UNIVERSITY OF HAWAI'I AT MĀNOA

OFFICE OF THE CHANCELLOR

March 23, 2006

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmonson:

Subject: Notice of Determination - Finding of No Significant Impact Telecommunications Facility, University of Hawai'i at Mānoa SprintCom Gilmore Hall Rooftop Antenna Site, Honolulu, O'ahu, HI TMK: (1) 2-8-023:003

The University of Hawai'i at Mānoa has reviewed the responses to comments related to the Draft Environmental Assessment received during the 30-day public comment period that began on January 23, 2006. The agency has determined that this project will not have significant environmental effects and has issued a Finding of No Significant Impact. Please publish this notice in the April 8, 2006 edition of *The Environmental Notice*.

We have enclosed the following items for your review:

(1) One copy of the OEQC Environmental Notice Publication Form;
(2) Four copies of the Final EA.

The following information is provided in accordance with the requirements for a Notice of Determination:

Identification of Applicant
SprintCom

Identification of Accepting Agency
University of Hawai'i t Mānoa, State of Hawai'i

Determination
Finding of No Significant Impact (FONSI)

Reasons Supporting Determination
This determination is based on the significance criteria listed in Section 11-200-12 of the Environmental Impact Statement Rules:

2500 CAMPUS ROAD • HAWAI'I HALL • HONOLULU, HAWAI'I 96822 • TEL (808) 956-9190 • FAX (808) 956-5136

1. The proposed project will not involve an irrevocable commitment to loss or destruction of any natural or cultural resources.

2. The proposed project will not curtail the range of beneficial uses of the environment. The project will be located within the University of Hawai'i parcel and easements, designated for institutional facilities.

3. The proposed project will not conflict with the Sate's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

4. The proposed project will not have a substantial negative effect on the economic or social welfare of the community or Sate. The project will not have a long-erm impact on employment or economics. The impact on social welfare will be positive since the proposed project will enhance telecommunication service for the community.

5. The proposed project will not substantially affect public health (in a negative manner). Rather, the project will provide a means to minimize emergency response time by providing efficient, quality telecommunication service on the university campus and its surrounding area.

6. The proposed project does not involve substantial secondary impacts, such as effects on public facilities (in a negative manner). Rather, it will increase capacity of the existing communication system to serve the university campus and its neighboring parcels in conformance with the County General Plan and the Primary Urban Center Development Plan.

7. The proposed project does not involve a substantial degradation of environmental quality. Antenna facilities are clean, unmanned facilities that do not generate additional vehicular traffic or degrade noise or air quality.

8. The proposed project does not have considerable cumulative effect upon the environment, and no larger commitment is required for the proposed antenna site.

9. The proposed project will not substantially affect rare, threatened, or endangered species, or their habitat since there are none present within the project site.

10. The proposed project will not detrimentally affect air or water quality or ambient noise levels. These potential impacts and mitigation measures have been addressed in the appropriate sections of the EA.

11. The proposed project will not affect, nor is it likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

12. The proposed project will not substantially affect scenic vistas or viewplanes identified in county or state plans or studies. The antennas will be painted the same color as the existing building and will not exceed the existing height of the structure.

13. The proposed antenna facility will not require substantial additional energy.

Should you have any questions, please contact Mr. Wallace Gretz of Facilities Management Office at 956-8896.

Sincerely,

Kathy Cutshaw

Kathy Cutshaw
Interim Vice Chancellor for Administration,
Finance and Operations

Enclosures
c: Colette Sakoda (Consultant)
Wallace Gretz

2006-04-08 OA FEA SPRINT ANTENNA AT GILMORE HALL, UH AT MANOA

Final Environmental Assessment

for

Proposed SprintCom Gilmore Hall Rooftop Antenna Site University of Hawai`i at Mānoa

Honolulu, O`ahu, Hawai`i

Submitted Pursuant to Chapter 343, Hawai`i Revised Statutes (HRS), as amended

Applicant:
SprintCom

Approving Agency:
University of Hawai`i at Mānoa

Prepared by:
Environmental Planning Solutions, LLC

March 2006

Final Environmental Assessment

Proposed Sprint Antenna Facility
Gilmore Hall Rooftop
University of Hawai`i at Mānoa
Tax Map Key No. 2-8-023:003

Prepared Pursuant to Chapter 343, HRS, as amended

Applicant:
SprintCom
925 Dillingham, Honolulu, HI
Honolulu, HI 96817

Approving Agency:
University of Hawai`i at Mānoa
2444 Dole Street
Honolulu, HI 96822

Prepared by:
Environmental Planning Solutions, LLC
945 Makaīwa Street
Honolulu, HI 96816

March 2006

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SUMMARY INFORMATION

CHAPTER 343, HAWAI`I REVISED STATUTES (HRS)
FINAL ENVIRONMENTAL ASSESSMENT

Project Name:	Proposed Antenna Facility University of Hawai`i at Mānoa (UHM) Gilmore Hall Rooftop
Applicant:	SprintCom 925 Dillingham Boulevard Honolulu, HI 96817
Approving Agency:	University of Hawai`i at Mānoa 2444 Dole Street Honolulu, Hawai`i 96822
Prepared by:	Colette M. Sakoda Environmental Planning Solutions LLC 945 Makaīwa Street Honolulu, Hawai`i 96816
Anticipated Determination:	Finding of No Significant Impact (FONSI)
Project Description:	6 panel antennas 6'(h) x 8"(w) are to be mounted vertically on the south and west walls of the rooftop elevator shaft. 3 panel antennas are to be mounted on the north facing wall of the upper roof level that contains a/c exhaust vents. Total space required on rooftop is 375 sq.ft.
Land Owner:	State of Hawai`i 2444 Dole Street Honolulu, Hawai`i 96822
Location:	Gilmore Hall, UHM, Mānoa, Honolulu District, O`ahu

Site Address:	Gilmore Hall College of Tropical Agriculture & Human Resources, 3050 Maile Way Honolulu, Hawai`i 96822-2275
TMK No.:	2-8-023:003
Land Use Classifications:	State Land Use District: Urban County Development Plan: Institutional County Zoning: R-5 Residential
Lot Area:	4,507,676 square feet (103.482 acres)
Height Limit:	25-30 feet
Special Management Area:	No
Flood Zone:	AE & X
Existing Use:	Gilmore Hall, a 7-story building, houses the College of Tropical Agriculture & Human Resources
Surrounding Land Uses:	Gilmore Hall is located in the northern sector of the center of the UHM campus. It is surrounded by Maile Way annexes to the west, Agricultural Engineering to the east, Hamilton Library Annex to the south, and Mid Pacific Institute campus to the north.

