 1991

Ms. Rose Cruz Churma
DesignLab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Agricultural Sciences Building Phase III at UH Manoa

This is in response to your letter of October 9, 1991 regarding the environmental assessment for the above subject. We have reviewed the project description and have the following suggestions:

1. The potential locations and noise impacts of the condensing units should be disclosed in the environmental assessment; and

2. Please consult the appropriate agencies and groups listed in the attached document prior to preparing the assessment.

Thank you for the opportunity to provide early input in the assessment process. If you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Brian J. J. Choy
Director

Attachment

JOHN WAIHEE
GOVERNOR

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

October 29, 1991

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

ILIMA A. PIANAIA
DEPUTY TO THE CHAIRPERSON

FAX: 548-6100

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive
Suite 5-211
Manoa Marketplace
Honolulu, HI 96822

Dear Ms. Churma:

Subject: Environmental Assessment for
Agricultural Sciences Building; Phase III
University of Hawaii at Manoa
TMK: 2-9-04: 5 Honolulu, Oahu

The Department of Agriculture has reviewed the subject notice and has no comments to offer.

Thank you for the opportunity to comment.

Sincerely,

Ilima Pianaia
for YUKIO KITAGAWA
Chairperson, Board of Agriculture

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
SEVEN WATERFRONT PLAZA, SUITE 300
500 ALA MOANA BOULEVARD
HONOLULU, HAWAII 96813
FAX (808) 587-0600

October 14, 1991

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

IN REPLY REFER TO:
91:PLNG/4611dl

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive
Manoa Marketplace, Suite 5-211
Honolulu, Hawaii 96822

Dear Ms. Churma:

Thank you for your letter of October 9, 1991 regarding the proposed Agricultural Sciences Building Phase III. We have no questions, concerns, or suggestions about the project at this time.

Sincerely,

Joseph K. Conant
Executive Director

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 548-4611

ESTHER UEDA
EXECUTIVE OFFICER

October 24, 1991

Ms. Rose Cruz Churma
DesignLab
2752 Woodlawn Drive
Suite 5-211 Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Environmental Assessment for the Agricultural Sciences Building Phase III at UH Manoa

The Department of Business, Economic Development and Tourism has referred your letter dated October 9, 1991 to our office for response.

Based on our review, we find that the subject project, as approximately shown in Figure 1, is located in the State Land Use Urban District.

We have no further comments to offer at this time.

Thank you for the opportunity to comment on this matter. If you have any questions, please call me or Steve Tagawa of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:to

cc: DBED

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2360
HONOLULU, HAWAII 96804

CHARLES T. TOGUCHI
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

October 17, 1991

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, HI 96822

Dear Ms. Churma:

Thank you for the opportunity to provide input into the EIS for the Agricultural Sciences Building Phase III at the University of Hawaii.

We have no comments to submit at this time.

Sincerely,

Charles T. Toguchi
Superintendent

CTT:sy

cc: Mr. Alfred K. Suga

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

OFFICE OF STATE PLANNING
Office of the Governor
MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540
STREET ADDRESS: 380 SOUTH HOTEL STREET, 4TH FLOOR
TELEPHONE: (808)587-2846, 587-2800
FAX: Director's Office 587-2846
Planning Division 587-2824

October 25, 1991

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive
Suite 5-211 Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Comments on the Environmental Assessment for the Agricultural Sciences Building, Phase III at the University of Hawaii (UH), Manoa

We have reviewed your letter regarding preparation of an Environmental Assessment for the Agricultural Sciences Building at UH, Manoa.

We have no comments to offer at this time. Thank you for the opportunity to review the project.

Sincerely,

for Harold S. Masumoto
Director

cc: Douglas Tom, CZM

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER

C MICHAEL STREET
DEPUTY DIRECTOR

ENV 91-227

October 25, 1991

Ms. Rose Cruz Churma
DesignLab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

Subject: Evironmental Assessment (EA)
Agricultural Sciences Building, Phase III
University of Hawaii at Manoa
Oahu, Hawaii

We have reviewed the subject EA and have the following comments:

1. The Project II Agricultural Sciences relief line as shown in the utilities master plan update will have to be installed before connection can be made to the municipal sewer line which is located across the UH Central Campus.

2. Also, an Application for Sewer Connection form should be submitted to Division of Wastewater Management for approval.

3. A wastewater facility charge may be applicable prior to approval of the building permit application.

Very truly yours,

for SAM CALLEJO
Director and Chief Engineer

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
1455 SOUTH BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

LIONEL E. CAMARA
FIRE CHIEF

DONALD S M. CHANG
DEPUTY FIRE CHIEF

October 21, 1991

Ms. Rose Cruz Churman
Design Lab
2752 Woodlawn Drive
Suite 5-211
Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churman:

We have reviewed the subject material provided and foresee no adverse impact in Fire Department facilities or services. Fire protection services provided from Manoa and McCully engine companies with ladder service from McCully are adequate.

Access for fire apparatus, water supply and building construction shall be in conformance to existing codes and standards.

Should you have any questions, please call Acting Assistant Chief Attilio Leonardi of our Administrative Services Bureau at 943-3838.

Very truly yours,

LIONEL E. CAMARA
Fire Chief

AKL:ny

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 - AREA CODE (808) 955-3111

FRANK F. FASI
MAYOR

MICHAEL S. NAKAMURA
CHIEF

HAROLD M. KAWASAKI
DEPUTY CHIEF

OUR REFERENCE ES-LK

October 16, 1991

Ms. Rose Cruz Churma
Design Lab
2752 Woodlawn Drive, Suite 5-211
Manoa Marketplace
Honolulu, Hawaii 96822

Dear Ms. Churma:

This is in response to your October 9 request for comments on the environmental assessment for the Agricultural Sciences Building Phase III at UH-Manoa.

In general, our concerns on projects of this sort fall into three areas: (1) public safety (e.g., preventing traffic and pedestrian hazards during and after construction); (2) crime prevention (designing facilities in order to minimize the opportunities for criminals); and (3) traffic flow (providing parking and designing roadways so as to avoid traffic congestion).

It seems unlikely that this project will occasion any specific comments or requests from us.

Thank you for the opportunity to comment.

Sincerely,

MICHAEL S. NAKAMURA
Chief of Police

By
CHESTER E. HUGHES
Assistant Chief of Police
Support Services Bureau

APPENDIX B

SOILS STUDY / FOUNDATION INVESTIGATION

FEWELL
GEOTECHNICAL
ENGINEERING, LTD.

Subsurface Investigation Report
Agricultural Science Facility, Phase III
University of Hawaii at Manoa
D.A.G.S. Job No.: 12-31-1519

for

State of Hawaii
Department of Accounting and
General Services
Division of Public Works

by

FEWELL GEOTECHNICAL ENGINEERING, LTD.

ALAN J. SHIMAMOTO
REGISTERED
PROFESSIONAL
ENGINEER
No. 4393-C
HAWAII, U.S.A.

Alan J. Shimamoto, P.E.

June 13, 1991

TABLE OF CONTENTS

Appendices

96-1416 Waihona Place • Pearl City, Hawaii 96782-1973 • (808) 455-6569 • FAX 456-7062

SUBSURFACE INVESTIGATION REPORT

Agricultural Science Facility, Phase III
University of Hawaii at Manoa
D.A.G.S. Job No.: 12-31-1519

INTRODUCTION

We have completed a subsurface investigation for the proposed Agricultural Science Facility, Phase III, at the University of Hawaii at Manoa in Honolulu, Oahu, Hawaii. This report summarizes our findings and conclusions and presents geotechnical recommendations for the design and construction of the proposed facility. The work has been completed in accordance with D.A.G.S. Contract No. 30249 dated April 29, 1991.

An abbreviated report format has been selected to present the conclusions and recommendations in a brief and concise manner with only pertinent background information included. Additional detailed information on the subsurface exploration, laboratory testing, and analyses can be provided upon request.

The subsurface exploration, including the borings logs, has been summarized in Appendix A. The laboratory test results have been included on the boring logs, where appropriate, and are also included in Appendix B. The limitations of this investigation are contained in Appendix C.

PROJECT CONSIDERATIONS

The proposed site for Phase III of the new Agricultural Science Facility is on the eastern side of the East-West Center Access Road and is shown on the attached Project Location Map, Figure 1. The site is across the street from the Biomedical Science Complex and immediately north of the existing Auxiliary Services Building.

Except for its southern boundary, the site slopes down gently from the northeast toward the southwest. Ground surface elevations vary from approximately Elev. 116 along the site's northeastern corner down to Elev. 104 at its southwestern corner. A 3-to 8-foot high bank with a slope of approximately 2H:1V elevates the site above the adjacent parking lot on its southern side. At the present time the site houses 5 wooden portable classroom buildings.

The preliminary building plans indicate that the new structure will encompass an area of approximately 160 feet by 140 feet in plan dimensions. The structure will be a 4-story concrete building with a basement level constructed beneath the western half of the building. The level of the first floor and basement have not been established at this time, but it is our understanding that the first floor level will be set between Elev. 110 and Elev. 116 while the related basement level will be set between Elev. 98 and Elev. 104. Perimeter retaining walls will be used to support the grade difference between the interior and exterior grades.

The structure will utilize pre-stressed tees, with concrete beams and concrete columns. Column loads are estimated at up to 950 kips with wall loads of approximately 44 kips per foot. Significant site grading may be necessary depending on the levels selected for the basement and first floor.

GENERAL SUBSURFACE CONDITIONS

Eight test borings were drilled during the period of April 24, through May 7, 1991 at the approximate locations shown on the Site and Boring Location Plan, Figure 2, in Appendix A. The borings were drilled by Leslie Drilling Company and were extended to depths ranging from 29.0 feet to 44.5 feet below the existing ground surface. The materials encountered are described in the Boring Logs, Figures 3 through 10 in Appendix A. A Boring Log Legend has been included as Figure 11. Laboratory test results are included on the Boring Logs where appropriate, and are also graphically shown as Figures 12 through 17 in Appendix B.

The test borings revealed that the site is generally underlain by 3 different geologic formations, which consists of a thin surface mantle of fill and residual silts, over an erratic rock formation of volcanic cinders and sand-and gravel-sized volcanic rock fragments (Aa clinker), over hard, massive basalt. The general subsurface conditions are summarized below:

Subsurface Condition Summary

Boring No.	Ground Surface Elev. (ft.)	Layer Thicknesses (ft.) Fill/Nat. Silts	Cinders/Clinker	Depth to Hard Basalt (ft)
1	Elev. 110±	8.5'	14.0'	22.5' (Elev. 87±)
2	Elev. 116±	2.5'	7.5'	10.0' (Elev. 106±)
3	Elev. 104±	2.5'	7.5'	10.0' (Elev. 94±)
4	Elev. 115±	2.0'	9.5'	11.5' (Elev. 104±)
5	Elev. 112±	3.0'	2.0'	5.0' (Elev. 107±)
6	Elev. 106±	0	10.0'	10.0' (Elev. 96±)
7	Elev. 109±	6.0'	13.0'	19.0' (Elev. 90±)
8	Elev. 113±	1.5'	7.0'	8.5' (Elev. 104±)

Except for the area of Boring 6, the site is covered by a mantle of sandy, or clayey silts, which is generally about 2.5 feet thick, but varies from 2.0 feet to 8.5 feet in thickness. The silts are moderately to highly plastic, and exhibited very stiff consistencies, high shear strengths, and no expansion potential. The silt layer appears thickest at Borings 1 and 7, which were drilled in the northwestern quadrant of the building area. Boring 6 was drilled in an area previously excavated for the existing parking lot and the silt layer was likely removed during the previous site grading.

The surface silts are underlain by an erratic cinder and Aa clinker formation which is generally about 7 to 8 feet thick, but varies from as thin as 2 feet at Boring 5 to as thick as 14 feet at the adjacent Boring 1. The composition of the formation is considerably variable and ranges from loose to medium dense volcanic cinders and silty sand-and gravel-sized volcanic rock fragments to highly weathered, soft to medium hard weakly welded clinker.

Hard, moderately weathered to fresh massive basalt was encountered below the cinder/clinker formation and extended to the bottom of all of the borings at depths of 29.0 to 44.5 feet below the existing ground surface. The depth to the rock varied from as shallow as 5 feet at Boring 5 to as deep as 23 feet at Boring 1, or between approximately Elev. 87 and Elev. 107. In general, the basalt layer appears to slope down toward the northwest corner of the site with a localized high point in the vicinity of Borings 2, 5, and 8.

Groundwater was not encountered in any of the test borings during the investigation.

DISCUSSION

We believe that the proposed site may be adequately developed to satisfactorily support the proposed structure and its related appurtenances provided the recommendations of this report are closely followed. The subsurface investigation has revealed that the site is underlain by a surface mantle of very stiff silts, over an erratic cinder/clinker formation, over hard, massive basalt.

The most significant of these three formations is the cinder/clinker layer which can directly affect the foundation selection and structural design of the building, depending on the selected finish floor levels. As indicated by the borings, this layer varies significantly in thickness, composition, and quality across the site. The supportive characteristics of the formation ranges from relatively hard, incompressible welded clinker to moderately compressible, loose to medium dense volcanic cinders and broken clinker.

Although a shallow foundation system bearing on these materials is possible, it would require relatively large foundations with a reduced bearing capacity of no more than 2,000 pounds per square foot (p.s.f.) to reduce the total and differential settlements to approximately 3/4 inch. The problem is compounded by the fact that portions of the structure would be founded on the massive basalt or welded clinker with adjacent foundations bearing on the loose to medium dense cinders, resulting in abrupt differential settlements between adjacent footings. The foundations and the super structure would have to be designed to accommodate these abrupt differential settlements.

In view of the difficulties involved in using this upper layer to support the structure, we believe that it is simpler and more prudent to extend all foundations to bear on the hard basalt underlying the clinker formation, at depths of 5 to about 23 feet below the existing ground surface. The underlying basalt would provide relatively high bearing capacities with negligible settlements.

The actual type of foundation selected would be directly dependent on the ground floor level, i.e. the first floor level and basement level, which is selected for the structure. Although they have not been determined at this time, it is our understanding that the first

floor and its corresponding basement level can vary from as low as Elev. 110 and Elev. 98, respectively (Elev. 110/98), to as high as Elev. 116 and Elev. 104 (Elev. 116/104). The lower level would favor a shallow foundation system since the boring information indicates that hard basalt would generally be less than 6 feet below the ground floor levels except in the northwestern quadrant, where the basalt appears to be 8 to 11 feet below the lower floor. However, selection of this level would necessitate the excavation of some of the basalt in the vicinity of Boring 5. The underlying basalt is massive and we believe that the removal of significant thicknesses of this layer would result in some excavation difficulties and increased costs. Excavations in the upper cinder/clinker formation can probably be completed utilizing standard excavating equipment, although the welded clinker sections and hard seams in the formation will require heavy rock excavating equipment and the use of hoerams.

Selection of the upper floor level at Elev. 116/104 would minimize the excavation of hard basalt, but would result in the finish floor levels being approximately 10 to 17 feet above the supportive basalt formation for most of the building except in the area of Boring 5. Due to the depth required to install spread or continuous foundations bearing on the basalt, it will likely be more economical and expeditious to support the structure using cast-in-place drilled piers socketed into the basalt. The most economical foundation system will depend on the levels selected for the basement and ground floor, and its selection should be based on a comparative cost analysis of the foundation's system and excavation costs once the finish floor levels have been selected.

Depending on the floor level chosen, the ground floor levels of the structure may rest on fill required to establish the higher floor level, the very stiff surface silts, the erratic medium dense clinker and volcanic cinder formation, or massive basalt. Each of these formations would require some special consideration during the earthwork to properly support the concrete slabs-on-grade.

The surface silts and fill material required to obtain the higher floor level at Elev. 116 can be compacted in accordance with standard construction methods. Massive basalt beneath the concrete slabs should be undercut below the bottom of the concrete slab to allow the placement of the slab cushion to prevent point loads on the concrete slab. Where the medium dense Aa clinker and volcanic cinders are encountered the materials should be proof-rolled with a heavy vibratory compactor to densify the materials in-place prior to the construction of the slab.

Materials excavated from the site will generally consist of moderately plastic silts, or granular volcanic cinders and sand-and gravel-sized clinker, which should provide suitable fill and backfill for the earthwork construction provided the materials are processed to remove the oversized materials. The use of the granular cinders and gravel-sized clinker material is preferable over the cohesive silts.

Groundwater was not encountered in any of the test borings during this investigation and should not be a factor in the proposed foundation construction. However, all below grade walls should be provided with waterproofing and transverse drains.

RECOMMENDATIONS

Site Preparation

1. Prior to the start of actual grading operations, the site should be cleared of all above ground vegetation, concrete slabs, and other deleterious materials in accordance with Section 10 of the Standard Specifications for Public Works Construction of the City and County of Honolulu (Standard Specifications). This material includes any debris generated by the demolition of the existing structures. The cleared materials should be wasted off site.

2. The site should then be stripped of the near surface organic materials and roots. Although the actual depth of stripping can best be determined in the field, it is anticipated that 2 to 4 inches should be sufficient.

3. Existing utilities passing beneath or immediately adjacent to the site, which can affect the planned construction should be removed and rerouted. Where the trenches extend below the planned finish floor levels, the trenches should be cleaned out to hard natural ground and backfilled in accordance with the grading recommendations once the utilities have been removed.

Site Grading

4. Once the site has been properly prepared, site grading may commence to generate the finish floor levels. Based on the present range of floor levels, it is anticipated that at least some excavation will be required to construct the basement on the western portion of the site. The majority of the excavation should encounter the near surface silts, weathered volcanic cinders and clinker which can likely be removed with large earth excavating equipment.

5. Localized areas within this cinder/clinker formation will consist of welded clinker or weathered basalts, while the deeper portions of the excavation will likely encounter hard basalt. The use of heavy rock excavating equipment and hocrams should be anticipated to remove these materials.

6. The natural cinder/clinker formations beneath the near surface silts will generally consist of a granular material which should provide a competent Select Fill for use as fill or backfill during the site grading provided it is segregated from the surface silts. The select fill should consist of minus 3 inch, granular material with no more than 20 percent passing the 200 sieve and a plasticity index of no more than 20.

7. The excavated areas should extend a sufficient depth below the floor slabs to allow the placement of the six-inch thick slab cushion beneath the concrete slabs-on-grade. Any high points generated by the excavation of the basalt should be broken out at least 6 inches below the bottom of the slab to minimize point loads on the slabs.

8. The loose to medium dense clinker deposits encountered at the subgrade level should be densified through vibrocompaction with no less than 5 passes of a heavy vibratory compactor, such as a Raygo 303A vibratory compactor, or its equivalent, capable of imparting at least 16,000 pounds of dynamic force to the underlying subgrade.

9. Soil areas designated to receive fill or concrete slabs-on-grade should be scarified, moisture conditioned to within 3 percent of the soil's optimum moisture content and uniformly compacted to at least 90 percent relative compaction as determined by Laboratory Compaction Test ASTM D1557 for a minimum depth of 6 inches.

10. Fill required to establish the higher ground floor level should be placed in level lifts of no more than 8 inches in loose thickness, moisture conditioned to within 3 percent of the optimum moisture content and uniformly compacted to at least 90 percent to relative compaction as determined by the above referenced test.

11. Should imported fill be required, it should consist of a non-expansive granular material, free of organics, rocks, or soil clods larger than 6 inches in diameter with a plasticity index of no more than 15.

12. Temporary cut slopes in the surface silts and cinder/clinker formation should be sloped at no steeper than 1H:1V. All excavations should be shored and braced by the contractor in accordance with the applicable safety requirements. Due to the proximity of the existing drain line along East-West Road on the western side of the site, shoring and bracing may be required along this section of the excavation, or the line may have to be underpinned.

Foundations

13. We believe that the proposed structure can be supported by either a shallow foundation system consisting of spread or continuous foundations bearing on the underlying massive basalt, or 24-inch diameter cast-in-place drilled piers socketed at least 1 foot into the underlying basalt. Either system should satisfactorily support the structure with negligible settlements. The actual system chosen would be dependent on the level selected for the basement and first floor of the structure. Recommendations for each type of foundation system are given below:

Shallow Foundation System

14. Should the lower ground floor level be at Elev. 110/98, we believe that a shallow foundation system consisting of spread or continuous footings, or a combination of these two types, bearing on the massive basalt would be the most economical system to support the structure.

15. The foundations should be embedded a minimum of 6 inches into the hard, moderately to slightly weathered basalt where they may be designed for an allowable

bearing capacity of 10,000 pounds per square foot. This value may be increased by 1/3 for short term transient loads. Total and differential settlements exceeding 1/4 inch are not anticipated.

16. Continuous wall foundations should have a minimum base width of 2 feet while individual spread footings should have a minimum width of 3 feet.

17. Any localized voids, loose clinker pockets, or soil filled cavities encountered in the foundation excavations, should be cleaned out and filled with concrete.

18. The excavations to install the foundations will extend through the cinder/clinker formation which will likely encounter sections of welded clinker and seams of hard basalt. The use of hoerams or similar rock excavating equipment should be anticipated to remove these materials.

19. Based on the boring information, the foundation excavations may extend as much as 11 feet or more below the lower floor levels at Elev. 110/98. Adequate shoring and bracing should be provided by the contractor in accordance with the applicable governmental regulations for the foundation excavations.

20. Steel reinforcement of the foundations should be provided in accordance with the recommendations of the Project Structural Engineer.

Cast-in-Place Concrete Drilled Piers

21. Should the higher ground floor level at Elev. 116/104 be selected, it is anticipated that the depth to the supportive rock will vary between 10 and 17 feet below the planned finished floor levels, except for in the vicinity of Boring 5, where the rock was encountered as shallow as 5 feet below the existing ground surface or at approximately Elev. 107. Due to the depth of excavation required to install spread or continuous foundations, it will likely be more expeditious to utilize 24-inch diameter cast-in-place drilled piers to support the majority of the structure. Where basalt is encountered at a shallow depth, spread and continuous footings, designed in accordance with above recommendations may be used.

22. The drilled piers should be extended to between approximately Elev. 87 and Elev. 107 to bear on the underlying massive basalt.

23. The drilled piers should be spaced no closer than 3 pier diameters center to center and should be socketed at least 12 inches into the basalt, where they should develop an allowable compressive capacity of 100 tons per pier.

24. Each drilled pier should provide an allowable uplift capacity of 8 kips and a lateral resistance of 25 kips with top deflections of less than 1/4 inch provided they are fixed in a pier cap. The above values are based on the piers extending at least 6 feet below the bottom of the pier cap and at least 1 foot into the basalt.

25. At least 5 test piers should be drilled and installed across the site prior to the fabrication of the reinforcing steel and the installation of the piers. It is anticipated that significant variation in lengths will occur across the site for the drilled pier foundations. A full scale load test may be required should erratic conditions be encountered at the pier bearing levels.

26. The structural design of the drilled piers and pier caps should be in accordance with the recommendations of the Project Structural Engineer. Total and differential settlements exceeding 1/4 inch are not anticipated for the pier foundations.

27. Construction of the drilled piers will likely require steel casing to prevent caving of the volcanic cinders and loose clinker deposits, and rock coring equipment will be required to penetrate the hard basalt seams and to socket the bottom of the pier into the massive basalt.

28. The bottom of the pier shaft should be cleaned out of all cuttings and debris prior to the placement of the reinforcing steel. The concrete should be piped to the bottom of the shaft and should not be allowed to freefall into the pier shaft. The pipe may be raised as the concrete is poured provided it maintains a minimum of embedment depth of at least 3 feet below the top of the concrete surface to prevent the entrapment of debris within the pier.

29. After the concrete has been poured, the pier casing should be removed carefully. If a delay of more than 1 hours occurs at anytime between the pouring of the concrete and the removal of the casing, the casing should not be pulled any further but should be left in place with the unburied section cutoff.

30. In general, the installation of the drilled piers should be in accordance with the above recommendations and the Standards and Specifications for the Foundation Drilling Industry by the International Association of Foundation Drilling.

31. Backfill around the drilled pier caps should be placed and compacted in accordance with the grading recommendations.

32. Due to the erratic nature of the underlying basalt formations, deviations should be anticipated in the length of the drilled piers. The contract documents and the design of the reinforcing steel should include provisions to accommodate the varying lengths.

Retaining Walls

33. The retaining wall foundations should be designed in accordance with the foundation recommendations and should all be founded on moderately to slightly weathered basalt or supported on drilled piers extending into the basalt formation.

34. Where the retaining wall foundations rest directly on the basalt a coefficient of friction 0.60 may be used at the contact surface between the bottom of the wall foundation and the supportive basalt to resist sliding. A passive resistance of 500 pounds per cubic foot equivalent fluid pressure may be used for keyways cut into intact basalt.

35. The lateral pressures exerted on the walls will be dependent on the type and slope of backfill placed behind the wall, and the allowable wall movements. The unyielding basement retaining walls should be designed for an at-rest lateral earth pressure of 55 pounds per cubic foot equivalent fluid pressure for the level backfill condition using the Select Fill recommended in the grading recommendations as the backfill material. The above lateral earth pressures do not include foundation, surcharge, or hydrostatic pressures which should be added where appropriate.

36. The backfill should be placed in accordance with the grading recommendations but should be compacted to no more than 95 percent relative compaction to minimize the lateral earth pressures exerted on the walls.

37. Adequate drainage should be provided behind the walls in the form of transverse drains surrounded by a minimum of 12 inches of filter gravel or ASTM D448 No. 6 gravel (3B fine) wrapped in filter fabric, to minimize the buildup of hydrostatic pressures behind the wall. All below grade walls should be provided with waterproofing.

Concrete Slabs-on-Grade

38. Concrete slabs-on-grade may be used provided the grading recommendations have been followed. This will assure that the concrete slabs will rest on a subgrade consisting of either rock, select fill or the on-site soil compacted to at least 90 percent relative compaction.

39. The concrete slabs should be underlain by a minimum of 6 inches of slab cushion consisting of 4 inches of lightly-compacted ASTM D448 No. 6 Gravel (3B Fine), a vapor barrier, and 2 inches of sand. The gravel should be placed on the compacted subgrade or rock surface to act as a capillary break. A vapor barrier should be provided over the gravel, and 2 inches of sand should be provided between the concrete slabs and the vapor barrier to promote even slab curing and to minimize shrinkage cracks.

40. Steel reinforcement of the concrete slabs should be provided as directed by the Project Structural Engineer.

Quality Control

41. The site preparation and site grading should be monitored by FGE, Ltd. with intermittent density tests taken to determine whether the specified levels of compaction are consistently attained.

42. Samples of proposed fill and backfill materials should be submitted to FGE, Ltd. no less than 7 working days prior to their intended jobsite delivery to allow adequate time for testing, evaluation, and approval.

43. Foundation excavations, or the installation of the drilled piers should be monitored by FGE, Ltd. to determine whether the anticipated bearing materials have been

encountered. The recommendations contained herein are contingent upon adequate construction monitoring of the geotechnical phases of the construction by FGE, Ltd.

Miscellaneous

44. Adequate drainage should be provided in the design of the project to preclude the ponding of water adjacent to or beneath the structure and its foundations.

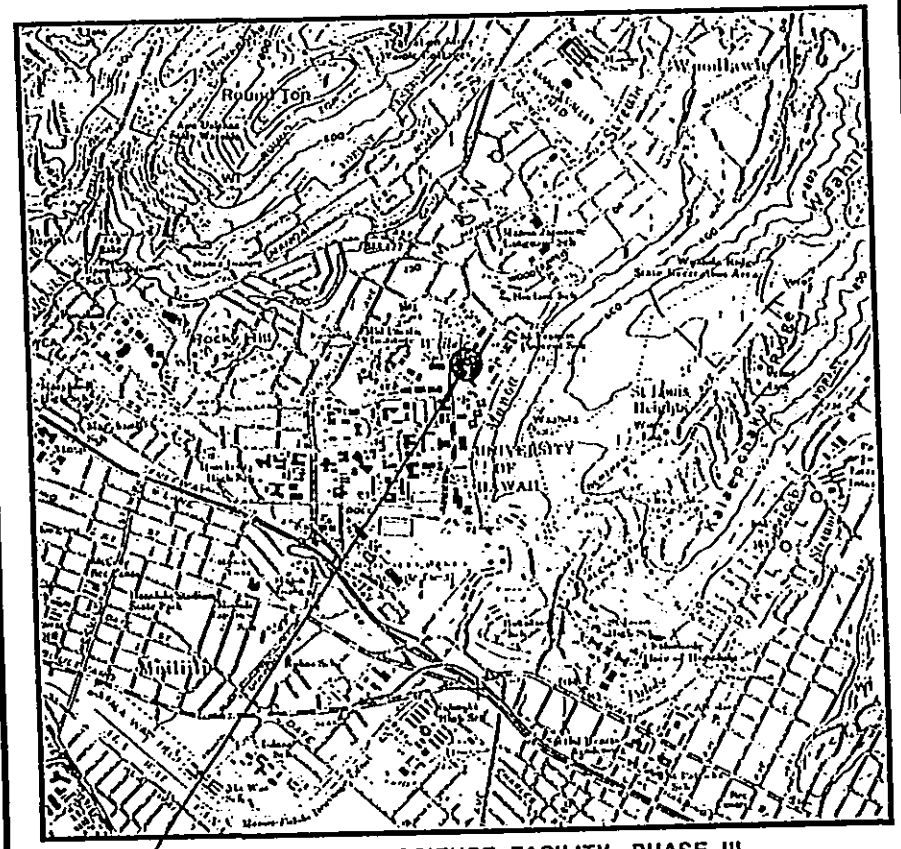
45. Utility trenches should be backfilled and compacted in accordance with the grading recommendations and Section 11 of the Standard Specifications using the appropriate mechanical compactors above and around the pipes. Jetting and ponding of the backfill should not be allowed.

46. Adequate shoring and bracing should be provided by the Contractor in accordance with the applicable governmental regulations for all utility trenches and other similar deep excavations.

47. The use of hoerams and similar rock excavating equipment should be anticipated for the installation of the utilities.

Limitations

48. This report has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. The limitations of this investigation are summarized in Appendix C.



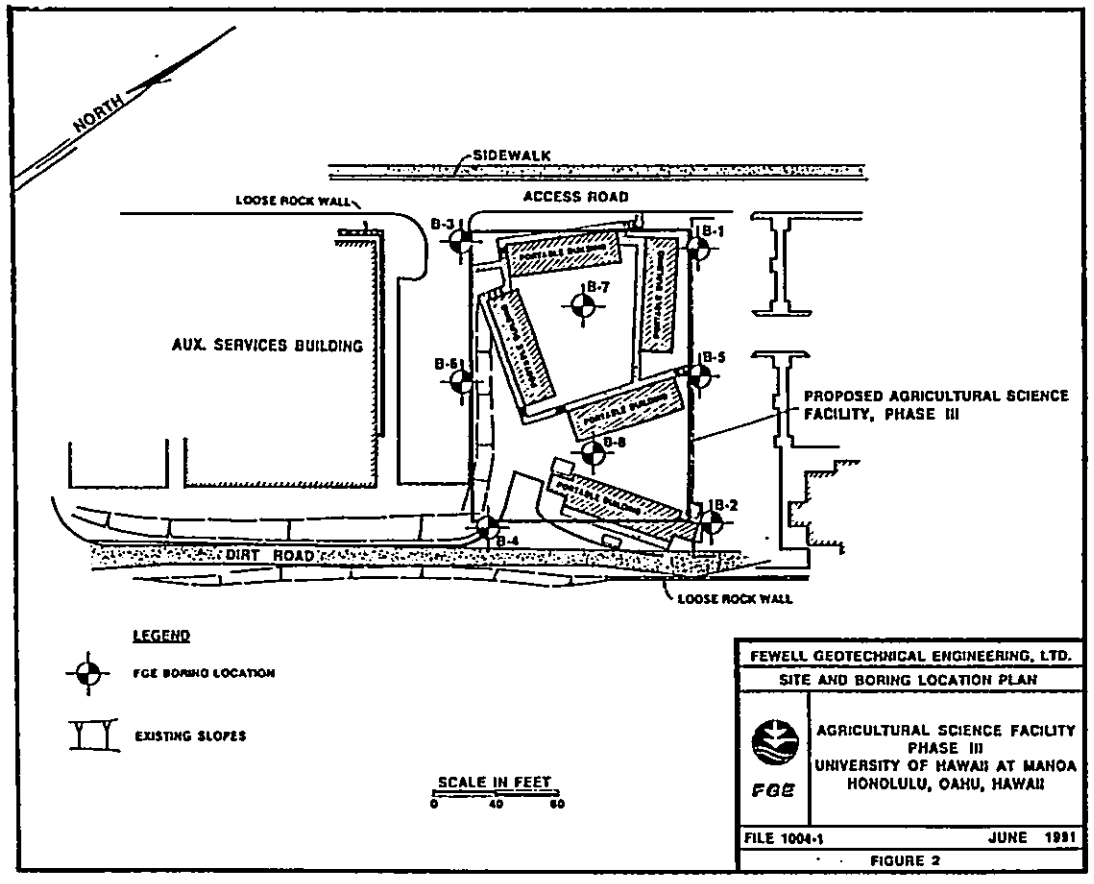
AGRICULTURAL SCIENCE FACILITY, PHASE III
UNIVERSITY OF HAWAII AT MANOA, HONOLULU, OAHU, HAWAII

PROJECT LOCATION MAP
1" = 2000'

REFERENCE:
HONOLULU QUADRANGLE
U.S.G.S. TOPOGRAPHIC MAP

GENERAL AREA:
MANOA, OAHU, HAWAII

FEWELL GEOTECHNICAL ENGINEERING, LTD.
FILE 1004-1 FIGURE 1



Boring: 1 **File:** 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 110' ±
Depth to Water: None Encountered
F.G.E. Ltd. **Completion Date:** 4-26-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
					0	8" Pavement Section
LL=63, PI=20 Direct Shear: Ø=38° C=150 p.s.f. 0% Swell	33	81	51	1		Dark Brown Clayey SILT (MH), very stiff, damp to moist (FILL)
	44	73	31	2	5	Brown Clayey SILT (MH) with gravel and sand, very stiff, moist (WEATHERED TUFF AND CINDERS)
Gradation: 29% Gravel 69% Sand 2% Silt	11		22	3	10	
	21	78	44	4	15	Brown Coarse SAND (SP) with gravel, medium dense, damp (CINDERS)
			46/.6" R	5	20	
			97% REC 80% ROD	NX CORE	25	Gray Fresh BASALT (F), very hard, massive
			97% REC 97% ROD	NX CORE	30	
			100% REC	NX	35	

Figure 3 a

F.G.E. Ltd.

Boring: 1 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 110' ±
Depth to Water: None Encountered
Completion Date: 4-26-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
			85% RQD	CORE		Gray Fresh BASALT (F), very hard, massive
					40	BOH @ 38.5'
					45	
					50	
					55	
					60	
					65	
					70	

Figure 3 b

F.G.E. Ltd.

Boring: 2 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 116' ±
Depth to Water: None Encountered
Completion Date: 4-29-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
						10" Pavement Section
Non-Plastic			43	1		Brown Sandy SILT (MH), very stiff, moist (FILL)
			63% REC 0% RQD	NX CORE	5	Brownish Gray Moderately Weathered Weakly Welded Volcanic BASALT FRAGMENTS (WM), soft to medium hard, extremely broken (A'A CLINKER)
			96% REC 50% RQD	NX CORE	10	Gray Slightly to Moderately Weathered BASALT (WS-WM), hard, moderately broken with clinkers
			100% REC 71% RQD	NX CORE	15	
			100% REC 100% RQD	NX CORE	20	
			100% REC 100% RQD	NX CORE	25	Gray Fresh BASALT (F), very hard, massive
			97% REC 97% RQD	NX CORE	30	
			100% REC	NX	35	

Figure 4 a

F.G.E. Ltd.

Boring: 2 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 116' ±
Depth to Water: None Encountered
Completion Date: 4-29-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
			100% RQD	CORE		Gray Fresh BASALT (F), very hard, massive
					40	BOH @ 39.0'
					45	
					50	
					55	
					60	
					65	
					70	

Figure 4 b

F.G.E. Ltd.

Boring: 3 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 104' ±
Depth to Water: None Encountered
Completion Date: 4-25-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
						11" Pavement Section
	49	67	21	1		Brown Clayey SILT (MH), medium stiff, moist (UNCOMPACTED FILL)
					5	Brown Coarse SAND (SM-SP) with gravel, medium dense, damp (CINDERS)
	10		71	2		Gray Moderately Weathered Weakly Welded Volcanic ROCK FRAGMENTS (WM), hard, very broken (A'A CLINKER)
			100% REC 100% RQD	NX CORE	10	
			100% REC 100% RQD	NX CORE	15	Gray Fresh BASALT (F), very hard, massive
			100% REC 100% RQD	NX CORE	20	
			100% REC 100% RQD	NX CORE	25	
					30	BOH @ 30.0'
					35	

Figure 5

F.G.E. Ltd.

Boring: 4 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 115' ±
Depth to Water: None Encountered
Completion Date: 4-24-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
LL=61, PI=20	30	73	38	1		Brown Clayey SILT (MH) with gravel, very stiff, moist (FILL)
Gradation: 21% Gravel 57% Sand 22% Silt	24		33	2	5	Brownish/Gray Silty Sand and Gravel sized VOLCANIC ROCK FRAGMENTS (SM), medium dense to dense, damp (CLINKER)
	19	90	65	3	10	Gray Highly to Moderately Weathered Vesicular BASALT (WM), medium hard, moderately broken
			40/.4' R	4	15	
			97% REC 97% RQD	NX CORE	20	Gray Fresh BASALT (F), very hard, massive
			100% REC 100% RQD	NX CORE	25	
			100% REC 100% RQD	NX CORE	30	
			100% REC 97% RQD	NX CORE	35	

Figure 6 a

F.G.E. Ltd.

Boring: 4 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 115' ±
Depth to Water: None Encountered
Completion Date: 4-24-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
					40	Gray Fresh BASALT (F), very hard, massive
						BOH @ 37.5'
					45	
					50	
					55	
					60	
					65	
					70	

Figure 6 b

F.G.E. Ltd.

Boring: 5 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 112' ±
Depth to Water: None Encountered
Completion Date: 4-29-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
						11" Pavement Section
LL=52, PI=16	27	82	47	1		Brown Clayey SILT (MH) with sand and gravel, very stiff, moist (FILL)
						Grayish/Brown Moderately to Highly Weathered BASALT (WM-WH), medium hard, moderately broken with clinkers
			92% REC 92% RQD	NX CORE	5	
			100% REC 90% RQD	NX CORE	10	
			97% REC 95% RQD	NX CORE	15	Gray Fresh BASALT (F), very hard, massive
			100% REC 97% RQD	NX CORE	20	
			100% REC 100% RQD	NX CORE	25	
					30	BOH @ 29.0'
					35	

Figure 7

F.G.E. Ltd.