1.0 INTRODUCTION

SprintCom (referred to herein as Sprint) is planning to upgrade its wireless voice and data coverage on the University of Hawai`i at Manoa campus on O`ahu. Sprint is licensed by the FCC to broadcast in the 1900 Megahertz (MHz) band; thus, this new site will enable Sprint to enhance in-building penetration of these frequencies. Kansas City, Kansas-based Sprint has a nationwide PCS system, and this provider offers bundled products such as internet access, paging, long distance, local and wireless phone service.

Sprint will be launching a CDMA network using state of the art equipment. This improved technology means better, more secure communications to its customers, and smaller, less visible installations to its landlords. Company policy is to attach to existing structures wherever possible in order to minimize visual impacts.

The proposed plan for Sprint's University of Hawai`i Mānoa campus facility is on the rooftop of Gilmore Hall in the center of campus. The antenna facility will consist of the following:

- 6 panel type antennas flush mounted to the south and west faces of the elevator penthouse just below the top of the highest parapet. Another 3 panel antennas will be flush mounted to the north-facing wall of the upper roof level that houses the building's air conditioning vents and other mechanical equipment. Each panel antenna measures about 6'(h) x 8"(w) and will be painted to blend in with the building's existing color.

- Two (2) self-contained, weatherproof BTS equipment cabinets that each measure approximately 60" (h) x 52" (l) x 30" (w) will sit against a wall mounted rack that is bolted to a wall on the main roof mauka of the elevators to ensure adequate space for rooftop maintenance. The BTS is connected to a utility demarcation/power protection cabinet that measures approximately 66" (h) x 30" (l) x 10" (w).

- Total space required on rooftop will be about 375 sq.ft. This installation will be regulated by the Federal Communications Commission and requires additional zoning and building permits from the City & County of Honolulu.

- Sprint's installation is classified as a Utility Installation, Type B, in the R-5 zoning district, and requires a minor modification to the Plan Review Use (PRU) from the Department of Planning and Permitting, City and County of Honolulu.

This Final Environmental Assessment (FEA) has been prepared to identify and evaluate the existing conditions and potential impacts of the installation of an antenna installation at the top of Gilmore Hall on the natural and human environment. This EA has been prepared in accordance with the provisions of Chapter 343, HRS and Title 11, Chapter 200 of the State Department of Health's Administrative Rules, as the proposed action involves the use of State land. See Figures in the appendix for Vicinity and Building Location.

1.1 IDENTIFICATION OF APPLICANT

SprintCom is a wireless telecommunications service provider proposing to implement this project.

1.2 IDENTIFICATION OF APPROVING AGENCY

The University of Hawai`i is the designated approving agency because it is the landowner. A minor modification to the University's Plan Review Use (PRU) File No. 88/PRU-3 is required by the City and County of Honolulu. Thus, the DEA prepared in accordance with Chapter 343, HRS, is a supplemental document to the minor modification to the PRU application.

1.3 IDENTIFICATION OF AGENCIES AND ORGANIZATIONS CONSULTED IN MAKING THE ASSESSMENT

Listed below are the agencies and organizations consulted in the preparation of the EA.

Federal Government:

1. U.S. Army Corps of Engineers Pacific Ocean Division
   Regulatory Branch
2. U.S. Department of Interior U.S. Fish & Wildlife Service
3. Environmental Protection Agency—PICO
4. Directorate of Facilities Engineer U.S. Army Support Command Hawai`i

State of Hawai`i:

5. Department of Education
6. State Department of Land and Natural Resources
   Historic Preservation Division
7. State Department of Land and Natural Resources Land Division
8. Office of Hawaiian Affairs
9. Office of Planning
10. UHM Environmental Center
11. University of Hawai`i Mānoa Facilities Planning and Management Office
12. State Department of Health Environmental Management Division

13. State Department of Transportation Highways Division

City and County of Honolulu:
14. Board of Water Supply
15. Department of Parks and Recreation
16. Department of Planning and Permitting
17. Department of Environmental Services
18. Department of Transportation Services
19. Fire Department
20. Police Department

Utilities:
21. Hawaiian Telcom Inc.
22. Hawaiian Electric Company
23. Oceanic Time Warner Cable of Hawai`i
24. The Gas Company

Other Organizations:
25. Nature Conservancy
26. Sierra Club
27. Mānoa Neighborhood Board No. 7
28. Ann Kobayashi, Councilmember, District 5

1.4 SUMMARY OF MAJOR IMPACTS AND MITIGATING MEASURES

1.4.1 SHORT TERM IMPACTSTRAFFIC AND PARKING. Minor traffic impacts will occur as a result of construction related traffic and the operation of construction equipment which may, on occasion, impede traffic in the immediate vicinity of Gilmore Hall on Maile Way. In addition, the proposed project may inhibit the use of the loading zone at Gilmore Hall while a boom truck is parked to unload the bulk of the panel antenna and equipment cabinet hardware. This is expected to occur over a 3-day period. NOISE. Construction activities will result in an increase in noise levels during the 5- to 8-week installation period. However, disruption to existing activities is anticipated to be minimal as the proposed project will not involve major earthmoving, pile driving or heavy demolition work.

AIR QUALITY. During construction, fugitive dust generation and on-site emission from construction and installation activities may affect air quality in the immediate vicinity of the project. However, these impacts are anticipated to be minor due to the short construction period and small size of the actual exterior equipment installation.

To mitigate potential short-term impacts associated with construction activities, the installation of the equipment should be coordinated with the university to minimize

disruption of classes and use of the building's elevator, preferably concentrating construction drilling on weekends and when the university is not in session.

1.4.2 LONG TERM IMPACTS

TRAFFIC AND PARKING. The proposed project will not result in any loss of parking spaces. Neither will it result in an increase in parking demand. The antenna facility will be unmanned and monitored from an offsite location. It will be visited once a month by a maintenance engineer whose normal length of stay on the site will be one hour. The project will not result in an increase in traffic volumes because it will be unmanned.

NOISE. The installation of electrical switching equipment in the 2 cabinets and 9 panel antennas will not result in any increase in noise levels in the long term at the rooftop or on lower floors of the Gilmore Hall.

VISUAL RESOURCES. The placement of 9 panel antennas on the north, south and west sides of the building's rooftop elevator shaft will have limited impact on ground level views in the vicinity of the building as the view angle from the ground limits views to the outer portions of the roof. Visual impacts will mainly occur to views from the upper floors of adjacent buildings or from distant ground level viewpoints. However, these impacts are anticipated to be minimal because the overall size of the antennas and related accessories in comparison to the building itself will result in changes to portions of the building roof, but will not result in a significant alteration to the overall form. The antennas will be painted to blend in with the building paint color.