Boring: 6 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 106' ±
Depth to Water: None Encountered
Completion Date: 4-25-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
						11" Pavement Section
	19		16	1		Brown Well Graded SAND (SW) with gravel, loose to medium dense, damp
Gradation: 18% Gravel 80% Sand 3% Silt	14	89	75/.9" R	2	5	Grades to slightly cemented (CINDERS)
			35/0" R	3		Brownish/Gray Highly Weathered Vesicular BASALT (WS-WM), soft, moderately broken with clinkers
			100% REC 100% RQD	NX CORE	10	
			100% REC 97% RQD	NX CORE	15	Gray Fresh BASALT (F), very hard, massive
			100% REC 100% RQD	NX CORE	20	
			100% REC 95% RQD	NX CORE	25	
					30	BOH @ 29.5'
					35	

Figure 8

F.G.E. Ltd.

Boring: 7 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 109' ±
Depth to Water: None Encountered
Completion Date: 5-6-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
LL=52, PI=20 Gradation: 18% Gravel 76% Sand 6% Silt	14		10	1	5	Brown Clayey SILT (MH) with sand, very stiff, moist (CINDERS)
	15	81	18	2	10	Brown Silty Coarse SAND (SM-SP) with gravel, loose to medium dense, damp Grades to dense and slightly cemented
			45/.7' R	3	15	
			50/.3' R	4		(CINDERS)
			97% REC 70% RQD	NX CORE	20	
			100% REC 78% RQD	NX CORE	25	Gray Fresh BASALT (F), very hard, massive
			97% REC 62% RQD	NX CORE	30	
					35	BOH @ 33.5'

Figure 9

F.G.E. Ltd.

Boring: 8 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 113' ±
Depth to Water: None Encountered
Completion Date: 5-2-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
Gradation: 49% Gravel 35% Sand 16% Silt	35		13	1	5	Brown Clayey SILT (MH) with gravel, stiff, damp (FILL)
			62/.9' R	2		Brown Silty GRAVEL (GM) with sand, loose to medium dense, damp (WEATHERED CLINKER)
			20/0" R	3	10	
			88% REC 58% RQD	NX CORE		Gray Slightly Weathered Vesicular BASALT (WS), hard, occasionally broken with clinkers
			100% REC 85% RQD	NX CORE	15	Grades to massive (WELDED A'A CLINKER)
			100% REC 90% RQD	NX CORE	20	
			100% REC 100% RQD	NX CORE	25	Gray Fresh BASALT (F), very hard, massive
			100% REC 100% RQD	NX CORE	30	
					35	

Figure 10 a

F.G.E. Ltd.

Boring: 8 File: 1004-1
Project: Agricultural Science Facility, Phase III, Manoa, Honolulu, Hawaii
Surface Elevation: 113' ±
Depth to Water: None Encountered
Completion Date: 5-2-91

LAB TEST RESULTS	MOIST CONT. %	DRY WT. PCF	BLOWS PER FT.	SAMPLE	DEPTH	CLASSIFICATION
			100% REC 100% RQD	NX CORE		
			100% REC 100% RQD	NX CORE	40	Gray Fresh BASALT (F), very hard, massive
					45	BOH @ 44.5'
					50	
					55	
					60	
					65	
					70	

Figure 10 b

BORING LOG LEGEND

MAJOR ROCK TYPES

- BASALT
- TUFF
- DECOMPOSED ROCK
- CORAL

MAJOR SOIL TYPES

- GRAVEL
- SAND
- SILT
- CLAY
- PEAT/ORGANICS

SECONDARY CLASSIFICATION

- GRAVELLY
- SANDY
- SILTY
- CLAYEY

SAMPLING SYMBOLS

- 3" O.D. UNDISTURBED SAMPLE
- 3" O.D. DISTURBED SAMPLE
- 2" O.D. STANDARD PENETRATION SAMPLE
- NO RECOVERY
- SHELBY TUBE
- NX-CORE
- WATER LEVEL

FEWELL GEOTECHNICAL ENGINEERING, LTD.
FILE 1004-1 FIGURE 11

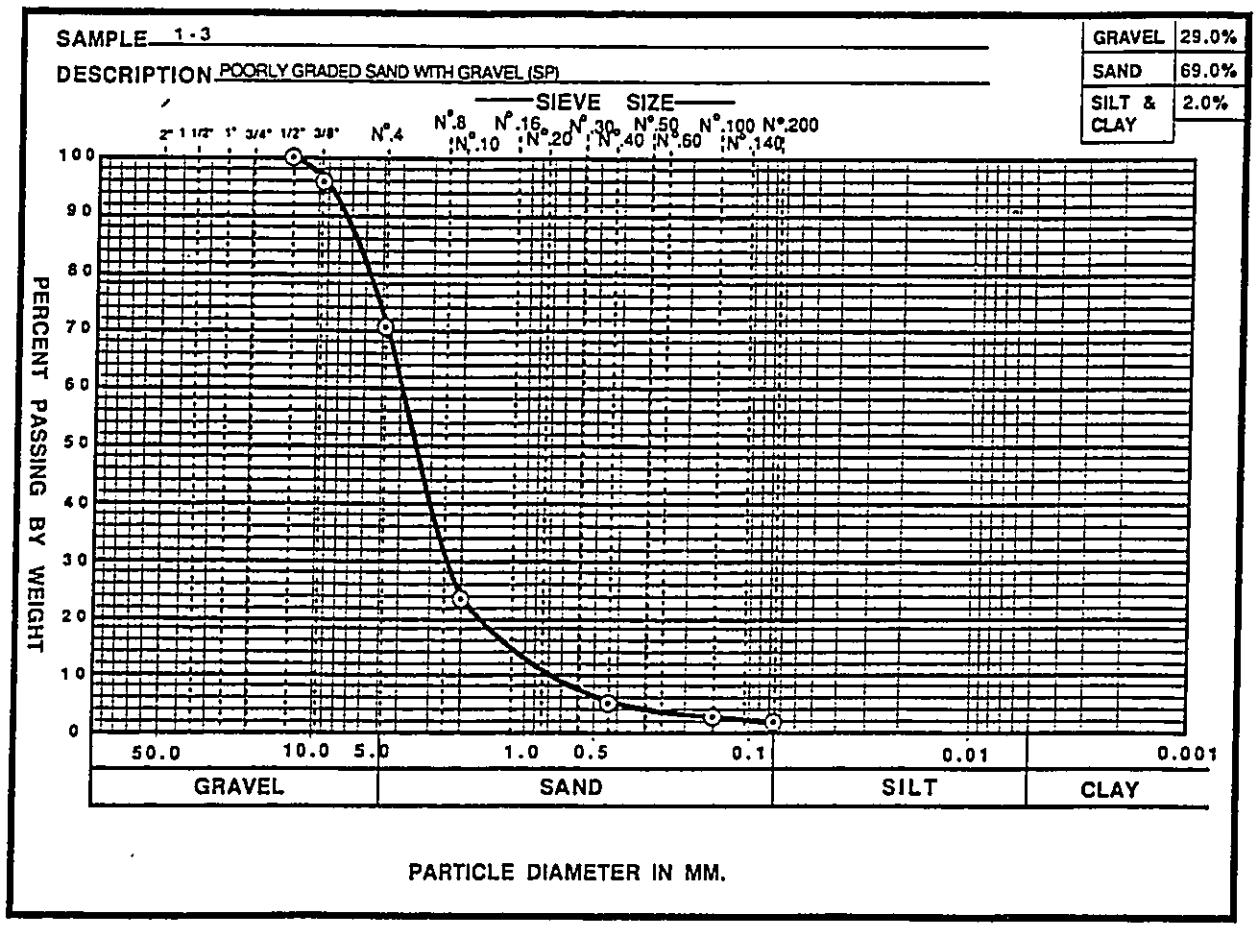
APPENDIX B

Laboratory Testing Summary

Project Designation: Agricultural Sciences Facility, Phase III — File: 1004-1
University of Hawaii at Manoa

Location: Honolulu, Hawaii

	Sample No.	Figure Designation
Gradation Charts:	1-3	12
	4-2	13
	6-1	14
	7-2	15
	8-1	16
Plasticity Chart:	1-2	17
	2-1	17
	4-1	17
	5-1	17
	7-1	17

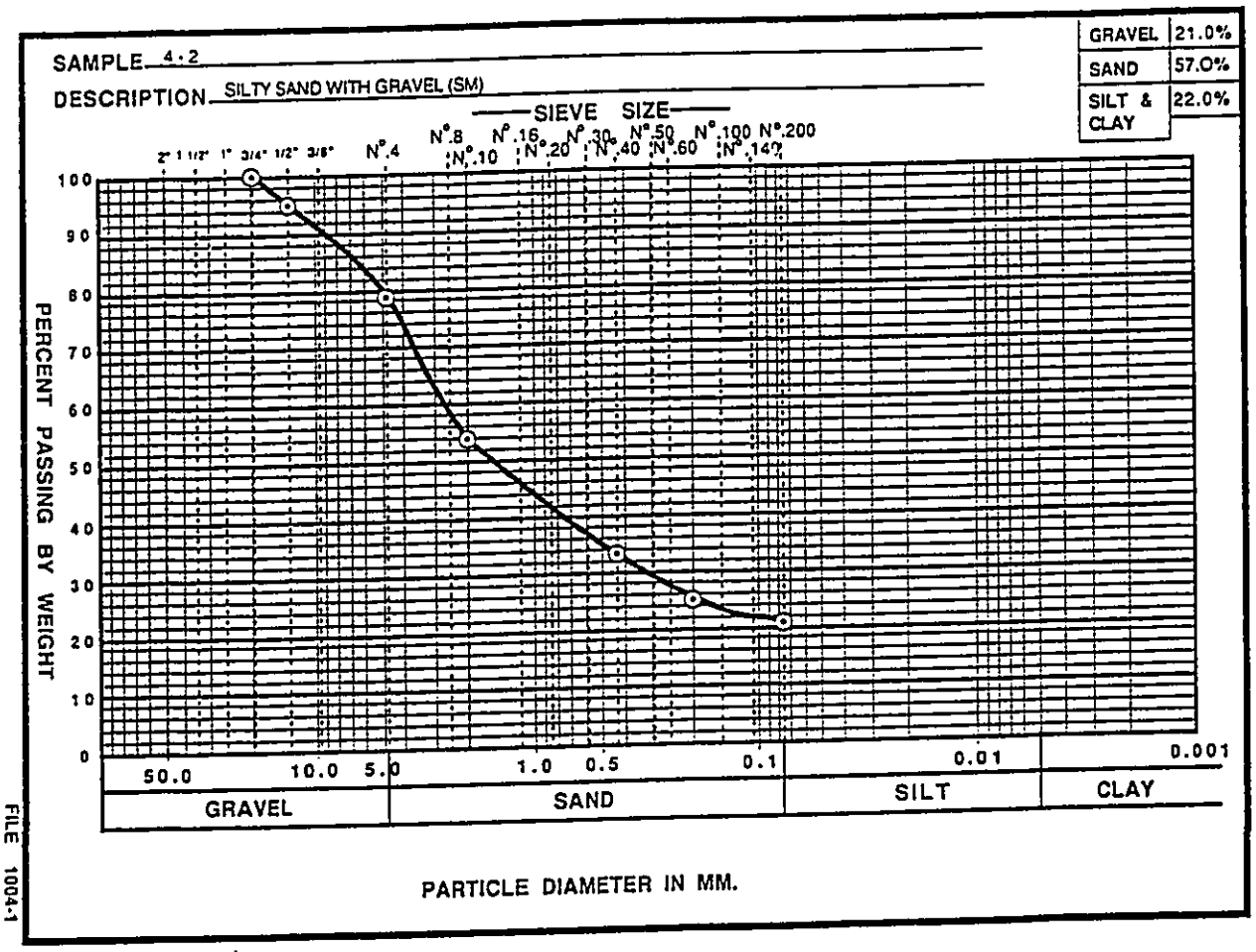


FILE 1004-1
FIGURE 12

SAMPLE 4-2

DESCRIPTION SILTY SAND WITH GRAVEL (SM)

GRAVEL	21.0%
SAND	57.0%
SILT & CLAY	22.0%

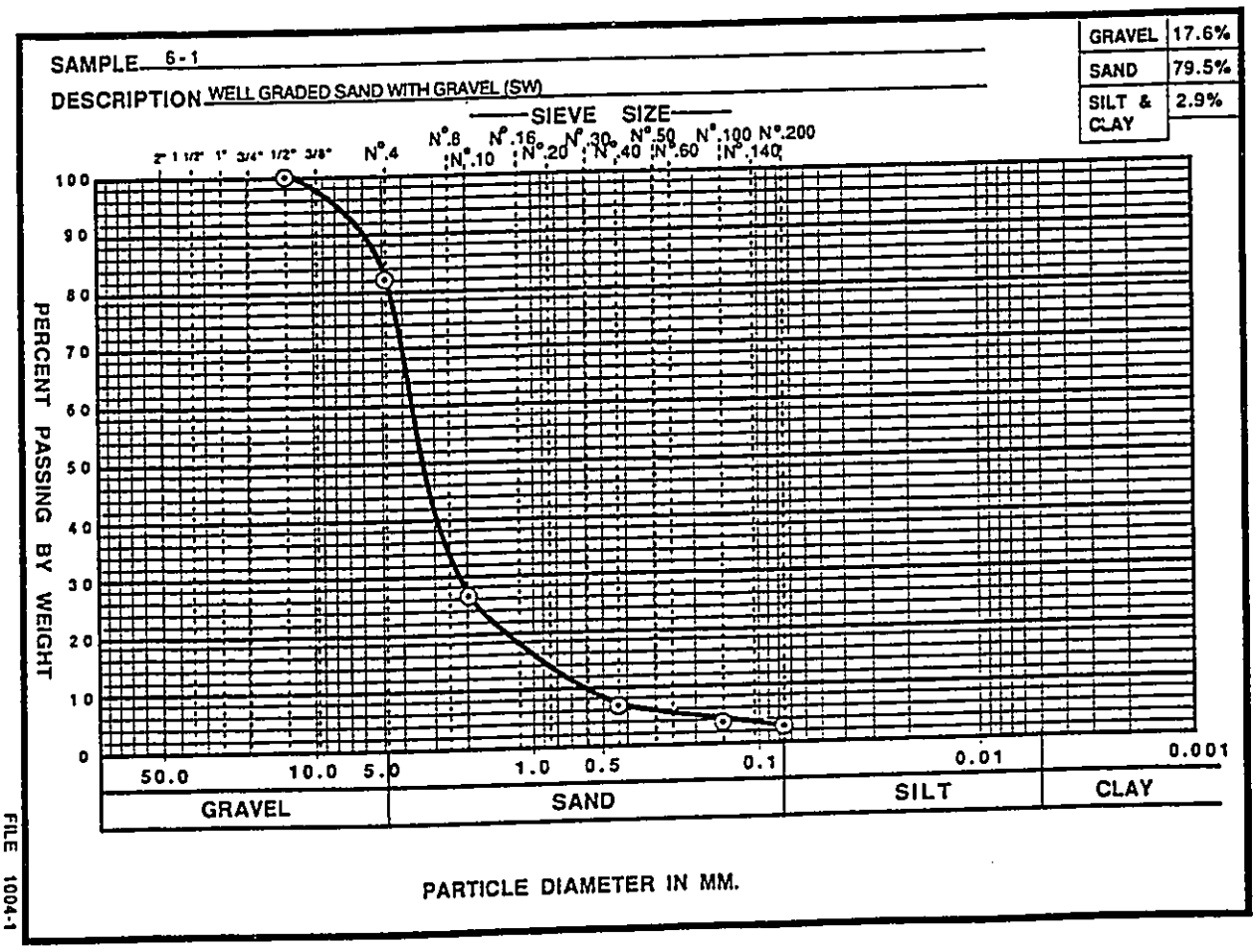


FILE 1004-1
FIGURE 13

SAMPLE 6-1

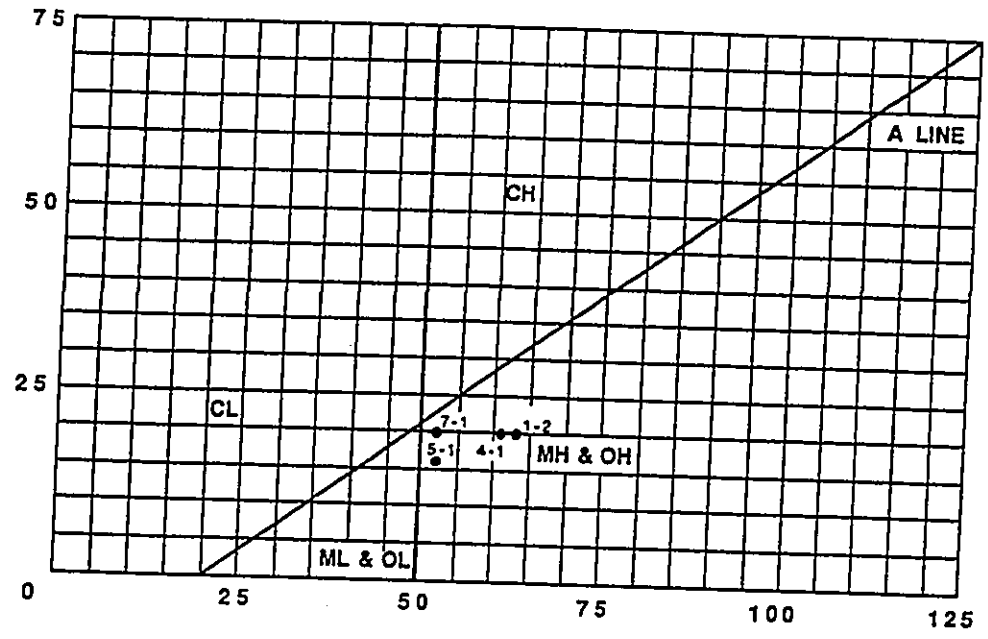
DESCRIPTION WELL GRADED SAND WITH GRAVEL (SW)

GRAVEL	17.6%
SAND	79.5%
SILT & CLAY	2.9%



FILE 1004-1
FIGURE 14

PLASTICITY CHART



FEWELL GEOTECHNICAL ENGINEERING, LTD.
FILE 1004-1
FIGURE 17

APPENDIX C

LIMITATIONS

This report has been prepared for the exclusive use of the State of Hawaii, Department of Accounting and General Services, for the proposed Agricultural Science Facility, Phase III, at the University of Hawaii at Manoa in Honolulu, Oahu, Hawaii in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

The analysis, conclusions and recommendations submitted in this report are based in part upon the present limited design information, the data obtained in the test borings, and upon the assumption that the soil conditions do not deviate from those observed. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that planned at the present time, FGE, Ltd. should be notified so that supplemental recommendations can be given. The conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by soil samples, test borings, or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Some contingency funds are recommended to accommodate such potential extra costs.

The site investigation for this report may not have disclosed the presence of underground structures, such as cesspools, drywells, storage tanks, etc. that may be present at the site. Should these items be encountered during construction, FGE, Ltd. should be notified to provide recommendations for their disposition. The cost for these services was not included within the fee for this investigation.