The installation of 2 electrical equipment cabinets on the rooftop will not impact ground level views because this part of the roof is recessed from the edges of the building. The equipment cabinets may be visible from upper floors of adjacent buildings, but should not significantly impact the overall visual quality of views from these buildings.

ELECTROMAGNETIC RADIATION (EMF). The lower level rooftop of the Gilmore Hall is not restricted to public access. College of Tropical Agriculture and Human Resource faculty (CTAHR) conduct plant and insect research on the lower level of the building rooftop. In response to concerns regarding potential impact on ongoing research activities, the Sprint panel antennas are being placed on the walls of the elevator shaft and northern call which are located away from the site where CTAHR faculty and experiments are taking place. Campus maintenance contractors and Sprint personnel will be aware of the facility and knowledgeable of the potential for exposure and can exercise control over their exposure. In the event that UH workers will be in close proximity to the antennas for prolonged periods, UH personnel will make prior arrangements with SPRINT. Sprint will work with the UH personnel to mitigate any concerns including education of RF safely and use of RF monitor devices. If it is determined that work will be unsafe, SPRINT will work with UH on reducing the power level of the antennas

possibly remotely powering down the antennas. UH personnel are aware that powering down the antennas will affect service and will be possible for rare and short periods of time. Caution or warning signs related to radiation safety will be posted on the locked roof access door and padlocked roof scuttle and the exteriors of the west facing wall.

SPRINT is licensed by the Federal Communications Commission (FCC) and complies with very strict emission guidelines. Pacific Wireless Communications (PWC) conducted an electromagnetic emissions (EME) prediction study for the proposed installation of the SPRINT CDMA PCS base station site on Gilmore Hall. The SPRINT report dated December 2005 in its entirety is included in the Appendix of this DEA. Analysis of the potential for RF hazards to personnel at the facility, conducted using an MPE analysis software application widely used in the wireless telecommunications industry, Roofview V4.15, revealed that personnel on the rooftop or in the rooms directly below the rooftop will not be exposed to the power densities exceeding the FCC Office of Engineering Technology (OET) Bulletin 65 Maximum Permissible Exposure (MPE) limits. Furthermore, faculty and personnel located in offices on the lower floors of the building and at ground level will not be exposed to power densities exceeding the FCC MPE limits. Therefore transmission from the proposed antennas will not be hazardous to personnel (PWC, December 2005).

Professor Vincent Z. Petersen, an expert in the field of radiation and radio transmission at the UHM Department of Physics, was asked by the Associated Students of the University of Hawai`i (ASUH), to determine whether a higher intensity KTUH antenna on Saunders Hall would result in a radiation hazard to occupants of the building. Dr. Petersen prepared a paper entitled, "Statement Regarding Electromagnetic Radiation Levels Associated with Proposed KTUH FM Radio Transmission" in 1995. Calculations prepared by Dr. Petersen concluded that the FM radiation from the KTUH antenna with 3000 watt total radiated power, does not constitute a radiation hazard to occupants at the top floor (or any floor) of the Social Sciences Building. The maximum intensity on the rooftop was projected as 30 times lower than FCC-acceptable radiation levels of 1.0 mW/cm^2. Please refer to a copy of Dr. Petersen's paper in the Appendix.

Sprint's antenna would be radiating at a significantly lower level than the KTUH site.

SOCIO-ECONOMIC. Wireless technology provides high quality, safe and secure communication services to the community. To be effective, the necessary infrastructure must be built so that the convenience, mobility and connectivity of wireless communication devices are easily and readily available to all residents. In addition to improving public safety and providing new jobs, Sprint is helping build a communications infrastructure that will support economic growth and additional tax revenues. Efficient and reliable communication is an essential requirement for people in any community. This installation is a part of a cellular telecommunications system that will help fulfill this need.

1.5 SUMMARY OF ALTERNATIVES CONSIDERED

Other buildings on campus that have existing facilities were considered but were ruled out either mainly because they are either not suitable for RF purposes or lack adequate infrastructure for additional antenna facilities, such as Saunders Building where there are existing antennas. Hamilton Library Annex, St. John Hall, and the Business Administration Building were evaluated as potential antenna sites. Hamilton Library annex is taller than Gilmore; however, Sprint's radio frequency engineers preferred that the site height not exceed 70 feet because the lower height will minimize interference with existing sites in the Manoa/Kaimuki area. By using a shorter building, the antennas can be slightly tilted downward in order to focus the coverage on the mauka end of the UH campus, according to Sprint's RF engineers. All of the concrete buildings on the mauka end of the campus can benefit from improved wireless service. Additionally, UHM's policy of one-carrier-per-building would not allow a second carrier.

1.6 DETERMINATION

Based upon the findings presented in the DEA and supporting technical studies, the potential impacts of the installation and operation of the SPRINT antenna facility have been sufficiently examined and discussed. After reviewing the significance criteria outlined in Section 11-200-12, EIS Rules, Contents of Environmental Assessments, the University of Hawaii at Mānoa determined that the action is not expected to result in significant adverse effects on the natural environment. The DEA was be circulated for public review and comment for a period of 30 days between January 23 and February 22, 2006. The University of Hawai`i reviewed written comments received at the end of the review period as well as written responses to make a final decision regarding project impacts.

2.0 PROJECT DESCRIPTION

2.1 PURPOSE AND NEED FOR THE PROJECT

Sprint is seeking to expand telecommunication service to its customers on the University of Hawai`i Mānoa campus. The purpose of the transmitter/antenna facility is to provide a large coverage zone over the University of Hawai`i campus, Mānoa, and particularly improve in-building service throughout the campus. Increasingly, PCS systems are being used to transmit data allowing callers to communicate with other telephones, computers, faxes and pagers around the world. This has greatly increased usage and demand for efficient coverage. PCS uses "cells" or geographic areas that resemble a honeycomb pattern. Located within each cell area, an antenna and a base station comprised of switching equipment. The signal travels from the wireless phone to the base station and is relayed to the switching equipment. The call is then connected to the local phone network or to other wireless users on the system.

Wireless technology provides high quality, safe and secure communication services to the community. To be effective, the necessary infrastructure must be built so that the convenience, mobility and connectivity of wireless devices are easily and readily available to all residents. In addition to improving public safety and providing new jobs, Sprint is helping build a communications infrastructure that will support economic growth and additional tax revenues. Efficient and reliable communication is an essential requirement for people in any community. This installation is a part of a wireless telecommunications system that will help fulfill this need.

2.2 LOCATION, OWNERSHIP AND SURROUNDING LAND USES

The site for the proposed Sprint antenna facility is located on the University of Hawai`i, Mānoa (UHM) campus in Honolulu on the island of O`ahu. See location map in Appendix. The University of Hawai`i is a multi-campus system of post-secondary educational institutions serving the State of Hawai`i. The UHM is the system's major comprehensive graduate and research campus with more than 18,700 students and is commonly referred to as the Mānoa Campus.

The University of Hawai`i Long Range Development Plan (UHLRDP) divides the Mānoa campus into four subareas: the Central campus, the Upper/Central campus, the Mauka campus, and the Makai campus. Gilmore Hall is centrally located within the upper Central campus on less than an acre of land. The building occupies a portion of Tax Map Key: 2-8-023:003 which is owned by the University of Hawai`i.

Gilmore Hall houses the University's College of Tropical Agriculture and Human Resources (CTAHR). Maile Way annexes are located to the west, Agricultural Engineering to the east, Hamilton Library Annex to the south, and Mid Pacific Institute campus to the north.

2.3 EXISTING FACILITY

The College of Tropical Agriculture and Human Resources classrooms and faculty are housed in Gilmore Hall. Classes are held rooms on the lower floors. The Center for Conservation Research and Training is also in Gilmore Hall, on the fourth floor. Two elevators which service the building are located on the ewa side of Gilmore Hall. The lower rooftop of Gilmore houses some insect research in hot houses while the elevator shaft is located on the upper rooftop off the ewa makai end, and entomology and insect behavioral experiments are conducted on the top three floors of this 7-story building.

2.4 PROPOSED PROJECT

The project proposes a CDMA PCS Nortel Networks 6S3C Compact Metrocell base transceiver station (BTS) consisting of one equipment cabinet and 6 panel antennas on the elevator/mechanical room located on the rooftop of the 7-story Gilmore Hall. All in all, the facility will occupy approximately 375 s.f. on the roof of the building. The installation, which will operate 24 hours a day, 7 days a week, is unmanned, and requires only monthly maintenance by the carrier's personnel.

Sprint facility details are:

- BTS cabinet measures approximately 60" (h) x 52" (l) x 30" (w) and will be mounted on a short platform to ensure adequate maintenance access. If any penetration of the roofing material is required, all work will be done in conjunction with approved roofing contractors so as not to void any existing warranties. The BTS cabinet is connected to a utility demarcation/power protection cabinet that measures approximately 66" (h) x 30" (l) x 10" (w). Coaxial cables will run from the radios housed in the BTS cabinets to nine (9) panel type antennas mounted on the rooftop as well.
- Each panel antenna measures about 6'H x 8"W. Six of these antenna panels are to be mounted vertically on the south and west sides of the elevator penthouse just below the top of the highest parapet. The tops of the panels will not extend above the top of elevator room's walls. Another three panel antennas will be flush mounted to the north-facing wall of the rooftop sector that houses air conditioning vents and other mechanical equipment. Equipment specifications are included as Exhibits in this application. See Appendix for zoning drawings, photos and photo simulation.

The proposed UH facility will help to bridge the gap in coverage throughout the University campus and meet user demand for better coverage.

2.5 PROJECT SCHEDULE AND COSTS

The construction of the project will take approximately 5 to 8 weeks. Scheduling of construction will be closely coordinated with the UH Mānoa Facilities Planning and Management Office to minimize potential noise and traffic impact concerns in and around Gilmore Hall. It is scheduled to start upon receipt of all zoning and building permit approvals. The estimated construction cost of the installation of the antenna facility is $85,000.00.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT, ANTICIPATED IMPACTS AND MITIGATIVE MEASURES

3.1 CLIMATE

A. Existing Conditions

Average daily minimum and maximum temperatures range from the low 70s (degrees Fahrenheit) to the low 90s, depending on the time of day and the season. Average daily temperatures vary by about 6.5 degrees between winter and summer seasons, and 15 to 20 degrees between day and night.

Precipitation is seasonal, with most rainfall occurring between the months of December through April. The adjusted median annual rainfall for this location is approximately 30 inches.

B. Anticipated Impacts and Mitigative Measures

The proposed project will have no effect on climatic conditions.

3.2 TOPOGRAPHY

A. Existing Conditions

The site is essentially flat. The elevation is approximately 70 feet above mean sea level (msl). The proposed project will not require alterations to existing grades as the project involves primarily installation of new fixtures to an existing structure without ground alterations or grading activities.

B. Anticipated Impacts and Mitigative Measures

The proposed project will have no effect on topographic conditions.

3.3 SOILS

A. Existing Conditions

According to the U.S. Soil Conservation Service, the soils on the property are comprised of Makiki Stony Clay Loam (MIA). This series consists of well-drained soil, and this particular soil type is found on slopes of 0 to 3 percent. Stones make up about 15 percent of this soil type by volume. The depth of the underlying bedrock or ash varies from 20 to 60 inches.

B. Anticipated Impacts and Mitigative Measures

The proposed project will have no effect on soil character as the site is entirely urban in character and the proposed improvements (which are concentrated on the upper rooftop of the Gilmore Hall) will not involve earthwork.

3.4 SURFACE WATER AND DRAINAGE

A. Existing Conditions

The proposed project is designated as Zone X, defined as "areas determined to be outside the 500-year flood plain" by the National Flood Insurance Program, Flood Insurance Rate Map (FIRM). The site is urban in character with concrete pavement and landscaping. The bulk of work on the proposed project will be concentrated on the upper roof of the existing building.

B. Anticipated Impacts and Mitigative Measures

The proposed project is not anticipated to have any impacts on existing drainage patterns or volumes because the site is already highly urban. Ground level activity will involve trucking in the panel antennas, cabinet and associated facility hardware to the southeast side of the building, with construction workers carrying the bulk of the hardware to the rooftop via the elevator. Because most of the installation hardware will be delivered to the rooftop in the same manner as office equipment, little to no impact is expected even during construction. The exception would be the delivery and boom-lifting of the 60" (h) x 52" (l) x 30" (w) cabinets to the southwest side of the building.

3.5 FLORA AND FAUNA

A. Existing Conditions

The vegetation and wildlife on the project site are entirely urban in character. No threatened or endangered species presently reside on the project site. Existing vegetation in the vicinity of the ground floor improvements include shower trees in front of Gilmore Hall and on the western side of the building, and ornamental plants and trees on the east. Other vegetation includes grass and shrubs on the south side of the building facing Maile Way. Some birds observed at the site include the Barred Dove, the Common English Sparrow, and the Mynah. Other animal species likely to occur are feral cats and mice.

B. Anticipated Impacts and Mitigative Measures

Neither construction activity nor operation of the proposed antenna facility will result in disturbance or removal of existing vegetation in the vicinity of the ground

floor or rooftop. Wildlife species currently utilizing the site will most likely be displaced into adjacent areas during facility hardware installation.