The boring locations were approximately determined by the drilling contractor, Leslie Drilling Company, using tape measurements from existing physical features. Elevations were approximately determined from the plan contours. The location and elevation of the borings should be considered accurate only to the degree implied by the methods used.

Groundwater was not encountered in any of the test borings of this investigation. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tides, temperature, and other factors not present at the time the measurements were made.

FGE, Ltd. should be provided the opportunity for general review of the final design drawings and specification in order that the earthwork and foundation recommendations may be properly interpreted and implemented in the design and specification. If FGE, Ltd. is not accorded the privilege of making this recommended review, it can assume no responsibility for misinterpretations of the recommendations.

FGE, Ltd. should also be retained to provide periodic soil engineering services during construction. This is to observe compliance of the design concepts, specifications and recommendations and to allow design changes in the event the subsurface conditions differ from that anticipated prior to construction. The recommendations contained herein are contingent upon adequate construction monitoring of the geotechnical phases of the construction by FGE, Ltd.

TEMED	50G	100G
TERT-BUTYL ALCOHOL	500L	1L
TETRACYCLINE	5G	25G
2-THIOBARBITURIC ACID	50G	100G
THIAMINE.HCL	5G	10G
DL-6,8-THIOCTIC ACID	200MG	500MG
L-THREONINE	0.5G	1G
THYROGLOBULIN	5G	5G
THYROGLOBULIN-AGAROSE	5ML	10ML
alpha-TOSYL-L-LYSINE CHLORO-METHYL KETONE, HCL	20MG	50MG
Nalpha-TOSYL-L-PHENYLALANINE CHLOROMETHYL KETONE	100MG	250MG
TRICHLOROACETIC ACID	1KG	2KG
2,4,5-TRICHLORO-PHENOXYACETIC ACID	50MG	100MG
TRIS HYDROXYMETHYL AMINOMETHANE	15KG	20KG
TRITON X-100	200ML	500ML
TRYPTONE	1KG	2KG
L-TRYPTOPHAN	0.5G	1G
TUNICAMYCIN	5MG	10MG
TWEEN 20	50ML	100ML
TWEEN 40	50 ML	100ML
TWEEN 80	50ML	100ML
L-TYROSINE	0.5G	1G
UREA	5KG	8KG
L-VALINE	0.5G	1G
VITAMINS (COMBINATION KIT)	10G	10G
XYLENE CYANOLE FF	5G	25G
XYLITOL	50G	500G
YEAST EXTRACT	3KG	5KG
ZINK SULFATE	50G	500G

Department of Food Science and Human Nutrition

ITEM	CHEMICALS CONSUMED/YR. Est. Qty. to be used, unit(s)	MAXIMUM TO BE STORED Est. quantity, unit(s)
Chemicals		
Celite 545	1 lb.	2 lb.
Cellex HX	100 g.	1 kg.
CGC-270, Ion/exchange Resin	1 lb.	2 lb.
Chloesterol	25 g.	100 g.
Citric Acid	1 kg.	2 kg.
p-Coumeric Acid	25 g.	50 g.
Curpric Chloride	500 g.	500 g.
Curpric Oxide	0.5 lb.	500 g.
Curpric Sulfate	5 lb.	10 lb.
Cyclamic Acid	100 g.	100 g.
Darco G-60 Activated Carbon	2 lb.	4 lb.
Decanoic Acid	100 g.	100 g.
3, 5-Dimethoxybenzidine	25 g.	25 g.
3, 5-Dinitrosalicylic Acid	100 g.	100 g.
Dowex 1-X8, Anion Exchange Resin	.25 lb.	2 lb.
Dowex 2-X, Anion Exchange Resin	1 lb.	2 lb.
Eriochrome Black T	50 g.	100 g.
Ethylene Glycol	8 pt.	2 gal.
Fumaric Acid	200 g.	200 g.
Ferric Ammonium Sulfate	0.5 lb.	1 lb.
Ferrous Ammonium Sulfate	0.5 lb.	1 lb.
Ferrous Sulfate	0.5 kg.	1 kg.
Gelatin	0.5 lb.	1 lb.
Guaiacol	.25 lb.	.25 lb.
Hemoglobin Denatured, Bovine	10 g.	25 g.
Hydroxylamine, Monohydrochloride	10 g.	100 g.
Iodine	.25 lb.	0.5 lb.
L-Ascorbic Acid	200 g.	2 kg.
Lanthanum Oxide	50 g.	250 g.
Lauco Crystal Violet	1 g.	5 g.
Lauryl Sulfate	10 g.	100 g.
Lead Acetate, Trihydrate, Granular	1 kg.	1.5 kg
Magnesium Sulfate	2 lb.	9 lb.
DL-Malic Acid	500 g.	1 kg.
L-Malic Acid	250 g.	1 kg.
Mercuric Chloride	0.5 lb.	1 lb.
Mercuric Iodide	0.5 lb.	1 lb.
Mercury(II) Oxide	100 g.	1 lb.

Estimated [redacted] Annual Chemical Consumption

Department of Food Science and Human Nutrition

ITEM	CHEMICALS CONSUMED/YR. Est. Qty. to be used, unit(s)	MAXIMUM TO BE STORED Est. quantity, unit(s)
Chemicals		
N-Acetyl-L-Cysteine		10 g.
Acrylamide	500 g.	2000 g.
AG 50W-X8, Hydrogen form (50-100 mesh) (Cation Exchange Resin)	1 lb.	2 lb.
Arsenic Trioxide	1 oz.	4 oz.
Aluminum Ammonium Sulfate	0.5 lb.	1 lb.
Aluminum Citrate Dibasic	0.5 lb.	1 lb.
Aluminum Nitrate	0.5 lb.	1 lb.
Aluminum Potassium Sulfate	0.5 lb.	1 lb.
Amberlite MB-1	1 lb.	1 lb.
Amberlite XAD-2	50 g.	1 lb.
Amido Black 10B	10 g.	100 g.
Ammonium Chloride Granular	500 g.	2 lb.
Ammonium meta-Vanadate	0.5 lb.	1 lb.
Ammonium Persulfate	0.5 g.	100 g.
Ammonium Phosphate Monobasic	1 lb.	4 lb.
Ammonium Sulfate	1 lb.	4 lb.
Ammonium Thiocyanate	50 g.	500 g.
Aniline	0.5 pt.	1 pt.
Aniline Hydrogen Phthalate	10 g.	100 g.
Anthrone	10 g.	25 g.
Aspartame	1 g.	10 g.
Barbituric Acid	100 g.	100 g.
Barium Chloride	0.5 lb.	1 lb.
Benzoic Acid	50 g.	500 g.
Blue Dextran	1 g.	10 g.
Boric Acid	100 g.	1 kg.
Boron Trifluoride	10 g.	100 g.
Brilliant Blue R	1 g.	5 g.
Butylated Hydroxy Toluene	10 g.	100 g.
Cadaverine	1 g.	10 g.
Caffeic Acid	1 g.	10 g.
Caffeine	10 g.	100 g.
Calcium Chloride Anhydrous (8 mesh)	2 lb.	5 lb.
(20 mesh)	500 g.	5 lb.
Calcium Hydroxide	50 g.	500 g.
Calcium Oxide	1 lb.	2 lb.
Calcium Phosphate Monobaric	0.5 lb.	1 lb.
Carbazole	200 g.	1 kg.
Catechol	10 g.	100 g.

Department of Food Science and Human Nutrition

ITEM	CHEMICALS CONSUMED/YR. Est. Qty. to be used, unit(s)	MAXIMUM TO BE STORED Est. quantity, unit(s)
Chemicals		
Methyl Red	0.1 oz.	1 oz.
Methyl Sulfoxide	2 pt.	1 gal.
Methylene Blue	50 g.	100 g.
Methylthymol Blue	5 g.	10 g.
N,N-Methylene-bis-Acrylamide	100 g.	200 g.
Myristic Acid	100 g.	200 g.
Ninhydrin	100 g.	200 g.
Oil Red O	1 g.	10 g.
Orange G	100 g.	100 g.
Orcinol (5-Methylresorcinol)	25 g.	100 g.
L-(+)-Ornithine Monohydrochloride	50 g.	100 g.
Oxalic Acid	2 lb.	3 lb.
o-Phenylenediamine	250 g.	500 g.
o-Phenylenediamine Dihydrochloride	25 g.	500 g.
Palladium Chloride	1 g.	2 g.
Palmitic Acid	100 g.	200 g.
Para Rosanilin Hydrochloride	10 g.	100 g.
Paraformaldehyde	500 g.	500 g.
Penicillin G Potassium	25 M U	25 M U
Phenol	4 lb.	4 lb.
Phenolphthalein	1 oz.	10 oz.
Phenosafranine	25 g.	100 g.
Phenylhydrazine Hydrochloride	50 g.	100 g.
Phosphomolybdic Acid	0.5 lb.	1 lb.
Phosphoric Acid	1 kg.	4 kg.
Phthalaldehyde	10 g.	10 g.
Pomalus, Malic Acid, Granular	250 g.	500 g.
Porapak (Type Q)	50 g.	100 g.
Potassium Bisulfate	0.5 lb.	1 lb.
Potassium Bitartrate	0.5 lb.	1 lb.
Potassium Carbonate	0.5 lb.	1 lb.
Potassium Chloride	500 g.	2 kg.
Potassium Chromate, Crystal	500 g.	1 kg.
Purified	200 g.	1 kg.
Potassium Dichromate	0.5 kg	1 kg.
Potassium Ferrocyanide	1.5 kg	2 kg.
Potassium Hydroxide	0.5 kg.	1 kg.
Potassium Iodide	1 lb.	2 lb.
Potassium Permanganate	2 lb.	3 lb.
Potassium Persulate	1 lb.	1 lb.
Potassium Phosphate	3 lb.	5 kg.
Potassium Phosphate Dibasic	1 kg.	2 kg.
Potassium Phosphate Tribasic	0.5 kg.	1 kg.

Department of Food Science and Human Nutrition

ITEM	CHEMICALS CONSUMED/YR. Est. Qty. to be used, unit(s)	MAXIMUM TO BE STORED Est. quantity, unit(s)
Chemicals		
Potassium Sodium Tartrate	0.5 lb.	1 lb.
Potassium Sulfate	0.5 kg.	1 kg.
Potassium Tartrate	500 g.	1 kg.
Putrescine	10 g.	25 g.
Pyridoxine Hydrocholide	10 g.	100 g.
Quine	10 g.	10 g.
Quine Sulfate	10 g.	10 g.
D(+)-Raffinose, Pentahydrate	25 g.	50 g.
Rhodamine B	10 g.	100 g.
Sephadex G-10	200 g.	500 g.
Sephadex G-100	50 g.	500 g.
Sephadex G-25	100 g.	500 g.
Sephadex G-50	100 g.	500 g.
Sephadex, DEAE	100 g.	500 g.
Sephadex, QAE	200 g.	500 g.
Silica Gel	500 g.	2 kg.
Silver Nitrate	8 oz.	1 lb.
Silver Sulfate	25 g.	50 g.
Sodium Acetate	1 kg.	2 kg.
Sodium Alginate	.25 lb.	1 lb.
Sodium Azide Practical	100 g.	100 g.
Sodium Bicarbonate	1 kg.	2 kg.
Sodium Bisulfite	500 g.	1 kg.
Sodium Borate	1 lb.	2 lb.
Sodium Cholide	500 g.	1 kg.
Sodium Citrate	500 g.	1 kg.
Sodium Hydrosulfite	.25 lb.	1 lb.
Sodium Hydroxide	3 kg.	5 kg.
Sodium Meta Periodate	4 oz.	4 oz.
Sodium Metabisulfite	1 lb.	2 lb.
Sodium Nitrate	2 lb.	2 lb.
Sodium Nitroferricyanide	.25 lb.	.25 lb.
Sodium Oxalate	1 lb.	2 lb.
Sodium Phosphate	1 kg.	2 kg.
Sodium Phosphate Dibasic Heptahydrate	1 lb.	1 kg.
Sodium Phosphate Dibasic, Anhydrous	1 lb.	1 kg.
Sodium Phosphate Monobasic	1 lb.	1 kg.
Sodium Phosphate Tribasic	2 lb.	1 kg.
Sodium Sulfate	2 lb.	1 kg.
Sodium Sulfite, Anhydrous	1 lb.	2 lb.
Sodium Thiosulfate	2 lb.	2 lb.
Sodium Tripolyphosphate	500 g.	1 kg.

Department of Food Science and Human Nutrition

ITEM	CHEMICALS CONSUMED/YR. Est. Qty. to be used, unit(s)	MAXIMUM TO BE STORED Est. quantity, unit(s)
Chemicals		
Sodium Tungstate	0.5 lb.	1 lb.
Sorbic Acid	50 g.	100 g.
Stannous Cholide	.25 lb.	.25 lb.
Streptomycin Sulfate	25 g.	100 g.
Sudan Black B	5 g.	10 g.
Sulfanilic Acid	4 oz.	10 oz.
Tartaric Acid	1 lb.	2 lb.
Tetrahydrofuan	4 gal.	4 gal.
Ethylenedinitrilo-Tetraacetic Acid Disodium Salt	200 g.	500 g.
Thymol Blue	7 g.	10 g.
Thymolphthalein	20 g.	100 g.
Tin(II) Chloride	10 g.	100 g.
Trichloroacetic Acid	500 g.	1 kg.
Trizma Base	500 g.	1 kg.
Trizma HCl	100 g.	1 kg.
Urea	1 lb.	2 lb.
Urocanic Acid (4-Imidazole Acrylic Acid Dihydrate)	5 g.	10 g.
Vanillin	275 g.	500 g.
Zinc, Missy	300 g.	500 g.
Zinc Chloride	1 kg.	1 kg.
Zinc Sulfate	2 lb.	2 lb.
Solvents		
Acetone	10 gal.	15 gal.
Acetone, Optima	20 l	30 l
Acetonitrile	10 gal.	15 gal.
Benzene, Purified	4 l	8 l
1-Butanol	500 ml.	1 l
Chloroform	30 l	40 l
Cyclohexane	4 l	8 l
Ethyl Acetate	4 l	8 l
Ethyl Alcohol	5 gal.	10 gal.
Ethyl Ether	10 l	10 l
Glycerol, Anhydrous	500 ml.	1 l
Hexane	12 l	16 l
Iso-Octane	2 l	4 l
Isopropyl Alcohol	5 pt.	1 gal.
2-Methoxyethanol	200 ml.	500 ml.
Methyl Alcohol	16 l	20 l

Department of Food Science and Human Nutrition

ITEM	CHEMICALS CONSUMED/YR. Est. Qty. to be used, unit(s)	MAXIMUM TO BE STORED Est. quantity, unit(s)
Solvents		
Petroleum Ether	4 gal.	4 gal.
Propanol-2	4 gal.	4 gal.
Toluene	500 ml.	1 l
Methylene Chloride	10 l	32 l
Acids		
Acetic Acid, Glacial	25 l	25 l
n-Butyric Acid	1 l	1 l
Formic Acid	5 pt.	2 gal.
Hydrochloric Acid	15 l	20 l
Lactic Acid	500 ml.	1 l
Nitric Acid	1 l	2 l
Perchloric Acid	8 l	8 l
Phosphoric Acid	5 l	10 l
Sulfuric Acid	30 l	40 l
Bases		
Ammonium Hydroxide	1x4L	8 l

17-May-90

Estimated Annual Chemical Consumption
Animal Science Dept.
Ag. Sci. III

Prefi	Common Name	Annual Amt. Used Quant.	Units	Max. Stored Quant.	Units	Class Code	Remarks
	Acetaldehyde	1	g	100	g		
	Acetic acid	64	l	65	l		
	Acetic Anhydride	2	l	2	l		
	Acetone	195	l	220	l		
	Acetonitrile	16	l	16	l		
	ACTH, 1251	200	uCi	50	uCi		
	Ammonium hydroxide	12	gal	6	gal		
	Ammonium oxalate	12	kg	6	kg		
	Androstenedione, 1251	200	uCi	50	uCi		
	Aquasol	400	l	48	l		
	Arachidic acid	1	g	25	g		
	Arachidonic acid	1	g	25	g		
	Benzene	700	ml	1	l		
	Betadyne Surgical Scrub	20	gal	10	gal		
	Boric acid	55	kg	40	kg		
	Boron trifluoride in MeOH, 14%	800	ml	1000	ml		
	Bovine serum albumin	250	g	500	g		
	Butanol	6	gal	3	gal		
tert.	Butyl alcohol	10	l	10	l		
	Butylated hydroxy toluene	50	g	1	kg		
	Butyric Acid	10	ml	500	ml		
	Calcium hydroxide	20	lb	20	lb		
	Carbon, decolorizing alkaline	1000	g	3000	g		
	Carbon dioxide	2	cyl	2	cyl		
	Carbon tetrachloride	6	gal	3	gal		
	Celite	1000	g	1	kg		
	Chloroform	16	l	4	l		
	Cholesterol	50	g	500	g		
	Chromium oxide	50	kg	50	kg		
	Compressed air	8	cyl	4	cyl		
	Cortisol, 1251	200	uCi	50	uCi		
	Cupric sulphate	10	kg	15	kg		
	Cyclohexane	1	l	4	l		
	Cysteine hydrochloric acid	20	g	150	g		
	Dextran	100	g	500	g		
	Diethyl Ether, anhydrous	120	l	60	l		
	Disodium EDTA	100	g	500	g		
	Eicosapentaenoic acid	1	g	5	g		
	Estradiol	5	g	200	g		
	Estradiol, 1251	250	uCi	100	uCi		
	Ethanol	180	l	100	gal		
	Ethanol, punctilious	123	l	15	gal		
2	Ethoxyethanol	20	l	17	l		
	Ethyl acetate	204	l	40	l		
	Ferric nitrate	150	g	500	g		
	Formic acid	10	ml	500	ml		
	Helium	3	cyl	2			
	HEPES sodium buffer	100	g	500	g		
	Heptane	500	ml	1	l		
	hexadecyltrimethylammonium brom	11	kg	17	kg		
	Hexane	40	l	20	l		
	Hydrochloric acid	60	l	70	l		
	Hydrofluoric acid	6	gal	3	gal		
	Hydrogen	4	cyl	2	cyl		
	Instrucal Instr. Disinfect.	20	gal	20	gal		
	Isoamyl alcohol	6	l	5	l		
	Isobutyric Acid	10	ml	1	l		
	Isopropyl Alcohol	10	l	8	l		
	Isovaleric acid	10	ml	500	ml		
	Iso-octane	24	l	12	l		
	Kjeldahl Digestion Mixture	90	kg	90	kg		
	Lactic Acid	10	ml	500	ml		
	Lauric Acid	1	g	5	g		
	Linoleic acid	1	g	5	g		
	Linolenic acid	1	g	5	g		
	Methanol	60	l	40	l		
	~~Methylene Chloride~~	300	ml				
	Methylene Chloride	55	l	40	l		
	Myristic acid	1	g	5	g		
	Ninhydrin	100	g	100	g		
	Nitric acid	100	l	15	l		
	Nitrogen, prepurified	116	cyl	9	cyl		
p-	Nitrophenylhydrazine	100	g	100	g		
	Oleic acid	1	g	5	g		
	Oxalic acid	21	kg	30	kg		
	Oxygen	1	cyl	1	cyl		
	Palmitic acid	1	g	5	g		
	Perchloric acid	26	l	15	l		
	Petroleum ether	420	l	64	l		
	Phenylisothiocyanate	20	ml	20	ml		
	Phosphoric acid	15	l	15	l		
	Phosporus pentoxide	500	g	1	kg		
	Potassium acetate	21	kg	13	kg		
	Potassium hydroxide	15	kg	10	kg		
	Potassium permanganate	9	kg	11	kg		
	Potassium sulfate	40	kg	32	kg		
	Potassium thiocyanate	12	lb	10	lb		
	Progesterone	5	g	100	g		
	Progesterone, 3H	500	uCi	100	uCi		
2	Propanol	12	l	20	l		
	Propionic Acid	10	ml	100	ml		
	Prostaglandin E2, 3H	100	uCi	50	uCi		
	Prostaglandin F2 alpha	500	uCi	100	uCi		
	Quanosine	100	g	500	g		
	Roccal disinfecant	20	gal	10	gal		
	Sephadex LH-20	1000	g	3000	g		