3.6 ARCHAEOLOGICAL /HISTORICAL RESOURCES

A. Existing Conditions

There are no known archaeological or historic sites on the project site. Gilmore Hall is not on the National or State Historic Register. See SHPD letter dated March 15, 2006 in the Appendix.

Act 50, enacted by the Legislature of the State of Hawai`i (2000) requires state agencies and other developers to assess the effect of proposed land use or shoreline developments on the "cultural practices of the community and State as part of the HRS Chapter 343 environmental review process (2001). Its purpose has broadened, "to promote and protect cultural beliefs, practices and resources of native Hawaiians and other ethnic groups, and it also amends the definition of 'significant effect' to be re-defined as "the sum of effects on the quality of the environment including actions that are...contrary to the State's environmental policies...or adversely affect the economic welfare, social welfare, or cultural practices of the community and State" (H.B. 2895, Act 50, 2000).

As suggested in the "Guidelines for Assessing Cultural Impacts" (OEQC 1997), consultation with organizations familiar with cultural practices and features associated with the project area is permissible in the process of determining the project's impacts on cultural practices in the area. According to the OEQC (1997), a "good faith effort" is required to investigate the potential cultural impact on a property. In the case of the present site, limited archival research was conducted, and letters of inquiry during the Pre-Assessment period were sent to the O`ahu Office of Hawaiian Affairs and the State Historic Preservation Division. The responses obtained, included in Appendix A, provide a good faith level of effort.

The University of Hawai`i at Mānoa began in 1907 as a land-grant college of agriculture and mechanic arts called the College of Hawai`i. The first classes were held at a temporary site in downtown Honolulu. In 1912, the school moved to its permanent site in Mānoa Valley. Since 1912, the University of Hawai`i Mānoa campus has grown to encompass 304 acres as a major educational institution in urban Honolulu. The project area has not been used for traditional cultural purposes within the last 93 years.

B. Anticipated Impacts and Mitigative Measures

The project is not expected to result in any adverse impacts because no archaeological or historic sites are known to exist on or in the vicinity of Gilmore Hall.

Because the proposed project does not require earthwork, no archaeological or historically significant resources are anticipated to be encountered during the construction and installation period. In accordance with Section 6E-46.6, HRS and Chapter 13-300, HAR, if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the contractor shall contact SHPD.

Based on historical research, it is reasonable to conclude that Hawaiian rights related to gathering, access or other customary activities will not be affected and there will be no direct adverse effect upon cultural practices or beliefs.

Therefore, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by the proposed antenna installation on the property. Because there were no activities identified, no adverse effects are anticipated.

3.7 TRAFFIC AND PARKING

A. Existing Conditions

Students, faculty and employees access the project site in a variety of ways: ride-sharing, motorcycles, mopeds, bicycles, City bus service, shuttle service, private vehicles, and on foot. Parking on campus nearest the project site is allowed by permit only. There is an open area where trucks can be parked for short periods at a time between Gilmore Hall and a separate single-story structure housing mechanical equipment for maintenance personnel and deliveries.

B. Anticipated Impacts and Mitigative Measures

Short-term impacts on parking fronting Gilmore Hall and its loading zone that fronts Maile Way will probably occur as a result of construction related traffic entering and exiting the project site. Traffic generated by construction workers will occur during normal working hours and between 7:30 a.m. and 4:30 p.m. However, construction activity will have very little impact on traffic entering and leaving the campus because the number of project workers is expected to be small. Operation of construction/installation equipment and trucks may, on occasion, impede traffic and short-term parking in the immediate area of Gilmore Hall during construction which is expected to occur between 5 to 8 weeks.

No long-term impacts on traffic or parking are expected because the proposed project is an unmanned facility that will operate 24 hours a day 7 days a week, with a once-per-month visit by the carrier's maintenance technician.

While the proposed project will have minimal impact on the existing traffic and parking conditions on the Mānoa campus, the contractor should be expected to do pro-active planning to avoid any short-term delays or parking problems during construction. Such measures would include notifying the UHM facilities planning and management office, Gilmore Hall faculty and administrative staff, and the security office of its construction schedule well in advance prior to commencement of activities, and to have a worker monitoring traffic and parking in the immediate vicinity of Gilmore Hall during the peak construction/installation period.

3.8 UTILITIES

A. Water and Wastewater

UHM water and wastewater infrastructure systems are owned, operated and maintained by City and County of Honolulu agencies. Like the other buildings on the campus, Gilmore Hall is served by these existing systems. The proposed project will not require water or wastewater system services because it is an unmanned facility. Therefore, this section does not include further discussion of water and wastewater systems.

B. Electrical and Telephone Systems

a. Existing Conditions

Electrical power for Gilmore Hall is provided by Hawaiian Electric Company (HECO) while the electrical power distribution system for the entire campus including Gilmore Hall is owned and managed by the University. Telephone service is provided by Hawaiian Telcom. The proposed project will require electrical power and telephone service for its operations on the Gilmore Hall rooftop.

b. Anticipated Impacts and Mitigative Measures

According to past demand charts from the UHM Facilities Planning and Management office, the capacity required for the antenna facility would be available from the existing electrical power and telecommunications systems.

3.9 NOISE

A. Existing Conditions

Noise levels in the vicinity of the project site's ground floor through the upper floors are affected by faculty and office workers, students and vehicular noise. The elevator/mechanical room, located on the building's rooftop contributes to the

ambient noise level of the project area. Traffic noise in the immediate area is generally not disruptive because vehicle speeds are low.

B. Anticipated Impacts and Mitigative Measures

The construction activities of the Sprint antenna facility will result in an increase in noise levels during the 5- to 8-week installation period. Construction related noise may affect faculty, labs, research facilities on the sixth floor. However, disruption to these activities is anticipated to be minor as the proposed project will not involve major activities such as earthmoving, pile driving or demolition work. At most, disruption may be limited to about 4 weeks. Construction related noise should not seriously affect the teaching and learning processes in the neighboring Agricultural Engineering building as this building is either substantially enclosed. The anticipated increase in noise level will be limited to the contractor's allowed work hours of weekdays, 7:30 a.m. to 4:30 p.m.

There will be a brief two-to-three day period during which flatbed trucks will deliver the panel antennas, reels of coax cable, and the BTS equipment cabinets to the rooftop. Most equipment, except the BTS cabinets, coax cable and support beams, is small enough to be carried via the elevator to the rooftop. The trucks will likely be parked on the south side of the building to get equipment onto the building elevator in the most efficient way and to minimize disruption to the building's normal daily activities. The work can be performed on a weekend, if necessary, to minimize impact to the College of Tropical Agriculture and Human Resources faculty, administration and students.

No long-term noise impacts are anticipated by the operations of the unmanned antenna facility. After installation of the panel antennas and equipment cabinets is complete, noise generated from the rooftop will be practically unchanged from the current situation due to the fact that the proposed project is not a noise-generating facility. No emergency generator or air conditioner is planned for the antenna facility, which is sometimes included in telecommunications facilities.

3.10 AIR QUALITY

A. Existing Conditions

Overall the air quality in the vicinity of the project area is generally good. There are no major sources of pollution near the project site. The site is upwind from all major transportation corridors. Present air quality in the project area is mostly affected by air pollutants from motor vehicles, with carbon monoxide being the most abundant of the air pollutants emitted.

B. Anticipated Impacts and Mitigative Measures

1. Short-Term Impacts

There will be two types of short-term air quality impacts that will result from the proposed project: 1) fugitive dust generation and 2) on-site emissions from construction equipment. Fugitive dust emissions may arise from exterior site preparations and construction activity. On-site mobile and stationary construction equipment will emit some air pollutants in the form of engine exhausts. However, these impacts are anticipated to be minimal due to the short construction period and the small size and scale of the proposed project.

Contractor construction equipment will be required to comply with State and County standards with respect to maintaining equipment so that trucks and heavy equipment will be operating in good condition. Best management practices such as this will help minimize any on-site emissions of air pollutants during the brief construction period. Additionally, if the most disruptive phase of the installation involves a boom truck lifting supporting beams, coax cable and BTS equipment cabinets to the rooftop can be accomplished over a single weekend, air quality impacts would be substantially minimized.

2. Long-Term Impacts

Long-term air quality impacts will remain at current levels from normal, day-to-day operations after the construction of the proposed project since, 1) the capacity of the parking lot next to Gilmore Hall will remain unchanged. As stated in Section 3.7 Traffic and Parking, this facility will be unmanned with a Sprint technician expected to visit the project site once a month to maintain the equipment and antennas.

3.11 VISUAL RESOURCES

A. Existing Conditions

The Ko'olau mountains, Wa'ahila Ridge and Tantalus (Pu'u-'ōhi'a) serve as a backdrop for views in the vicinity of Gilmore Hall. However, opportunities for experiencing these views are limited due to a number of multi-story structures surrounding the building. There are mechanical room/elevator shaft and stairwell extension as well as air conditioning exhaust vents and CTAHR hot houses located on the roof of Gilmore Hall.

B. Anticipated Impacts and Mitigative Measures

The installation of the proposed antennas will have limited impacts on ground level views as the view angle from the ground limits views to the outer portion of the roof. Visual impacts will mainly occur to views from the upper floors of adjacent buildings looking toward Gilmore Hall. However, these impacts are anticipated to be minimal because: (1)

views are urban in character and are already impacted by the existing built environment; (2) the overall size of the antennas in comparison to the building as well as the elevator shaft will result in changes to a portion of the building roof, but will not result in a significant alteration to the overall form.

Mitigation Measures: The planned flush mounting of the panel antennas walls of the elevator shaft and north-facing wall, and painting of the panels to blend in with the existing color of the building will help minimize any potential impact to the existing view. See photo simulation in photos section.

3.12 LAND USE DESIGNATIONS

A. Existing Conditions

The project site is located within the State's Urban land use district, as is all of the surrounding area. The project site is comprised of lands that are designated as R-5 single-family residential. There is a height limit of 25 feet for R-5 districts, but this limit is amended by City Council-approved Plan Review Use/Long Range Development Plan (PRU-LRDP) which sets different heights in different locations. Although no specific height is set for Gilmore Hall, the general rule of thumb used in the UH LRDP is the relationship to surrounding facilities.

B. Anticipated Impacts and Mitigative Measures

No changes in land use classification or zoning are required to implement the proposed action.

3.13 SOCIO-ECONOMIC CHARACTERISTICS

A. Existing Conditions

The Mānoa community surrounding the UH Mānoa campus is an older, stable neighborhood of predominantly single family residences. Most homes were built in the first quarter of the twentieth century, and are still maintained in good condition. The neighborhood gets its name from the valley formed by two mountain ridges of the Ko'olau mountain chain. Wa'ahila Ridge borders UHM on the east, and residential properties and private educational institutions border much of the rest of the perimeter. Mānoa is generally regarded as a very desirable place to live, and hence, home values are high. Many University students, faculty and staff live in the surrounding community.

Gilmore Hall is bordered by Maile Way Annexes to the west, Ag Engineering to the east, Hamilton Library annex to the south, and Mid Pacific Institute campus to the north. Gilmore Hall houses the College of Tropical Agriculture and Human Resources and the college's entomology research activities and laboratories.

B. Potential Impacts and Mitigation Measures

In the short-term, construction of the proposed facility will create a slight increase in employment opportunities for construction related jobs. In the long-term, the new telecommunications facility would be expected to not only improve the quality of Sprint on-air service but could increase the customer base. In addition to improving public safety and providing new jobs, Sprint is creating a communications infrastructure that will support economic growth and additional tax revenues. Efficient and reliable communication is an essential requirement for people in any community. This installation is a part of a cellular telecommunications system that will help fulfill this need.

3.14 Police and Fire

The proposed project is not expected to result in increased demand for police and fire protection. The antenna facility will not require employees except for one technician who would need to visit the Gilmore Hall rooftop facility on a monthly basis to check equipment and maintain the hardware.

3.15 EMF

A. Existing Conditions

Electromagnetic fields exist wherever electricity is used. In August 1996 the Federal Communication Commission (FCC) adopted new guidelines for evaluating the environmental effects of radiofrequency (RF) energy from transmitters on wireless communication sites. While there is no scientific evidence that RF emissions from these sites operating within established safety guidelines pose a health risk, fields close to antennas on transmitter sites must be understood and care must be taken to assure safe operation during maintenance. The guidelines adopted by the FCC provide considerable margins of protection from any known health risk.

The Telecommunications Act of 1996 mandated that the FCC implement regulations to protect public and workers from potentially hazardous exposure to non-ionizing radiation. The Act of Congress was driven by the National Environmental Policy Act (NEPA) of 1969, which requires agencies of the federal government to evaluate the effects of their actions on the quality of the human environment. In addition, recent studies indicated existing standards did not adequately protect workers and the general public from continuously increasing presence of Emissions associated with radio frequency transmissions.

In response to this mandate, the FCC passed law 96-326 in August 1996. The new guidelines implement more recent scientific studies of the biological effect of RF emissions and were recommended for adoption by the American National Standards Institute (ANSI), the Institute of Electrical and Electronic Engineers (EEE), and the National Council on Radiation Protection and measurements (NCRP). The FCC received favorable support for these stricter standards from the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the Occupational Safety and Health Administration (OSHA), as well as from a number of nongovernmental groups and companies.