DEPARTMENT/INSTITUTE: IBSNAT/TROPSOILS

Chemical Name	Chemicals Consumed/Year Estimated Qty to be used/Units
Ammonium acetate	5.0 kg
Ammonium sulfate	2.5 kg
Antimony potassium tartrate	0.5 kg
Ascorbic acid	0.5 kg
Barium chloride	0.5 kg
Boric acid	1.5 kg
DeVarda alloy	1.0 kg
Ferrous sulfate	2.5 kg
Hydrochloric acid	6.0 l
Hydrogen peroxide	4.0 l
Indicators	
Lathanum oxide	1.0 kg
Magnesium oxide	1.0 kg
NaOH	12.5 kg
Methanol organic	20.0 l
Nitric acid	5.0 l
Perchloric acid	5.0 l
Potassium chloride	6.0 kg
Phosphoric acid	4.0 l
Potassium dichromate	1.0 kg
Sodium chloride	1.5 kg
Potassium sulfate	1.5 kg
Sodium hexametaphosphate	0.5 kg

*Based on 2,000 samples

Sodium borate	8	kg	9	kg		
Sodium borate	1.5	kg	6	kg		
Sodium carbonate	12	lb	2	kg		
Sodium Chloride	500	g	1	kg		
Sodium EDTA	6	kg	3	kg		
Sodium hydroxide	200	kg	90	kg		
Sodium iodide, 125I	20	mCi	5	mCi		
sodium lauryl sulfate	13	kg	15	kg		
Sodium nitrate	100	g	500	g		
Sodium phosphate	18	g	15	kg		
Sodium phosphate	24	lb	20	lb		
Sodium phosphate, dibasic	2	kg	6	kg		
Sodium phosphate, mono basic	150	g	300	g		
Sodium sulfate	10	kg	5	kg		
Sodium Thiocyanate	5	kg	5	kg		
Sodum chloride	300	g	500	g		
Stearic acid	1	g	5	g		
Sulfuric acid, Babcock	6	l	24	l		
Sulfuric acid, reagent	31	l	45	l		
Sulfuric acid, technical	105	l	85	l		
Thimersol	5	g	100	g		
Trichloroacetic acid	1	l	1	l		
Triethylamine	500	ml	1	l		
Trizma hydrochloride	200	g	500	g		
Urea	10	kg	10	kg		
Valeric Acid	10	ml	500	ml		
Zinc, mossy	500	g	500	g		

Department of Agricultural Biochemistry
Chemicals Consumed/Year

Chemical Name	Estimated Qty. to be Used
Cadmium	<1 g
Calcium	<1 g
Calcium Carbonate	1 Kg
Calcium Chloride	2 Kg
Calcium Hydride	200 g
Calcium Hypochlorite	500 g
Calcium Nitrate	<1 g
Calcium Phosphate	<1 g
Carbon	1.5 Kg
Carbon Dioxide	100 cu ft
Carbon Disulfide	1 L
Carbon Tetrachloride	200 ml
Carbonyl Cyanide 3-Chlorophenylhydrazone	<1 g
Carborundum	50 g
Cesium Chloride	10 g
Chloroform	80 L
p-Chlorophenoxyacetic Acid	<10 ml
Cholesterol	100 g
Cholic Acid	200 g
Choline Chloride	1 g
Chromerge	1 L
Chromium Oxide	<1 g
Citric Acid	500 g
Cobaltous Chloride	<1 g
Coomassie Brilliant Blue	150 g
Copper	<5 g
Copper Sulfate	50 g
Cupric Sulfate	10 g
1-Cyano-4-dimethylamino-pyridinium tetrafluoroborate	<1 g
N-Cyano-N,N,N-triethylammonium tetrafluoroborate	<1 g
Cyanogen Bromide	<1 g
Cyclohexane	100 ml
Cycloheximide	<1 g
Cytidine	<1 g
2,3-Dehydro-2-deoxy-N-acetyl-neuraminic Acid	<1 ml
Deoxycholic Acid	100 g
Dextrose	200 g
3,4-Diaminopyridine	<1 g
Dibutylamine	<1 g
Dichlorodifluoromethane	<100 mg
Dichlorodimethylsilane	100 ml
1,2-Dichloroethane	10 ml
Dichloromethane	60 L
2,4-Dichlorophenoxyacetic Acid	<100 mg
Diethanolamine	<10 ml
Diethylamine	4 L
N,N-Dimethylformamide	100 ml
Diethyl Pyrocarbonate	1 ml
N,N-Dimethylaniline	<1 g
5,5-Dimethyl-1,3-cyclohexanedione	<1 g
2,6-Dimethyl-4-heptanone	<10 ml
Dimethyl Sulfide	2 L
Dimethyl Sulfoxide	1.5 L
Dioxane	100 ml

Chemical Name	Estimated Qty. to be Used
Abscisic Acid	1 g
Acetaldoxime	<1 g
4-Acetamidophenol	<1 ml
Acetic Acid	20 L
Acetic Anhydride	500 ml
Acetone	200 L
Acetonitrile	300 L
Acetylthiocholine Iodide	1 g
Acrylamide	500 g
Adenosine	1 g
Adenylyl-Imidodiphosphate	<1 g
Aflatoxin	100 ug
Agar	800 g
Alcian Blue	<1 g
Alpha-bromo-2,3,4,5,6-pentafluorotoluene	<1 ml
Aluminum	500 g
Aluminum Ammonium Sulfate	25 g
Aluminum Chloride	1 g
Amberlite XAD-4	5 Kg
Aminoacetaldehyde Diethyl Acetal	<1 g
2-Amino-2-methyl-1-propanol	25 ml
Ammonium Acetate	5 Kg
Ammonium Bicarbonate	500 g
Ammonium Chloride	<8 g
Ammonium Hydroxide	6 L
Ammonium Molybdate	10 g
Ammonium Nitrate	5 g
Ammonium Oxalate	50 g
Ammonium Peroxydisulfate	5 g
Ammonium Persulfate	500 g
Ammonium Phosphate	100 g
Ammonium Sulfate	5 Kg
Amyl Acetate	10 ml
Aniline	<1 g
Arsenic Trioxide	200 mg
Barium Diphenylamine	<1 g
Benzene	10 L
Benzyl Isothiocyanate	10 g
Benzyloxazolidine	<1 g
Boric Acid	5 Kg
Boron Trifluoride	200 ml
Brilliant Blue	<1 g
Bromine	25 ml
Bromobenzene	<1 g
Bromocresol Green	<1 g
Bromophenol Blue	4 g
1-Butanol	4 L
tert-Butanol	200 ml
2-Butoxyethanol	10 ml

Lithium Dodecyl Sulfate	<1 g
Magnesium Acetate	<5 g
Magnesium Chloride	100 g
Magnesium Nitrate	<5 g
Magnesium Oxide	50 g
Magnesium Sulfate	800 g
2-Mercaptoethanol	500 ml
2-Mercaptoimidazole	10 g
Mercaptosuccinic Acid	1 g
Mercury	<1 g
Methanesulfonic Acid	5 g
Methanesulfonyl Chloride	<1 g
Methanol	120 L
2-Methylbutyric Acid	1 ml
Methyl Cellosolve	20 L
Methyl Cyclohexane	5 ml
Methyl Cyclopentane	5 ml
Methyl Disulfide	1 ml
Methyl Ethyl Ketone	500 ml
Methyl Red Hydrochloride	100 mg
Methyl Sulfide	1 g
Myxothiazol	1 g
Nalidixic Acid	5 ml
1-Naphthaleneacetic Acid	1 g
2-Naphthol	5 g
Naphthol Blue Black	<100 mg
N-1-Naphthylethylenediamine Dihydrochloride	3 g
Ninhydrin	30 g
Nitric Acid	5 L
Nitroethane	5 ml
Nitrogen	9600 cu ft
2-Nitro-M-Xylene	<10 ml
4-Nitrophenyl Phosphate	5 g
2-Nitroso-1-Naphthol	<1 g
Nonadecanoic Acid	<1 g
Oxalic Acid	5 g
Oxalyl Chloride	<1 g
Oxygen	400 cu ft
Palladium (II) Chloride	100 g
Pancreatin	500 g
Pepsin	<5 g
Paraffin Oil	100 ml
Paraffin Wax	10 g
Pentane	5 L
Pepsin	<1 g
Perchloric Acid	2 L
Periodic Acid	<1 ml
Petroleum Ether	200 L
Petroleum Naphtha	5 ml
Phenol	100 g
Phenolphthalein Solution	10 ml
Phenyl Isothiocyanate	<1 g
Phenylmethylsulfonyl Fluoride	10 g
Phenylselenenyl Bromide	1 g

Dowex 50W Hydrogen	800 g
Drierite	5 Kg
Ethyl Acetate	65 L
Ethyl Alcohol	50 L
Ethyl Ether	80 L
Ethylene Dichloride	1 L
Ethylene Glycol	1 L
Ethylene Glycol Monoethyl Ether	8 L
Ethylenediamine	500 g
Ethylenediamine Tetraacetic Acid	500 g
Ferric Ammonium Sulfate	<10 g
Ferric Chloride	20 g
Ferric Nitrate	5 g
Ferrous Ammonium Sulfate	10 g
Ferrous Fumarate	1 Kg
Ferrous Sulfate	10 g
Formaldehyde	500 ml
Formamide	1 ml
Formic Acid	3 L
D-Fructose	50 g
Galactose	10 g
Gibberellic Acid	100 mg
Glycerin	300 ml
Helium	9600 cu ft
Heptafluorobutyric Anhydride	50 g
Heptane	4 L
Hexadecyltrimethyl Ammonium Bromide	<1 ml
Hexane	260 L
Hydrochloric Acid	20 L
Hydrofluoric Acid	1 L
Hydrogen	4800 cu ft
Hydrogen Peroxide (30% solution)	500 ml
Hydroquinone	5 g
2-Hydroxyisobutyric Acid	1 g
Hydroxylamine Hydrochloride	1 g
8-Hydroxyquinoline	1 g
N-Hydroxyurea	1 g
Imidazole	10 g
2-Imidazolidone	1 g
Indole-3-Acetic Acid	<1 g
Indole-3-Butyric Acid	<1 g
Iodine	100 g
2-Iodo-1,1,1-trifluoroethane	<1 g
2-Iodoacetamide	10 g
Iodomethane	10 g
Iodopropane	1 g
Iso-Amyl Alcohol	50 ml
Iso-Butyl Alcohol	50 ml
Iso-Octane	20 L
Lactic Acid	100 g
Lauryl Sulfate Lithium	<5 g
Lead Acetate	100 g
Lithium Aluminum Hydride	10 g
Lithium Chloride	<1 g

Sodium Ethylenediamine Tetraacetate	500 g
Sodium Fluoride	100 g
Sodium Hydroxide	3.5 Kg
Sodium Lauryl Sulfate	5 g
Sodium Metabisulfite	20 g
Sodium Metasilicate	1 g
Sodium Molybdate	10 g
Sodium Perborate	1 g
Sodium Phosphate, dibasic	2 Kg
Sodium Phosphate, monobasic	2 Kg
Sodium Pyrophosphate, decahydrate	1.5 Kg
Sodium Sulfate	30 Kg
Sodium Sulfide	1 g
Sodium Sulfite	5 g
Sodium Tetraphenyl Boron	<1 g
Sodium Tungstate, dihydrate	<1 g
Stannous Chloride	10 g
Sucrose	6 Kg
Sulfanilamide	<1 g
Sulfosalicylic Acid	200 g
Sulfuric Acid	15 L
Tannic Acid	<1 g
Tetrabromoethane	1 ml
Tetrabutylammonium Hydrogen Sulfate	<1 g
Tetrabutylammonium Hydroxide	<1 g
Tetrachloroethylene	5 ml
Tetracycline Hydrochloride	<1 g
Tetrahydrofuran	8 L
Thioacetic Acid	1 g
Thiourea	10 g
Thiphenol	1 g
Thymidine	1 g
Toluene	40 L
Trichloroacetic Acid	700 g
Trichloroethene	8 ml
Triethanolamine Hydrochloride	100 g
Trifluoroacetic Acid	100 ml
Trifluoroacetic Anhydride	150 g
2,2,2-Trifluoroethanol	25 g
Trifluoromethyl Iodide	<1 g
Triphenylmethyl Chloride	<1 g
Triphenyl Phosphate	<1 g
Triton X-100	100 ml
Triton X-102	10 ml
Triton X-114	<1 ml
Trypsin	2 g
Urea	150 g
Uridine	<1 g
Vanadium (V) Oxide	<1 g
Vanadyl Acetylacetonate	<1 g
Xanthurenic Acid	5 g
Xylenes	8 ml
Zinc	<5 g
Zinc Chloride	<5 g

Phenylselenenyl Chloride	1 g
Phosphatase	<1 g
Phosphoric Acid	20 L
Phosphorous Oxychloride	10 g
Phosphorous Pentachloride	1 g
Phosphorous Pentoxide	1 Kg
Phosphorous Tribromide	5 g
Phophotungstic Acid	100 g
Phthalaldehyde	100 g
Picric Acid	50 g
Potassium Acetate	5 g
Potassium Biphthalate	<5 g
Potassium Bromide	<1 g
Potassium tert-Butoxide	10 g
Potassium Carbonate	150 g
Potassium Chloride	300 g
Potassium Cyanide	6 g
Potassium Dichromate	500 g
Potassium Ferricyanide	1 g
Potassium Ferrocyanide	1 g
Potassium Hydrogen Phthelate	<1 g
Potassium Hydroxide	3 Kg
Potassium Iodide	100 g
Potassium Metabisulfite	<1 g
Potassium Nitrate	<1 g
Potassium Permanganate	500 g
Potassium Persulfate	<1 g
Potassium Phosphate, dibasic	1.5 Kg
Potassium Phosphate, monobasic	6 Kg
Potassium Sulfate	10 g
Potassium Thiocyanate	50 g
Propergyl Alcohol	<1 ml
Propergyl Bromide	1 g
n-Propanol	16 L
2-Propanol	20 L
Propiolic Acid	1 g
Propylene Glycol	10 ml
Pyridine	1 L
Salicylic Acid	50 g
Silica Gel	1.5 Kg
Silver Nitrate	100 g
Silver Sulfate	<1 g
Sodium Acetate	1.5 Kg
Sodium Ammonium Phosphate	<10 g
Sodium Azide	270 g
Sodium Bicarbonate	2 Kg
Sodium Borate	1 Kg
Sodium Carbonate	1 Kg
Sodium Chloride	10 Kg
Sodium Chromate	5 g
Sodium Citrate	500 g
Sodium Cobaltinitrite	<1 g
Sodium Dichromate	500 g
Sodium Dodecyl Sulfate	400 g

Dept. of Agricultural Biochemistry
Estimated Chemical Consumption/Year

Pesticide	Amt. Consumed/Year
Acephate	250 mg
Alachlor	100 mg
Aldicarb	300 mg
Aldicarb Oxime	100 mg
Aldicarb Oxime Sulfoxide	100 mg
Aldicarb Sulfone	100 mg
Aldicarb Sulfoxide	100 mg
Aldrin	300 mg
Allethrin	50 mg
Amdro	50 mg
Ametryn	200 mg
2-Aminobenzimidazole	50 mg
Aminocarb	50 mg
Amitrole	50 mg
Anilazine	50 mg
Anthraquinone	50 mg
Asulam	50 mg
Atrazine	300 mg
Azinphos Ethyl	100 mg
Azinphos Methyl	200 mg
Azobenzene	50 mg
Bendiocarb	50 mg
Benefin	50 mg
Benomyl	100 mg
Bensulide	50 mg
Bentazon	50 mg
Benzyl Benzoate	50 mg
BHC, mixed isomers	50 mg
BHC, alpha isomer	50 mg
BHC, beta isomer	50 mg
BHC, delta isomer	50 mg
BHC, gamma isomer	200 mg
Bromacil	100 mg
Bromophos	50 mg
Butylate	50 mg
Cacodylic Acid	10 mg
Calcium Arsenate	10 mg
Captafol	50 mg
Captan	100 mg
Carbaryl	100 mg
Carbendazim	50 mg
Carbofuran	100 mg
Carbophenothion	150 mg
Carbophenothion Oxygen Analog	50 mg
CDAA	10 mg
CDEC	10 mg
Chloramben	10 mg
Chlorenil	50 mg
Chlorbenside	50 mg
Chlordane	200 mg
Chlordane, alpha isomer	200 mg
Chlordane, gamma isomer	200 mg
Chlordecone	50 mg
Chlordene	50 mg
Chlordimeform	50 mg
Chlorfenvinphos	10 mg
Chlorobenzilate	10 mg
Chloroneb	10 mg
Chlorophacinone	50 mg
Chlorpyrifos	300 mg
Chlorpyrifos Methyl	300 mg
Chlorpyrifos Oxygen Analog	50 mg
Chlorthalonil	50 mg
Chlorthiophos	50 mg
Coumafuryl	10 mg
Coumaphos	10 mg
Crotoxyphos	10 mg
Cyanazine	10 mg
Cycloate	10 mg
Cycloheximide	10 mg
Cyhexatin	50 mg
Cypermethrin	100 mg
2,4-D	50 mg
2,4-D, butoxyethanol	50 mg
2,4-D, mixed butyl esters	50 mg
2,4-D, mixed isobutyl esters	50 mg
2,4-D, isooctyl ester	50 mg
2,4-D, isopropyl ester	50 mg
2,4-D, propylene glycol butyl ether esters	50 mg
2,4-D, sodium salt	50 mg
Dalapon	100 mg
Daminozide	10 mg
2,4-DB	50 mg
DCPA	10 mg
p,p'-DDA	10 mg
DDD, mixed isomers	100 mg
o,p'-DDD	50 mg
p,p'-DDD	200 mg
o,p'-DDE	50 mg
p,p'-DDE	200 mg
DDT, mixed isomers	50 mg
o,p'-DDT	50 mg
p,p'-DDT	200 mg
DEF	300 mg
Deltamethrin	50 mg
Diazinon	300 mg
Dibromochloropropane	100 mg
Dibutyl phthalate	50 mg
Dicamba	100 mg
Dichlobenil	50 mg
Dichlone	10 mg
Dichloran	50 mg
o-Dichlorobenzene	50 mg

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Dept. of Agricultural Biochemistry
Estimated Chemical Consumption/Year