Exposure limits in the new guidelines adopted by the FCC are specified in terms of Maximum Permissible Exposure (MPE) as a function of frequency; MPEs are given in units of electric and magnetic field strength and power densities. For exposure to multiple frequencies, the fraction (or percentage) of the MPE produced by each frequency is determined and these fractions (or percentages) must not exceed unity (or 100 percent).

PWC conducted an electromagnetic emissions (EME) prediction study for the proposed CDMA PCS base station on Gilmore Hall. Based on the FCC Office of Engineering Technology (OET) Bulletin 65 guidelines, a two-tier Maximum Permissible Exposure (MPE) limits criteria for occupational/controlled and general population/uncontrolled exposure was used for the analysis. The complete report is included in the Appendix.

The proposed model units to be installed on the Gilmore Hall rooftop are: cellular panel antennas, make: EMS Wireless, model: RV65-18-00DPL2, and model: RV65-17-02DPL2.

B. Anticipated Impacts and Mitigative Measures

The prediction analysis conducted by PWC in December 2005 concludes that the cellular panel antennas at the proposed rooftop locations at Gilmore Hall would not expose personnel to EME levels above the occupational/controlled MPE standard on the rooftop. Therefore, it is concluded that the Sprint rooftop installation will not be hazardous to personnel. Personnel on the lower floors of Gilmore Hall, and at ground level will not be exposed to power densities exceeding the general population/uncontrolled MPE limits. Upon completion of installation of the facility, Sprint will conduct an EMR hazards survey of the actual site to supplement the predicted analysis.

To ensure further safety to University maintenance employees, additional proactive safety measures should be considered: (1) Preparation of a written safety plan that would account for both routine and non-routine operations; (2) transmitters should be silenced if maintenance is performed on the transmitting antennas or cables; and (3) An RF radiation hazard warning sign should be posted on the door leading to the roof where transmitting antennas are to be located.

Professor Vincent Z. Petersen, an expert in the field of radiation and radio transmission at the UHM Department of Physics, was asked by the Associated Students of the University of Hawai`i (ASUH), to determine whether a higher intensity KTUH antenna on Saunders Hall would result in a radiation hazard to occupants of the building. Dr. Petersen prepared a paper entitled, "Statement Regarding Electromagnetic Radiation Levels Associated with Proposed KTUH FM Radio Transmission" in 1995. Calculations prepared by Dr. Petersen concluded that the FM radiation from the KTUH 4-bay antenna with 3000 watt total radiated power, does not constitute a radiation hazard to occupants at the top floor (or any floor) of the Social Sciences Building. The maximum intensity on the rooftop was projected as 30 times lower than FCC-acceptable radiation levels of 1.0 mW/cm^2. Please refer to a copy of Dr. Petersen's paper in the Appendix.

4.0 INDIRECT AND CUMULATIVE IMPACTS

Using the FCC's exposure standard for radio frequency fields, it is possible to calculate a "safe distance" (also referred to as "exclusion distance") for every antenna. Based on radio engineering standard design for facilities such as those on the UH Mānoa campus, the typical cellular telephone 100-watt antenna has a "safe distance" of about 13 feet. A person standing farther than 13 feet for a half hour would probably not have his/her cells' water heated up or experience an adverse effect. Even for an antenna as powerful as KGMB TV's antenna between Kapiolani Boulevard and Makaloa Street near the Ala Moana Center, which effectively radiates a power of 100,000 watts, its "safe distance" has been calculated to be less than 175 feet (L. Au, State DOH, March 2006). With each UH Mānoa antenna's limited harmful or exclusion range, it would be highly unlikely for a person to be simultaneously within the harmful range of more than one antenna at a time. Consequently, there would be no cumulative exposure. Therefore, the cumulative and indirect impact from multiple antennae on UH Mānoa campus rooftops would be insignificant.

5.0 UNAVOIDABLE ADVERSE IMPACTS

The construction of the antenna facility will have only minimal adverse environmental impacts which cannot be fully mitigated by the measures planned to be implemented. The following list includes those short-term and long-term impacts that are expected to be unavoidable.

1. Negligible releases of air contaminants will occur from construction equipment. Emissions of fugitive dust may occur during dry periods as a result of construction

operations despite efforts to control dust per State Department of Health (DOH) regulations.

2. In the short-term, the visual character of the area will be affected by construction activities and by the presence and operation of construction equipment.

3. Short-term increases in noise levels will result from construction activities. Noise and construction may cause minor disruptions to floors directly below the proposed activity.

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The construction and operation of the Sprint antenna facility will involve the irretrievable commitment of certain physical and fiscal resources. The major resource commitment will be the loss of utility infrastructure space on the upper roof of Gilmore Hall for the development of the project. Financial resources, construction materials, manpower, and energy will be expended by Sprint to construct and operate the facility.

The impact of utilizing these resources should, however, be weighed against the benefits of providing upgraded, expanded, and improved Sprint service on the University of Hawai`i at Mānoa campus.

7.0 ALTERNATIVES

Alternative sites that were considered are discussed in Section 1.5 of this DEA.

The no-action alternative would result in Sprint not proceeding with necessary physical upgrades of its existing service level for the Mānoa area. This alternative would result in no change to the present environmental characteristics of the project site; to employment, to government expenditures, to infrastructure services, and to traffic conditions. However, the existing capacity is diminishing and continued operations without improvements will make it difficult for Sprint to maintain expected quality service to its present customers on the UHM campus. A potential scenario that may result from the no-action alternative is: For any customer who is in need of emergency assistance or able to respond to an emergency situation, lack of reliable broadband PCS service at a critical moment could mean a lost opportunity to save a life.

8.0 RELATIONSHIP TO EXISTING PLANS, POLICIES

This section includes a discussion of the relationship of the project to the following policies and plans: Hawai`i State Plan, State Land Use Law, University of Hawai`i, Mānoa Campus Long Range Development Plan (LRDP), the County Development Plan, and the Land Use Ordinance.

8.1 The Hawai`i State Plan

This section includes an assessment of the proposed facility to the applicable goals, objectives, and policies of the Hawai`i State Plan, Chapter 226, HRS.

Section 6(a): Objectives and policies for the economy-general:
Section 6(b): Applicable policies:

"(9): Foster greater cooperation and coordination between the public and private sectors in developing Hawai`i's employment and economic growth opportunities."

Discussion: By working out an amenable leasing arrangement with Sprint, both Sprint and the UH Mānoa administration are an example of public and private sector partnerships which are beneficial to the State's economic growth and diversification. The facility will be under lease from the State of Hawai`i and will provide a source of revenue to the State.

Section 18(a): Objectives and policies for facility systems—energy/telecommunications:
Section 18(b): Applicable policies:
Section 18(d): Applicable telecommunication objectives:

"(2): Encourage public and private sector efforts to develop means for adequate, ongoing telecommunication planning."