Pesticide	Amt Consumed/Year
Acephate	250 mg
Alachlor	100 mg
Aldicarb	300 mg
Aldicarb Oxime	100 mg
Aldicarb Oxime Sulfoxide	100 mg
Aldicarb Sulfone	100 mg
Aldicarb Sulfoxide	100 mg
Aldrin	300 mg
Allethrin	50 mg
Amdro	50 mg
Ametryn	200 mg
2-Aminobenzimidazole	50 mg
Aminocarb	50 mg
Amitrole	50 mg
Anilazine	50 mg
Anthraquinone	50 mg
Asulam	50 mg
Atrazine	300 mg
Azinphos Ethyl	100 mg
Azinphos Methyl	200 mg
Azobenzene	50 mg
Bendiocarb	50 mg
Benefin	50 mg
Benomyl	100 mg
Bensulide	50 mg
Bentazon	50 mg
Benzyl Benzoate	50 mg
BHC, mixed isomers	50 mg
BHC, alpha isomer	50 mg
BHC, beta isomer	50 mg
BHC, delta isomer	50 mg
BHC, gamma isomer	200 mg
Bromacil	100 mg
Bromophos	50 mg
Butylate	50 mg
Cacodylic Acid	10 mg
Calcium Arsenate	10 mg
Captafol	50 mg
Captan	100 mg
Carbaryl	100 mg
Carbendazim	50 mg
Carbofuran	100 mg
Carbophenothion	150 mg
Carbophenothion Oxygen Analog	50 mg
CDAA	10 mg
CDEC	10 mg
Chloramben	10 mg
Chloranil	50 mg
Chlorbenside	50 mg
Chlordane	200 mg
Chlordane, alpha isomer	200 mg
Chlordane, gamma isomer	200 mg
Chlordecone	50 mg
Chlordene	50 mg
Chlordimeform	50 mg
Chlorfenvinphos	10 mg
Chlorobenzilate	10 mg
Chloroneb	10 mg
Chlorophacinone	50 mg
Chlorpyrifos	300 mg
Chlorpyrifos Methyl	300 mg
Chlorpyrifos Oxygen Analog	50 mg
Chlorthalonil	50 mg
Chlorthiophos	50 mg
Coumafuryl	10 mg
Coumaphos	10 mg
Crotoxyphos	10 mg
Cyanazine	10 mg
Cycloate	10 mg
Cycloheximide	10 mg
Cyhexatin	50 mg
Cypermethrin	100 mg
2,4-D	50 mg
2,4-D, butoxyethanol	50 mg
2,4-D, mixed butyl esters	50 mg
2,4-D, mixed isobutyl esters	50 mg
2,4-D, isooctyl ester	50 mg
2,4-D, isopropyl ester	50 mg
2,4-D, propylene glycol butyl ether esters	50 mg
2,4-D, sodium salt	50 mg
Dalapon	100 mg
Daminozide	10 mg
2,4-DB	50 mg
DCPA	10 mg
p,p'-DDA	10 mg
DDD, mixed isomers	100 mg
o,p'-DDD	50 mg
p,p'-DDD	200 mg
o,p'-DDE	50 mg
p,p'-DDE	200 mg
DDT, mixed isomers	50 mg
o,p'-DDT	50 mg
p,p'-DDT	200 mg
DEF	300 mg
Deltamethrin	50 mg
Diazinon	300 mg
Dibromochloropropane	100 mg
Dibutyl phthalate	50 mg
Dicamba	100 mg
Dichlobenil	50 mg
Dichlone	10 mg
Dichloran	50 mg
o-Dichlorobenzene	50 mg

Fonofos Oxygen Analog	10 mg
Gibberellic Acid	10 mg
Glyphosate	300 mg
Glyphosine	200 mg
Heptachlor	300 mg
Heptachlor Epoxide	300 mg
Hexachlorobenzene	50 mg
Hexazinone	50 mg
3-Hydroxycarbofuran	10 mg
1-Hydroxychlordene	10 mg
Isodrin, 3,4,5-isomers	10 mg
Isodrin, 2,3,5-isomers	10 mg
Linuron	100 mg
Malathion	500 mg
Malathion Oxygen Analog	300 mg
Maneb	300 mg
MCPA	50 mg
MCPP	50 mg
Mecoprop	10 mg
Merphos	50 mg
Methamidophos	50 mg
Methanearsonic Acid	10 mg
Methazole	10 mg
Methidathion	100 mg
Methiocarb	50 mg
Methomyl	150 mg
Methoprene	100 mg
Methoxychlor, mixed isomers	100 mg
p,p'-Methoxychlor	200 mg
Methyl Carbophenothion	50 mg
Methylmercury Chloride	50 mg
Methyl Parathion	200 mg
Metolachlor	50 mg
Metribuzin	50 mg
Mevinphos	100 mg
Mexacarbate	10 mg
MH	10 mg
Mirex	100 mg
Molinate	10 mg
Monocrotophos	10 mg
Monuron	50 mg
MSMA	50 mg
Naled	200 mg
Naphthalene Acetic Acid	100 mg
1-Naphthol	50 mg
Neburon	10 mg
Nitrofen	10 mg
4-Nitrophenol	10 mg
trans-Nonachlor	10 mg
Oryzalin	100 mg
Oxadiazon	50 mg
Oxamyl	100 mg
Oximino Methomyl	50 mg
Oximino Oxamyl	50 mg

p-Dichlorobenzene	50 mg
Dichloropropene, mixed isomers	50 mg
Dichlorprop	50 mg
Dichlorvos	50 mg
Dicofol	100 mg
Dicrotophos	50 mg
Dieldrin	200 mg
Difenzoquat	50 mg
Diflubenzuron	10 mg
Dimethoate	200 mg
Dimethoate Oxygen Analog	50 mg
Dimethyl Phosphate	10 mg
Dimethyl Phthalate	50 mg
Dinocap	10 mg
Dinoseb	10 mg
Dioxathion	10 mg
Diphacinone	100 mg
Diphenyl Mercury	50 mg
Diquat Dibromide	100 mg
Disulfoton	100 mg
Diuron	100 mg
DNOC	10 mg
Dodine	10 mg
DSMA	10 mg
Endosulfan, mixed isomers	100 mg
Endosulfan I	200 mg
Endosulfan II	200 mg
Endosulfan Sulfate	200 mg
Endothall	100 mg
Endrin	100 mg
Endrin Aldehyde	50 mg
Endrin Ketone	50 mg
EPN	10 mg
EPTC	10 mg
Ethephon	50 mg
Ethion	50 mg
Ethroprop	100 mg
Ethylan	10 mg
Ethylmercury Chloride	10 mg
Famphur	50 mg
Fenac	50 mg
Fenaminosulf	50 mg
Fenamiphos	100 mg
Fenbutatin Oxide	10 mg
Fenitrothion	100 mg
Fensulfothion	50 mg
Fenthion	50 mg
Fentin Hydroxide	10 mg
Fenuron	10 mg
Fenvalerate	100 mg
Ferbam	50 mg
Flumeturon	10 mg
Folpet	50 mg
Fonofos	50 mg

Resmethrin	100 mg
Ronnel	100 mg
Rotenone	100 mg
Siduron	10 mg
Silvex	50 mg
Silvex, mixed isooctyl esters	10 mg
Simazine	150 mg
Sodium Pentachlorophenate	10 mg
Sodium o-Phenylphenate	10 mg
Sulfotepp	50 mg
2,4,5-T	50 mg
2,4,5-T, butyl ester	50 mg
2,4,5-T, butoxyethanol ether esters	50 mg
Tecnazene	50 mg
Temephos	50 mg
TEPP	50 mg
Terbacil	50 mg
Terbufos	10 mg
Terbutryn	10 mg
Tetrachlorophenol	10 mg
Tetrachlorvinphos	50 mg
Thiabendazole	100 mg
Thiobencarb	10 mg
Thiram	50 mg
Toxephene	100 mg
2,4,5-Trichlorphenol	10 mg
Triclopyr	10 mg
Trifluralin	50 mg
Triforine	50 mg
Vernolate	10 mg
Warfarin	50 mg
Zineb	100 mg
Ziram	50 mg

Zinc Nitrate	<1 g
Zinc Oxide	<1 g
Zinc Sulfate, heptahydrate	<1 g

Oxychlordane	10 mg
Oxyfluorfen	100 mg
Oxythioquinox	10 mg
Paraquat	200 mg
Parathion	200 mg
PCNB	10 mg
PCP	100 mg
Pendimethalin	10 mg
Permethrin, mixed isomers	100 mg
cis-Permethrin	150 mg
trans-Permethrin	150 mg
Phenothiazine	10 mg
Phenylmercury Acetate	10 mg
Phenylmercury Chloride	10 mg
Phenylmercury Hydroxide	10 mg
Phorate	200 mg
Phorate Oxygen Analog	100 mg
Phorate Sulfoxide	50 mg
Phosalone	10 mg
Phosmet	50 mg
Phosmet Oxygen Analog	10 mg
Picloram	50 mg
Piperalin	10 mg
Piperonyl Butoxide	10 mg
Pirimiphos Ethyl	50 mg
Pirimiphos Methyl	200 mg
Polychlorinated Biphenyls	
Aroclor 1016	10 mg
Aroclor 1221	10 mg
Aroclor 1232	10 mg
Aroclor 1242	10 mg
Aroclor 1248	10 mg
Aroclor 1254	50 mg
Aroclor 1260	50 mg
Aroclor 1262	50 mg
Polychlorinated Naphthalenes	
Halowax 1000	10 mg
Halowax 1001	10 mg
Halowax 1013	10 mg
Halowax 1014	10 mg
Halowax 1051	10 mg
Halowax 1099	10 mg
Potassium Diethyl Dithiophosphate	10 mg
Potassium Diethyl Thiophosphate	10 mg
Potassium Dimethyl Dithiophosphate	10 mg
Potassium Dimethyl Thiophosphate	10 mg
Prometon	50 mg
Prometryn	100 mg
Propachlor	50 mg
Propargite	10 mg
Propazine	50 mg
Propetamphos	10 mg
Propoxur	50 mg
Pyrethrins	100 mg

APPENDIX D

LIST OF HAZARDOUS WASTE GENERATED

DEPT	PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9001	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9002	TANG	1.00	GAL	ABAMECTIN
AGBC	9002	TANG	1.00	GAL	ABAMECTIN
AGBC	9002	TANG	0.24	GAL	PETROLEUM ETHER
AGBC	9003	STEVE	1.00	LB	DDT
AGBC	9003	STEVE	0.13	GAL	PESTICIDE MIXTURE
AGBC	9005	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9007	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9008	TANG	1.00	GAL	ACETONITRILE
AGBC	9008	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9008	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9009	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9009	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9011	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9012	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9012	TANG	0.20	GAL	ARSENIC PENTOXIDE
AGBC	9012	TANG	0.10	GAL	DIACETYL
AGBC	9012	TANG	0.50	GAL	TITANIUM TETRACHLORI
AGBC	9012	TANG	7.00	LBS	SODIUM PEROXIDE
AGBC	9012	TANG	10.00	LBS	DOWPON H
AGBC	9012	TANG	2.50	LBS	COPPER SULFATE
AGBC	9012	TANG	0.13	GAL	NEONACUR
AGBC	9012	TANG	0.75	GAL	MALATHION

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9012	TANG	0.75	GAL	MALATHION
AGBC	9012	TANG	0.50	LBS	MERCURY
AGBC	9012	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9012	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9012	TANG	0.25	LBS	THORIUM NITRATE
AGBC	9012	TANG	1.00	LBS	THYMIOL
AGBC	9012	TANG	0.13	GAL	ETHYL ACETOACETATE
AGBC	9012	TANG	1.00	LBS	PICRIC ACID
AGBC	9012	TANG	0.13	GAL	ANILINE
AGBC	9012	TANG	0.13	GAL	ANILINE
AGBC	9012	TANG	0.13	GAL	DIBUTYL PHTHALATE
AGBC	9012	TANG	1.00	LBS	P-BENZOQUINONE
AGBC	9012	TANG	0.25	LBS	1-AMINO-2-NAPTHTHOL-
AGBC	9012	TANG	200.00	LBS	ANILINE HYDROCHLORID
AGBC	9012	TANG	0.25	LBS	METHYL-P-HYDROXYBENZ
AGBC	9012	TANG	0.01	GAL	O-PHENANTHROLINE
AGBC	9012	TANG	1.00	LBS	PHLOROGLUCIN
AGBC	9012	TANG	0.25	LBS	PHENYL HYDRAZINE
AGBC	9012	TANG	0.06	LBS	PHLORO GLUCINOL
AGBC	9012	TANG	0.20	LBS	1,10-PHENANTHROLINE
AGBC	9012	TANG	0.25	LBS	2,4-PENTANEDIONE
AGBC	9012	TANG	0.10	LBS	IODOACETIC ACID
AGBC	9012	TANG	0.50	LBS	BENZIDINE
AGBC	9012	TANG	0.50	LBS	ETHYLENEDIAMINETETRA
AGBC	9012	TANG	0.13	LBS	1-AMINO-2-NAPHTHOL-4
AGBC	9012	TANG	0.01	GAL	BALSAM FIR RESIN
AGBC	9012	TANG	0.05	LBS	4-AMINO-ANTIPYRINE
AGBC	9012	TANG	0.25	LBS	P-AMINO BENZOIC ACID
AGBC	9012	TANG	1.00	LBS	ALUMINUM OXIDE
AGBC	9012	TANG	0.13	GAL	ACETIC ANHYDRIDE
AGBC	9012	TANG	3.00	LBS	CHLOROACETIC ACID SO
AGBC	9012	TANG	0.25	GAL	DIETHYL SULFATE
AGBC	9012	TANG	0.25	GAL	ETHANOLAMINE
AGBC	9012	TANG	2.00	LBS	AMMONIUM ACETATE
AGBC	9012	TANG	0.01	GAL	ANILINE
AGBC	9012	TANG	0.50	LBS	DICHLOROISOCYANURIC
AGBC	9012	TANG	1.00	LBS	LANOLIN
AGBC	9012	TANG	0.25	LBS	1,3-DIAMINO-2-HYDROX
AGBC	9012	TANG	0.06	LBS	PIPERIDINE
AGBC	9012	TANG	0.13	LBS	DICYCLOHEXYL CARBODI
AGBC	9012	TANG	1.00	LBS	HYDRAZINE SULFATE
AGBC	9012	TANG	0.01	GAL	ANILINE
AGBC	9012	TANG	0.01	GAL	MERCAPTOACETIC ACID
AGBC	9012	TANG	0.06	LBS	P-AMINOPHENYLMERCURI
AGBC	9012	TANG	0.40	LBS	BENZIDINEDIHYDROCHLO
AGBC	9012	TANG	0.01	LBS	2,6-DIBROMO-N-CHLORO
AGBC	9012	TANG	0.02	LBS	1,10-DECANEDICARBOXY
AGBC	9012	TANG	0.01	LBS	NITRON
AGBC	9012	TANG	0.06	LBS	URACIL

DATE 15-Nov-91

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9012	TANG	0.06	LBS	N-CAPRYLIC
AGBC	9012	TANG	0.50	LBS	ALPHA-NAPHTHALENE AC
AGBC	9012	TANG	0.06	LBS	CARBAZOLE
AGBC	9012	TANG	0.06	LBS	3,5-DINITROBENZOYL C
AGBC	9012	TANG	0.07	LBS	2-METHYL-1,4-NAPHTHO
AGBC	9012	TANG	0.01	LBS	N-METHYL-2-QUINOLONE
AGBC	9012	TANG	0.05	GAL	2,3-DIBROMOPROPENE
AGBC	9012	TANG	0.13	LBS	ETHANE SULFONIC ACID
AGBC	9012	TANG	0.01	GAL	ISO-AMYL PHTHALATE
AGBC	9012	TANG	0.01	GAL	BROMOFORM
AGBC	9012	TANG	0.01	GAL	ALPHA-CHLORO NAPHTHA
AGBC	9012	TANG	0.01	GAL	ALPHA-BROMO NAPHTHAL
AGBC	9012	TANG	0.01	GAL	CINEOLE
AGBC	9012	TANG	0.06	LBS	DIPHENYL CARBAMINE C
AGBC	9012	TANG	0.25	LBS	DIPHENYLTHIOCARBAZON
AGBC	9012	TANG	0.06	LBS	P-NITROSODIMETHYLANI
AGBC	9012	TANG	0.01	LBS	2,6-DICHLOROINDOPHEN
AGBC	9012	TANG	0.02	LBS	2,4-DIBROMOACETOPHEN
AGBC	9012	TANG	0.01	GAL	CANADA BALSAM
AGBC	9012	TANG	0.06	LBS	P-NITROPHENYL HYDRAZ
AGBC	9012	TANG	0.06	LBS	N,N'-DIPHENYL ETHYLE
AGBC	9012	TANG	0.01	LBS	MUREXIDE
AGBC	9012	TANG	0.01	LBS	QUANINE
AGBC	9012	TANG	0.06	LBS	1,8-DIHYDROXY-NAPHTH
AGBC	9012	TANG	0.01	GAL	ETHYL HYDROCAFFEATE
AGBC	9012	TANG	0.01	LBS	5,6-DIMETHYL-1,10-PH
AGBC	9012	TANG	0.13	LBS	BENZIDINE
AGBC	9012	TANG	0.01	GAL	DIMETHYL-ALPHA-NAPHT
AGBC	9012	TANG	0.13	LBS	4-HYDROXYDIPHENYL
AGBC	9012	TANG	0.20	LBS	HYDROQUINONE
AGBC	9012	TANG	0.06	LBS	P-ETHOXYPHENOXYACETI
AGBC	9012	TANG	0.06	LBS	DIGITONIN
AGBC	9012	TANG	0.25	LBS	DIPHENYLAMINE
AGBC	9012	TANG	0.50	LBS	BLOOD CHARCOAL
AGBC	9012	TANG	0.01	LBS	HYDRAZINE SULFATE
AGBC	9012	TANG	0.25	LBS	O-DIANISIDINE TETRAZ
AGBC	9012	TANG	0.02	LBS	7-IODO-8-HYDROXYQUIN
AGBC	9012	TANG	0.25	LBS	1-NAPHTHOL
AGBC	9012	TANG	2.00	LBS	DIETHYL OXALACETATE
AGBC	9012	TANG	0.13	GAL	CARBOLIC ACID
AGBC	9012	TANG	0.25	LBS	DIMETHYL GLYOXIME
AGBC	9012	TANG	0.01	GAL	1,2-DIBROMOETHANE
AGBC	9012	TANG	0.25	LBS	3,3'-DIMETHOXYBENZID
AGBC	9012	TANG	1.20	LBS	IMINODIACETIC ACID
AGBC	9012	TANG	0.50	LBS	NACCONOL
AGBC	9012	TANG	0.01	GAL	CYCLOHEXANONE
AGBC	9012	TANG	0.50	LBS	SALICYLAMIDE
AGBC	9012	TANG	0.25	LBS	DODECYL SODIUM SULFA
AGBC	9012	TANG	1.00	LBS	P-METHYLAMINOPHENOL

DATE 15-Nov-91

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9012	TANG	1.00	LBS	P-HYDROXY PHENYL ARS
AGBC	9012	TANG	0.05	LBS	QUINIDINE SULFATE
AGBC	9012	TANG	0.25	LBS	METALDEHYDE
AGBC	9012	TANG	0.10	LBS	PYROGALLOL
AGBC	9012	TANG	0.05	LBS	NORDIHYDROGUAIARETIC
AGBC	9012	TANG	0.05	LBS	PHENYLARSONIC ACID
AGBC	9012	TANG	0.01	LBS	DIAZOBENZENE SULFONI
AGBC	9012	TANG	0.05	LBS	2-NITROSO-1-NAPHTHOL
AGBC	9012	TANG	0.25	LBS	POTASSIUM SODIUM TAR
AGBC	9012	TANG	0.25	LBS	PROPIONAMIDE
AGBC	9012	TANG	0.05	LBS	2,2'-METHYLENE BIS-(
AGBC	9012	TANG	0.25	LBS	P-NITROPHENYL HYDRAZ
AGBC	9012	TANG	0.01	LBS	P-NITROANILINE
AGBC	9012	TANG	0.01	LBS	NINHYDRIN
AGBC	9012	TANG	0.01	LBS	ETHYL GALLATE
AGBC	9012	TANG	0.50	LBS	REINECKE SALT
AGBC	9012	TANG	0.05	LBS	PHTHALIC ACID MONOPO
AGBC	9012	TANG	5.00	LBS	ETHYLENE DINIRILO TE
AGBC	9012	TANG	30.00	LBS	N,N-DIMETHYL-P-PHENY
AGBC	9012	TANG	5.00	LBS	BENZOIC ACID
AGBC	9012	TANG	5.00	LBS	TANNIC ACID
AGBC	9012	TANG	0.13	GAL	2-ETHYL HEXANOL
AGBC	9012	TANG	0.70	GAL	1-NITROSO-2-NAPHTHOL
AGBC	9012	TANG	0.05	LBS	MALONAMIDE
AGBC	9012	TANG	0.01	GAL	MALONONITRILE
AGBC	9012	TANG	0.01	LBS	NITROAMINOGUANIDINE
AGBC	9012	TANG	0.01	LBS	N-(1-NAPHTHYL)-ETHYL
AGBC	9012	TANG	0.05	LBS	NITROSORESORCINOL SO
AGBC	9012	TANG	0.01	LBS	CALCIUM PANTOTHENATE
AGBC	9012	TANG	0.01	GAL	TRIMETHYLENE BROMIDE
AGBC	9012	TANG	0.05	LBS	SALICYLALDOXIME
AGBC	9012	TANG	0.01	LBS	REINECKE SALT
AGBC	9012	TANG	0.05	GAL	ALCOLEC
AGBC	9012	TANG	0.01	GAL	BALSAM
AGBC	9012	TANG	0.01	LBS	N-(1-NAPHTHYL)-ETHYL
AGBC	9012	TANG	0.05	LBS	P-NITROBENZENE AZO R
AGBC	9012	TANG	0.05	GAL	NITROBENZENE
AGBC	9012	TANG	0.50	LBS	BENZIDINE DIHYDROCHL
AGBC	9012	TANG	0.25	LBS	MANZATE 200
AGBC	9012	TANG	0.25	LBS	MANEL-M-22
AGBC	9012	TANG	0.25	LBS	PHENYLTHIOHYDANTOIC
AGBC	9012	TANG	0.50	LBS	P-METHYLAMINO PHENOL
AGBC	9012	TANG	0.25	LBS	HEXADECYLTRIMETHYLAM
AGBC	9012	TANG	1.00	LBS	ALUMINUM ORE

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9012	TANG	5.00	LBS	3,5-DINITROSALICYLIC
AGBC	9012	TANG	1.00	LBS	MANNITOL
AGBC	9012	TANG	0.05	GAL	M-CRESOL
AGBC	9012	TANG	2.00	LBS	ETHYLENE DINITRILO T
AGBC	9012	TANG	1.20	LBS	P-METHYLAMINO PHENOL
AGBC	9012	TANG	5.00	LBS	PECTIN
AGBC	9012	TANG	5.00	LBS	RESORCINOL
AGBC	9012	TANG	1.00	LBS	OXGALL
AGBC	9012	TANG	1.00	LBS	PYROGALLIC ACID
AGBC	9012	TANG	2.00	LBS	RESORCIN
AGBC	9012	TANG	2.00	LBS	PALMITIC ACID
AGBC	9012	TANG	0.02	GAL	OLEIC ACID
AGBC	9012	TANG	5.00	LBS	BETAINE HYDROCHLORID
AGBC	9012	TANG	5.00	LBS	PHENYL HYDRAZINE HYD
AGBC	9012	TANG	0.25	LBS	POLYVINYL PYRODIDONE
AGBC	9012	TANG	10.00	LBS	PROTOPAM CHLORIDE
AGBC	9012	TANG	1.00	LBS	PHENYL HYDRAZINE HYD
AGBC	9012	TANG	0.13	GAL	OIL OF PERIGANUM
AGBC	9012	TANG	0.25	GAL	2,2-OXYDIETHANOL
AGBC	9012	TANG	1.20	LBS	4-METHYL-2-PENTANONE
AGBC	9012	TANG	1.20	LBS	PHENYL ETHER
AGBC	9012	TANG	0.30	GAL	ISOBUTYRONITRILE
AGBC	9012	TANG	0.25	GAL	TRIOLEIN
AGBC	9012	TANG	1.00	LBS	CHLOROPERBENZOIC
AGBC	9012	TANG	1.00	LBS	BENZOIC ACID
AGBC	9012	TANG	5.00	LBS	BETA NAPHTHOL
AGBC	9012	TANG	0.13	GAL	POTASSIUM DIMETHYL D
AGBC	9012	TANG	0.13	GAL	PARALDEHYDE
AGBC	9012	TANG	0.01	GAL	PYRIDINE
AGBC	9012	TANG	1.00	LBS	FUMARIC ACID
AGBC	9012	TANG	1.00	LBS	6-HEXANOLACTONE
AGBC	9012	TANG	1.00	LBS	TRISTEARIN
AGBC	9012	TANG	1.00	LBS	DIETHYL CHLOROPHOSPH
AGBC	9012	TANG	1.20	LBS	1,5-NAPHTHALENEDISUL
AGBC	9012	TANG	1.00	LBS	CITRIC ACID
AGBC	9012	TANG	0.50	LBS	1,2-NAPHTHOLQUINONE-
AGBC	9012	TANG	0.05	GAL	3-BROMO-1-PROPANOL
AGBC	9012	TANG	0.25	GAL	ANILINE
AGBC	9012	TANG	2.00	LBS	BETA NAPHTHOL
AGBC	9012	TANG	0.13	GAL	POLYETHYLENE GLYCOL
AGBC	9012	TANG	3.00	LBS	SALICYLIC ACID

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9012	TANG	0.01	GAL	ALPHA-METHYL-ALPHA-P
AGBC	9012	TANG	0.01	GAL	DELTA-BROMOVALERONIT
AGBC	9012	TANG	0.25	LBS	SAPONIN
AGBC	9012	TANG	0.50	LBS	SEQUESTRENE AA
AGBC	9012	TANG	0.05	LBS	XANTHYDROL
AGBC	9012	TANG	0.05	LBS	SUCCINIC ACID
AGBC	9012	TANG	0.50	LBS	SODIUM DIMETHYLGLYOX
AGBC	9012	TANG	0.50	LBS	BICINE
AGBC	9012	TANG	0.50	LBS	SULFANILAMIDE
AGBC	9012	TANG	0.25	LBS	CAMPHOR
AGBC	9012	TANG	0.25	LBS	DIMETHYLAMINE HYDROC
AGBC	9012	TANG	0.25	LBS	SEQUESTRENE SODIUM-I
AGBC	9012	TANG	0.05	LBS	SODIUM-P-DIMETHYL AM
AGBC	9012	TANG	0.02	LBS	ZINCON
AGBC	9012	TANG	0.50	LBS	SUCINIMIDE
AGBC	9012	TANG	0.01	GAL	STEROX
AGBC	9012	TANG	0.01	GAL	XYLIDINE
AGBC	9012	TANG	0.25	LBS	STRYCHNINE NITRATE
AGBC	9012	TANG	0.05	LBS	SODIUM-2,6-DICHLORO
AGBC	9012	TANG	0.01	GAL	GAMMA-BROMOBUTYRONIT
AGBC	9012	TANG	0.50	LBS	CAFFEINE-SODIUM BENZ
AGBC	9012	TANG	1.50	LBS	CALCIUM GLUCONATE
AGBC	9012	TANG	1.00	GAL	2-PHENOXY ETHANOL
AGBC	9012	TANG	0.13	GAL	NITROMETHANE
AGBC	9012	TANG	0.13	GAL	P-METHYLANISOLE
AGBC	9012	TANG	0.60	GAL	2,2',2"-NITRILOTRIET
AGBC	9012	TANG	1.00	GAL	BROMOFORM
AGBC	9012	TANG	0.50	GAL	BENZOYL CHLORIDE
AGBC	9012	TANG	1.00	LBS	SODIUM SALICYLATE
AGBC	9012	TANG	1.00	LBS	TANNIC ACID
AGBC	9012	TANG	3.00	LBS	SALICYLIC ACID
AGBC	9012	TANG	5.00	LBS	URIC ACID
AGBC	9012	TANG	0.01	GAL	PROPYLENE GLYCOL
AGBC	9012	TANG	0.13	GAL	OLEIC ACID
AGBC	9012	TANG	0.13	GAL	QUINOLINE
AGBC	9012	TANG	0.05	GAL	STRYCHNINE SULFATE
AGBC	9012	TANG	0.25	LBS	SUCCINONITRILE
AGBC	9012	TANG	0.01	GAL	EPSILON-BROMOCAPRONI
AGBC	9012	TANG	0.13	LBS	UREASE
AGBC	9012	TANG	0.05	LBS	N-VALERAMIDE
AGBC	9012	TANG	0.13	LBS	SOYA STIROLS

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9012	TANG	1.00	LBS	BRUCINE SULFATE
AGBC	9012	TANG	1.00	LBS	TRICHLOROACETIC ACID
AGBC	9012	TANG	1.00	LBS	N-BUTYRIC ACID
AGBC	9012	TANG	0.13	GAL	NITROETHANE
AGBC	9012	TANG	6.00	LBS	IODINE
AGBC	9012	TANG	1.20	LBS	M-CHLOROPEROXYBENZOI
AGBC	9012	TANG	1.00	LBS	SODIUM METHOXIDE
AGBC	9012	TANG	2.50	LBS	BENZOYL PEROXIDE
AGBC	9101	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9101	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9101	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9101	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9101	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9102	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9103	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9103	JOAN	1.00	GAL	METHANOL
AGBC	9103	JOAN	1.00	GAL	ACETONITRILE
AGBC	9103	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9103	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9103	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9103	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9103	TANG	0.25	GAL	VIGORO (50% MALATHIO
AGBC	9103	TANG	3.00	LBS	DITHANO M-22 (80% MA
AGBC	9104	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9104	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9104	JOAN	1.00	GAL	SOLVENT MIXTURE

AGBC	9012	TANG	5.00	LBS	TRICHLOROACETIC ACID
AGBC	9012	TANG	5.00	LBS	INDIGOTIN
AGBC	9012	TANG	1.20	LBS	4,5-DIHYDROXY-2,7-NA
AGBC	9012	TANG	0.13	GAL	TRIETHYL PHOSPHATE
AGBC	9012	TANG	0.25	GAL	MESITYL OXIDE
AGBC	9012	TANG	0.25	GAL	CRESOL
AGBC	9012	TANG	1.20	LBS	GAMMA-BUTYROLACTONE
AGBC	9012	TANG	0.13	GAL	ETHYL OXYLATE
AGBC	9012	TANG	0.13	GAL	CALCIUM GLUCONATE
AGBC	9012	TANG	0.50	LBS	BRUCINE ALKALOID
AGBC	9012	TANG	0.13	GAL	METHYL-P-TOLUENE SUL
AGBC	9012	TANG	0.13	GAL	CINCHONA BARK
AGBC	9012	TANG	1.50	LBS	SHELLAC ORANGE
AGBC	9012	TANG	1.00	LBS	CASEIN
AGBC	9012	TANG	0.01	GAL	1-NITROPROPANE

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9107	TANG	10.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9108	TANG	1.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	5.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	1.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	5.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	5.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	1.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	1.00	GAL	SOOLVENT MIXTURE
AGBC	9108	TANG	1.00	GAL	SOOLVENT MIXTURE
AGBC	9109	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	TANG	1.00	GAL	SOLVENT MIXTURE

AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
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AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9105	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	5.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	0.25	GAL	CHROMIC ACID WASTE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9107	TANG	1.00	GAL	SOLVENT MIXTURE

AGBC	9109	TANG			
AGBC	9109	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9109	C.S.TANG	1.00	GAL	METHYLENE CHLORIDE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	C.S.TANG	1.00	GAL	SOLVENT MIXTURE

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
AGBC	9110	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9110	JOAN	1.00	GAL	SOLVENT MIXTURE
AGBC	9111	JOAN	1.00	GAL	SOLVENET MIXTURE
AGBC	9111	JOAN	1.00	GAL	SOLVENET MIXTURE
AGBC	9111	JOAN	1.00	GAL	SOLVENET MIXTURE
AGBC	9111	JOAN	1.00	GAL	SOLVENET MIXTURE
AGBC	9111	JOAN	1.00	GAL	SOLVENET MIXTURE
AGBC	9111	JOAN	1.00	GAL	SOLVENET MIXTURE

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
ANSC	9001	FISHER	0.50	GAL	SUNBUGGER
ANSC	9001	FISHER	0.25	GAL	PYRENEONE FOG CONCEN
ANSC	9001	FISHER	0.25	GAL	RABON
ANSC	9001	FISHER	0.13	GAL	WEED-B-GON
ANSC	9001	FISHER	0.50	GAL	PYRENEONE FOG CONCEN
ANSC	9001	FISHER	0.50	GAL	DIBROM
ANSC	9001	FISHER	1.00	GAL	VAPONA
ANSC	9001	FISHER	5.00	GAL	DIVERSIDE K
ANSC	9001	FISHER	15.00	LB	WARFARIN
ANSC	9001	FISHER	1.00	GAL	DIAZINON
ANSC	9001	FISHER	1.00	GAL	DIAZINON
ANSC	9005	VINCENT	3.00	LB	DIAZINON
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9005	VINCENT	0.75	GAL	CHROMERGE
ANSC	9006	EARLY	0.25	GAL	XYLENE
ANSC	9012	PATTERSON	0.40	GAL	PERCHLORIC ACID
ANSC	9012	PATTERSON	0.13	GAL	MAGNESIUM-2
ANSC	9012	PATTERSON	0.13	GAL	ETHYLENEDIAMINETETRA
ANSC	9012	PATTERSON	0.13	GAL	ACETIC ACID
ANSC	9012	PATTERSON	0.25	GAL	ACETIC ACID
ANSC	9012	PATTERSON	0.06	GAL	ACETIC ACID
ANSC	9012	PATTERSON	0.25	GAL	ACETIC ACID
ANSC	9012	PATTERSON	0.25	GAL	HYDROCHLORIC ACID
ANSC	9012	PATTERSON	0.40	GAL	NITRIC ACID
ANSC	9012	PATTERSON	0.05	GAL	SULFURIC ACID
ANSC	9012	PATTERSON	0.05	GAL	SULFURIC ACID
ANSC	9012	PATTERSON	0.06	GAL	ARSENIC ACID
ANSC	9012	PATTERSON	0.05	GAL	SODIUM HYDROXIDE
ANSC	9103	ISHIZAKI	0.05	GAL	SODIUM HYDROXIDE
ANSC	9103	ISHIZAKI	17.00	GAL	ISO-AMYL ALCOHOL
ANSC	9103	ISHIZAKI	0.50	GAL	HYDROGEN PEROXIDE
ANSC	9103	SHELL	10.00	LBS	CALCIUM HYDROXIDE
ANSC	9103	SHELL	0.50	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	1.00	GAL	CHLOROFORM
ANSC	9103	SHELL	0.75	GAL	CHROMERGE
ANSC	9103	SHELL	0.75	GAL	CHROMERGE
ANSC	9108	KIM PATRICK	1.00	GAL	XYLENE
ANSC	9108	KIM PATRICK	1.00	GAL	XYLENE
ANSC	9108	KIM PATRICK	1.00	GAL	XYLENE
ANSC	9110	BLATT	0.13	GAL	ISOFLUORANE

Pages output: 2
(.95/second)
Elapsed time : 00:00:59.89

ANSC 53 GAL
28 LBS

DATE 15-Nov-91

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
PLMP	9007	SUN	0.06	GAL	ETHYL ETHER
~~PLMP~~	~~9106~~	~~ROCKHOLM~~	~~12.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9108~~	~~ALVAREZ,ANNE~~	~~0.00~~		~~THERMOMETER~~
PLMP	9108	KATHY	10.00	LBS	ETHIDIUM BROMIDE
PLMP	9108	KATHY	1.00	LBS	PHENOL
PLMP	9108	KATHY	3.00	GAL	ACETONITRILE
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
~~PLMP~~	~~9109~~	~~NIRANJULA~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
PLMP	9110	MING LI	5.00	LB	ETHIDIUM BROMIDE
PLMP	9110	MING LI	2.00	LB	ETHIDIUM BROMIDE
~~PLPA~~	~~9001~~	~~TENG~~	~~5.00~~	~~GAL~~	~~TELONE~~
~~PLPA~~	~~9001~~	~~TENG~~	~~5.00~~	~~GAL~~	~~TELONE~~
PLPA	9001	TENG	5.00	GAL	PHOSPHORIC ACID
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.15	GAL	EX 2008 B ORIGINE RP
PLPA	9001	TENG	0.90	GAL	TERGITOL
PLPA	9001	TENG	0.13	GAL	ETHYLENE DIBROMIDE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.25	GAL	TELONE
PLPA	9001	TENG	0.03	GAL	NEMACUR
PLPA	9001	TENG	0.01	LB	DS 46995-0601-0405-1
PLPA	9001	TENG	1.00	LB	DPX 43898
PLPA	9001	TENG	1.00	LB	DPX 43898
PLPA	9001	TENG	1.00	LB	DPX 43898
PLPA	9001	TENG	0.25	GAL	DISYSTON
PLPA	9001	TENG	0.13	GAL	BAY HWG 1608
PLPA	9001	TENG	0.25	GAL	DISYSTON
PLPA	9001	TENG	0.20	GAL	DIBROMOCHLOROPROPANE
PLPA	9001	TENG	0.10	GAL	ZOLONE EC

DATE 15-Nov-91

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
~~PLPA~~	~~9001~~	~~TENG~~	~~0.13~~	~~GAL~~	~~NEMACUR~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.13~~	~~GAL~~	~~NEMACUR~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.13~~	~~GAL~~	~~NEMACUR~~
~~PLPA~~	~~9001~~	~~TENG~~	~~1.00~~	~~LB~~	~~ZINC SULFATE~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.20~~	~~GAL~~	~~ROCCAL~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.00~~	~~LB~~	~~HEPTACHLOR~~
~~PLPA~~	~~9001~~	~~TENG~~	~~10.00~~	~~LB~~	~~HEPTACHLOR~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.00~~	~~LB~~	~~HEPTACHLOR~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.13~~	~~LB~~	~~PHOSPHORIC ACID~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.13~~	~~GAL~~	~~PHOSPHORIC ACID~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.06~~	~~LB~~	~~AMMONIUM NITRATE~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.50~~	~~LB~~	~~BORIC ACID~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.06~~	~~GAL~~	~~LACTIC ACID~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.06~~	~~LB~~	~~TRYPAN BLUE~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.06~~	~~LB~~	~~COTTON BLUE~~
~~PLPA~~	~~9001~~	~~TENG~~	~~0.25~~	~~LB~~	~~SODIUM BORATE~~
PLPA	9002	BORTH	0.25	LB	ETHIDIUM BROMIDE
PLPA	9002	BORTH	0.15	GAL	ETHIDIUM BROMIDE
PLPA	9002	BORTH	0.06	GAL	ETHIDIUM BROMIDE
PLPA	9002	BORTH	0.13	GAL	PHENOL
PLPA	9002	BORTH	0.13	GAL	PHENOL
PLPA	9003	SUN	1.00	LB	ETHIDIUM BROMIDE
~~PLPA~~	~~9003~~	~~YAMAMOTO~~	~~1.00~~	~~GAL~~	~~SOLVENT MIXTURE~~
PLPA	9003	SUN	0.10	GAL	ETHYL ETHER
PLPA	9003	SUN	0.06	GAL	ETHYL ETHER
PLPA	9004	SAM SUN	0.02	GAL	PHENOL
PLPA	9004	SAM SUN	0.13	GAL	PHENOL
PLPA	9004	SAM SUN	0.25	GAL	PHENOL
PLPA	9005	MCINTOSH,CARL	0.13	GAL	PHENOL
PLPA	9006	BORTH	0.05	GAL	GUANIDINE THIOCYANAT
PLPA	9006	BORTH	0.10	GAL	GUANIDINE THIOCYANAT
PLPA	9006	BORTH	0.10	GAL	GUANIDINE THIOCYANAT
PLPA	9006	BORTH	0.10	GAL	TRICHLOROACETIC ACID
PLPA	9006	BORTH	0.10	GAL	TRICHLOROACETIC ACID
PLPA	9006	BORTH	0.10	GAL	TRICHLOROACETIC ACID
PLPA	9006	BORTH	3.00	LB	TRICHLOROACETIC ACID
PLPA	9006	BORTH	0.15	GAL	CHROMIC ACID
PLPA	9006	BORTH	0.15	GAL	CHROMIC ACID
PLPA	9006	BORTH	0.13	GAL	PERCHLORIC ACID
~~PLPA~~	~~9006~~	~~TRUJILLO~~	~~2.00~~	~~LB~~	~~CARBONATE~~
~~PLPA~~	~~9006~~	~~TRUJILLO~~	~~1.00~~	~~LB~~	~~MERCURY DICHLORIDE~~
~~PLPA~~	~~9006~~	~~TRUJILLO~~	~~4.00~~	~~LB~~	~~ETHYLENE DICHLORIDE~~
PLPA	9007	SUN	0.50	LB	ETHIDIUM BROMIDE
PLPA	9007	SUN	1.00	GAL	ETHIDIUM BROMIDE
PLPA	9007	SUN	0.80	GAL	GUANIDINE
PLPA	9007	CARL	0.01	GAL	GLUTARALDEHYDE
PLPA	9007	CARL	0.25	GAL	PHENOL
PLPA	9009	CARL	0.13	GAL	CESIUM SULFATE
PLPA	9009	CARL	0.05	GAL	GLUTEU ALDEHYDE

DEPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
PLPA	9009	MING LI	3.00	LBS	ETHIDIUM BROMIDE
PLPA	9009	MING LI	0.50	LBS	ETHIDIUM BROMIDE
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.40~~	~~GAL~~	~~PETROLEUM ETHER~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~2.00~~	~~LBS~~	~~PHENOL~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.13~~	~~GAL~~	~~SPON-913~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.13~~	~~GAL~~	~~DMF-30~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.13~~	~~GAL~~	~~ETHYLENE GLYCOL~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.13~~	~~GAL~~	~~GLUTANALDEHYDE~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.10~~	~~LBS~~	~~CEELOCIDIN~~
~~PLPA~~	~~9010~~	~~NORMAN~~	~~0.02~~	~~GAL~~	~~CHAPMAN TELLURITE SO~~
~~PLPA~~	~~9010~~	~~PAT~~	~~0.50~~	~~GAL~~	~~FORMIC ACID~~
PLPA	9011	MCINTOSH	0.25	GAL	CHLOROFORM
PLPA	9011	MCINTOSH	0.25	GAL	CHLOROFORM
PLPA	9011	MCINTOSH	0.20	GAL	CHLOROFORM
PLPA	9011	MCINTOSH	0.13	GAL	GUANIDINE THIOCYANAT
PLPA	9011	MING-LI	1.00	LBS	ETHIDIUM BROMIDE
PLPA	9011	MING-LI	1.00	GAL	ETHIDIUM BROMIDE
PLPA	9011	MING-LI	1.00	LBS	ETHIDIUM BROMIDE
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.13~~	~~GAL~~	~~DIOXANE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.13~~	~~GAL~~	~~DIOXANE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.13~~	~~GAL~~	~~DIOXANE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.06~~	~~GAL~~	~~DIOXANE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.01~~	~~GAL~~	~~CARBON DISULFIDE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.03~~	~~GAL~~	~~METHYL SULFOXIDE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.01~~	~~GAL~~	~~HYDROCHLORIC ACID~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.06~~	~~GAL~~	~~CYGON~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.01~~	~~GAL~~	~~DIETHANOLAMINE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.06~~	~~GAL~~	~~CARBOLIC ACID~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.06~~	~~GAL~~	~~DIAZONON~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.06~~	~~GAL~~	~~ORTHENE~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.01~~	~~GAL~~	~~GUIACOL~~
~~PLPA~~	~~9012~~	~~DECOVET~~	~~0.01~~	~~GAL~~	~~MALATHION~~
PLPA	9102	MARTIN	0.50	LBS	ETHIDIUM BROMIDE
PLPA	9102	MARTIN	1.00	LBS	ETHIDIUM BROMIDE
PLPA	9102	MARTIN	4.00	LBS	ETHIDIUM BROMIDE
PLPA	9102	BORTH	0.13	GAL	CHOLROFORM
PLPA	9102	BORTH	0.13	GAL	CHOLROFORM
PLPA	9102	BORTH	0.13	GAL	CHOLROFORM
PLPA	9102	BORTH	0.13	GAL	CHOLROFORM
PLPA	9102	BORTH	2.00	LBS	ETHIDIUM BROMIDE
PLPA	9102	BORTH	0.05	GAL	ETHIDIUM BROMIDE
PLPA	9102	BORTH	0.50	GAL	GUANIDINE
PLPA	9102	BORTH	0.50	GAL	GUANIDINE
PLPA	9103	MARTIN	2.00	LBS	ETHIDIUM BROMIDE
PLPA	9104	NUGA	1.00	LB	ETHIDIUM BROMIDE
PLPA	9104	NUGA	1.00	GAL	ETHIDIUM BROMIDE
PLPA	9109	MING LI	2.00	LB	ETHIDIUM BROMIDE
PLPA	9109	MING LI	10.00	LB	ETHIDIUM BROMIDE
PLPA	9109	MING LI	2.00	LB	PHENOL
PLPA	9109	MING LI	0.25	GAL	ETHIDIUM BROMIDE
PLPA	9110	SAM SUN	1.00	LB	ETHIDIUM BROMIDE
PLPA	9110	SAM SUN	2.00	LB	ETHIDIUM BROMIDE
PLPA	9111	SAM SUN	2.00	LB	PHENOL
PLPA	9111	SAM SUN	5.00	LB	ETHIDIUM BROMIDE

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SAM SUN 82 GAL 86 lbs

EPT	YRMO PU	GENERATOR	AMOUNT	UNT	WASTE
LPA	9104	NUGA	0.25	GAL	CHLOROFORM
LPA	9104	NUGA	0.25	GAL	CHLOROFORM
LPA	9104	NUGA	0.25	GAL	CHLOROFORM
LPA	9104	NUGA	0.25	GAL	CHLOROFORM
LPA	9104	LI	1.00	LB	CHLOROFORM
LPA	9104	LI	2.00	LB	CHLOROFORM
LPA	9104	LI	2.00	LB	ETHIDIUM BROMIDE
LPA	9104	LI	0.75	GAL	ETHIDIUM BROMIDE
LPA	9104	TOM MARTIN	4.00	LBS	ETHIDIUM BROMIDE
LPA	9105	MARTIN	2.00	LBS	ETHIDIUM BROMIDE
LPA	9105	MARTIN	1.00	LB	ETHIDIUM BROMIDE
LPA	9105	TANG	2.00	GAL	SOLVENT MIXTURE
LPA	9105	TANG	5.00	GAL	SOLVENT MIXTURE
LPA	9105	TANG	5.00	GAL	SOLVENT MIXTURE
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.25	GAL	PHENOL
LPA	9105	JOHN HU	0.06	GAL	ETHIDIUM BROMIDE
LPA	9105	JOHN HU	0.06	GAL	OSMIUM TETROXIDE
LPA	9106	MING	0.50	LB	CHLOROFORM, PHENOL
LPA	9106	MING	0.50	LB	CHLOROFORM, PHENOL
LPA	9106	MING LI	1.00	LB	ETHIDIUM BROMIDE
LPA	9106	MING LI	0.25	GAL	ETHIDIUM BROMIDE
LPA	9107	MARTIN	2.00	LB	ETHIDIUM BROMIDE
LPA	9108	MING LI	1.00	LB	ETHIDIUM BROMIDE
LPA	9108	MING LI	1.00	LB	PHENOL
LPA	9108	MING LI	1.00	LB	PHENOL
LPA	9109	MING LI	1.00	GAL	ETHIDIUM BROMIDE
LPA	9109	MING LI	0.25	GAL	PHENOL
LPA	9109	MING LI	0.25	GAL	PHENOL
LPA	9109	MING LI	0.13	GAL	PHENOL
LPA	9109	MING LI	0.13	GAL	PHENOL
LPA	9109	MING LI	0.13	GAL	PHENOL
LPA	9109	MING LI	1.00	LB	PHENOL
~~LPA~~	~~9109~~	~~NANI WONG~~	~~1.00~~	~~LB~~	~~PICRIC ACID~~

DEPT	PU	GENERATOR	AMOUNT	UNT	WASTE
FSHN	9108	CORY	2.00	LB	ACRYLAMIDE
FSHN	9108	CORY	0.75	GAL	METHANOL

Pages output: 1
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Report completed 04:23 PM

FSHN 2 LBS
.75 GAL

(.83/second)
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AGBC 179 GAL 430 lbs

APPENDIX C

ESTIMATED CHEMICAL CONSUMPTION

Sam Sun
PMP, 5/18/90

AG. Sci. III - Biotechnology Suite
Estimated Annual Chemical Consumption

Chemical Name	Chemicals Consumed/Year Estimated Qty/Units	Max. To Be Stored Estimated Qty/Units
ABSCISIC ACID	100MG	100MG
ACETIC ACID (GLACIAL)	40L	50L
ACETONE	5L	10L
ACRYLAMIDE	1KG	2KG
ADENINE	0.5G	5G
ADENOSINE 5' TRIPHOSPHATE	0.5G	1G
AGAR (granulated)	500G	1KG
AGAROSE	1KG	2KG
ALCOHOL (DENATURED)	40L	60L
AMIDO BLUE BLACK	5G	10G
L-AMINO ACIDS	0.5G EACH	1G EACH
p-AMINOBENZOIC ACID	2G	5G
AMMONIUM HYDROXIDE	1L	2L
AMMONIUM ACETATE	3KG	5KG
AMMONIUM NITRATE	1KG	2KG
AMMONIUM PERSULFATE	50G	250G
AMMONIUM PHOSPHATE	100G	500G
AMMONIUM SULFATE	1KG	2KG
AMPICILLIN	5G	2G
ANTIFOAM A EMULSION	50ML	100ML
L-ARGININE	0.5G	1G
L-ASCORBIC ACID	50G	100G
L-ASPARIGINE	0.5G	1G
L-ASPARTIC ACID	0.5G	1G
BACTO-AGAR	5KG	5KG
6-BENZYL-AMINOPURINE	0.5G	1G
6-BENZYLAMINO-PURINE RIBOSIDE	50MG	100MG
BIO-GEL P4	50G	100G
d-BIOTIN	50MG	100MG
BIS-ACRYLAMIDE	50G	100G
BORIC ACID	2KG	3KG
BRIJ 35	10G	500G
BRILLIANT BLUE	25G	50G
BROMOPHENOL BLUE-SODIUM SALT	5G	25G
BROMOPHENOL BLUE	2G	5G
5-BROMO-4-CHLORO-3-INDOLYL-PHOSPHATE-TOLUIDINE SALT	0.5G	2G
BUTYLATED HYDROXYTOLUENE	50G	100G
BUTYLATED HYDROXYANISOLE	50G	100G

CALCIUM CHLORIDE	1KG	2KG
CARBENICILLIN-DI.NA SALT	2G	5G
CASAMINO ACIDS	200G	500G
CASEIN ACID Hydrolysate	1KG	2KG
CEFOTAXIME	3G	5G
CESIUM CHLORIDE	3KG	3KG
CHLOROFORM	12L	20L
CHLOROPHENOXY-ACETIC ACID	10MG	100MG
CHLORAMPHENICOL	5G	25G
CHOLINE CHLORIDE	10G	100G
CITRIC ACID	2KG	5KG
COBALT SULFATE	10G	100G
COLCHICINE	10MG	100MG
CUPRIC SULFATE	50G	500G
CYANOGEN BROMIDE activated sepharose 4B	2G	5G
CYCLOHEXIMIDE	50MG	100MG
L-CYSTEINE	0.5G	1G
L-CYSTINE	0.5G	1G
DEOXYCHOLIC ACID Na SALT	25G	100G
DEXTROSE	3KG	5KG
2,4-DICHLOROPHENOXY-ACETIC ACID	50MG	100MG
DIETHYL PYROCARBONATE	25ML	50ML
3'5'-DIMETHOXY-4-HYDROXY-ACETOPHONE	0.5G	1G
DIMETHYL FORMAMIDE	200ML	500ML
DITHIOTHREITOL	10G	20G
DRIERITE	5LB	10LB
EDTA disodium salt	1KG	2KG
EDTA tetrasodium salt	200G	500G
ETHANOL, ABSOLUTE	15L	20L
ETHANOLAMINE	500ML	1L
ETHER	500ML	1L
ETHIDIUM BROMIDE	5G	5G
FAST VIOLET B SALT	5G	5G
FORMALDEHYDE	1L	2L
FICOLL	200G	500G
FOLIC ACID	0.2G	1G
FORMAMIDE	500ML	500ML
GELATIN type A	25G	100G
GIBBERELLIC ACID	50MG	100MG
L-GLUTAMIC ACID	0.5G	1G
L-GLUTAMINE	0.5G	1G
GLYCEROL	500ML	1L
GLYCINE	5KG	5KG
GUANIDINE THIOCYANATE	500G	500G
GUANOSINE-5'-TRIPHOSPHATE	200MG	250MG
HEPES	200G	250G
HEXADECYLTRIMETHYLAMMONIUM BROMIDE (CTAB)	100G	250G

PHOSPHORIC ACID	500ML	1L
O-PHTHALDIALDEHYDE	1G	5G
POTASSIUM ACETATE	1KG	2KG
POTASSIUM CHLORIDE	1KG	2KG
POTASSIUM FERRICYANIDE	5G	100G
POTASSIUM FERROCYANIDE	5G	100G
POTASSIUM HYDROXIDE	250G	500G
POTASSIUM IODIDE	10G	100G
POTASSIUM NITRATE	250G	500G
POTASSIUM PHOSPHATE (dibasic)	2KG	3KG
POTASSIUM PHOSPHATE (monobasic)	2KG	3KG
L-PROLINE	0.5G	1G
2-PROPANOL	4L	8L
PVP-360	250G	1KG
POLYVINYLPYRROLIDONE (PVP)	250G	500G
POLYVINYLPOLYPYRROLIDONE (pvpp)	250G	500G
PYRIDOXAL-HCL	50MG	100MG
PYRIDOXAMINE	100MG	250MG
PYRIDOXINE	1G	5G
PYROPHOSPHATE-4 Na	250G	500G
RESIN, MIXED BED	25G	100G
RIBOFLAVIN	1G	5G
SARKOSYL	100G	500G
SODIUM DODECYL SULFATE (SDS)	3KG	5KG
SEPHADEX G-25	50G	50G
SEPHADEX G-50	50G	50G
SEPHADEX G-75	50G	50G
SEPHADEX G-150	50G	50G
SEPHACRYL S-300	500ML	1L
L-SERINE	0.5G	1G
SERVA BLUE G	15G	15G
SIGMACOTE	100ML	200ML
SODIUM ACETATE	5KG	5KG
SODIUM AZIDE	5G	10G
SODIUM BORATE	1KG	2KG
SODIUM BICARBONATE	1KG	2KG
SODIUM CARBONATE	1KG	2KG
SODIUM CHLORIDE	15KG	20KG
SODIUM CITRATE	10KG	20KG
SODIUM FLUORIDE	100G	200G
SODIUM HYDROXIDE	1KG	2KG
SODIUM PHOSPHATE (Na2HPO4)	2KG	3KG
SODIUM PHOSPHATE (NaH2PO4)	2KG	3KG
SODIUM PYROPHOSPHATE	100G	500G
SORBITOL	1KG	1KG
SPERMINE	1G	5G
SPERMIDINE	1G	5G
SUCROSE	5KG	10KG

HEXANE	20L	30L
L-HISTIDINE	0.5G	1G
HYDROCHLORIC ACID	2L	4L
HYDROGEN PEROXIDE	100ML	500ML
HYDROXY-L-PROLINE	0.5G	1G
8'HYDROXYQUINOLINE	20G	50G
INDOLE-3-ACETIC ACID	50MG	100MG
INDOLE-3-ACETIC ACID ETHYL ESTER	50MG	100MG
INDOLE-3-BUTYRIC ACID	50MG	100MG
INDOLE-3-PROPIONIC ACID	50MG	100MG
ISOAMYL ALCOHOL	3L	4L
L-ISOLEUCINE	0.5G	1G
ISOPROPYL-BETA-THIOGALACTOSIDE (IPTG)	3G	5G
KANAMYCIN MONOSULFATE	2G	5G
KINETIN	50MG	100MG
L-LEUCINE	0.5G	1G
LEUPEPTIN HEMISULFATE	10MG	20MG
LITHIUM CHLORIDE	1KG	1KG
L-LYSINE	0.5G	1G
MAGNESIUM ACETATE	1KG	2KG
MAGNESIUM CHLORIDE	1KG	2KG
MAGNESIUM SULFATE	500G	1KG
MALEIC ACID HYDRAZIDE	50MG	100MG
MALIC ACID	50G	100G
MANGANESE CHLORIDE	50G	500G
MANNITOL	1KG	2KG
2'MERCAPTOETHANOL	100G	200G
MES	100G	200G
METHANOL	30L	40L
L-METHIONINE	0.5G	1G
MOLYBDIC ACID	10G	100G
MOPS	1KG	2KG
MYO-INOSITOL	100G	500G
a-NAPHTHALENEACETIC ACID	25MG	50MG
b-NAPHTHALENEACETIC ACID	25MG	50MG
NAPHTHOL BLUE/BLACK	1G	10G
NEOMYCIN SULFATE	10G	25G
NICOTINIC ACID	15G	100G
NITRO-BLUE TETRAZOLIUM.CL	50MG	100MG
NITRILOTRIACETIC ACID	5G	50G
NP-40	50ML	100ML
a-PANTOTHENIC ACID	1G	5G
L-PHENYLALANINE	0.5G	1G
PHENOL	3KG	5KG
PHENYLMETHYLSULFONYL FLUORIDE (PMSF)	0.5G	1G
PHOSPHOENOLPYRUVATE	0.5G	1G