Discussion: By working with Sprint, the UH Mānoa offices of Facilities Planning and Management and Procurement Real Estate and Risk Management are actively participating in the planning process to help achieve the State's objectives of gaining dependable, efficient, and economical statewide telecommunication systems capable of supporting the needs of residents and businesses. By facilitating Sprint's plans to expand and improve its telecommunication system, this action should spur this carrier's competitors to either improve or expand their services in this area as well.

8.2 STATE LAND USE LAW

The proposed project is presently classified within the State Land Use Urban District. Public and private utility system facilities and research institutions are compatible in the

Urban District. Thus, the project is consistent with the State Land Use District classification.

8.3 UNIVERSITY OF HAWAI`I, MĀNOA CAMPUS LONG RANGE DEVELOPMENT PLAN (LRDP)

In 1987, the University of Hawai`i Board of Regents adopted the LRDP for the University of Hawai`i Mānoa Campus, to guide campus development through the year 2010. Gilmore Hall is part of the College of Tropical Agriculture and Human Resources component of the Central Campus layout.

Because the roof level of Gilmore Hall houses mechanical and electrical systems and other equipment appurtenant to the mechanical systems of the building, the proposed use is similar and compatible with current uses. The proposed project is consistent with the University of Hawai`i, Mānoa Campus LRDP.

8.4 CITY AND COUNTY OF HONOLULU GENERAL PLAN

The 1992 edition of the General Plan is a statement of the long-range social, economic, environmental, and design objectives for the general welfare and prosperity of O`ahu's citizens. These objectives contain both statements of desirable conditions to be sought over the long run and statements of desirable conditions which can be achieved within an approximate 20-year time horizon. The General Plan is also a statement of broad policies which facilitate the attainment of the objectives of the Plan. The following discussion provides an assessment of how the proposed project implements the objectives and policies for Education in the General Plan.

Objective C To make Honolulu the center of higher education in the Pacific.

Discussion: The proposed project is located at the Mānoa campus of the University of Hawai`i thereby facilitating the objective to focus on Honolulu as the center of higher education.

Policy 1
Encourage continuing improvement in the quality of higher education in Hawai`i.

Discussion: The project proposes to improve the quality of higher education locally by helping to upgrade wireless communication systems on the Mānoa campus.

Policy 2
Encourage the development of diverse opportunities in higher education.

Discussion: By enabling the upgrade of the University's telecommunications system, the project proposes to strengthen the physical infrastructure that can facilitate diversification and expansion of opportunities to faculty, students and administration.

The proposed facility is appropriately located on the Gilmore Hall rooftop because the hardware is proposed to be non-intrusive on existing views while expanding and improving the quality of high tech broadband PCS communications services to Sprint customers. Equally important to note, antenna facilities such as the proposed project are clean and nonpolluting state-of-the-art installations.

8.5 THE CITY AND COUNTY OF HONOLULU PRIMARY URBAN CENTER DEVELOPMENT PLAN

The City and County of Honolulu Primary Urban Center Development Plan (PUC DP), approved on June 21, 2004 (Ordinance No. 04-14), presents a vision for the PUC's future development consisting of policies, guidelines and conceptual schemes that will serve as a policy guide for more detailed zoning maps and regulations and for public and private sector investment decisions. The PUC-East Land Use Map designates the University of Hawai`i parcel as Institutional. Since the proposed project is accessory to the university's infrastructure as a technical, non-intrusive improvement to the existing telecommunication system, it would be consistent with the existing Institutional land use designation.

8.6 LAND USE ORDINANCE – ZONING

The existing zoning is R-5 Residential. University uses are permitted in the R-5 Residential District with an approved Plan Review Use (PRU). An antenna installation such as this is defined by the Land Use Ordinance (LUO) as a Utility Installation Type B which is an allowed use in residential zoning districts, subject to conditions. However, the University of Hawai`i at Mānoa is operating under a Plan Review Use (PRU) File No. 88/PRU-3 (City and County of Honolulu Department of Planning and Permitting (DPP)). According to the DPP (December 2004) instead of a Conditional Use Permit-minor (CUPm) for a utility installation, a minor modification to the PRU will be required. Section 7.7 Plan Review Use below contains a detailed discussion. Development standards related to permitted uses and the maximum height of structures for the university are regulated under the PRU. A building permit is also required.

8.7 PLAN REVIEW USE

Plan Review Use (PRU) approval is required for a number of public and private uses including colleges and universities. In December 1989, a PRU was approved for the Five-Year master plan 1988-1993 University of Hawai`i, Mānoa Campus. As a result, the University of Hawai`i at Mānoa is operating under a Plan Review Use File No. 88/PRU-3.

On December 13, 1989, a PRU File No. 88/PRU-3 (Resolution No. 89-411, CD-2) was approved by the Honolulu City Council to expand the University of Hawai`i Mānoa campus. A major modification to the PRU was approved on March 10, 1993 (Resolution No. 92-286) to increase the seating capacity of the Physical Education Facilities Phase II and to redesignate the facility as the Special Events Arena (DPP, December 2004). The proposed Sprint antenna facility is necessary to expand and improve broadband PCS communication service for the university campus. The proposed project is consistent with the uses approved in the PRU, and therefore can be reviewed as a minor modification to the PRU.

9.0 FINDINGS AND REASONS FOR SUPPORTING THE DETERMINATION

Based upon the findings presented in the EA, the potential impacts of installation and operation of the proposed telecommunications antenna facility have been sufficiently examined and discussed. After reviewing the significance criteria in Section 11-200-12, EIS Rules, Contents of the Environmental Assessment, it has been preliminarily determined that the action is not expected to result in significant adverse effect on the natural environment. The DEA was circulated for a 30-day public review period between January 23 and February 22, 2006. A total of 16 copies of the DEA was sent to agencies and organizations and six (6) comment letters were received. UHM has reviewed these comments and has determined that the project will not result in adverse impact to the environment. Therefore, the University of Hawaii has issued a Finding of No Significant Impact (FONSI) for this project.

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resources.
Development of the proposed project is not expected to impact natural or cultural resources, as the project site is located in a developed, urbanized area and the rooftop is already populated with similar mechanical and electrical facility hardware. OHA and SHPD confirmed that there are no known archaeological or cultural resources on or in the vicinity of the project site. See letters dated March 2006 in the Appendix.

2. Curtails the range of beneficial uses of the environment.
The proposed project will be compatible with the existing uses of the surrounding area and will have minimal disturbance to the UHM campus and surrounding community as it is located on the Gilmore Hall roof with other similar mechanical and electrical facilities.

3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in chapter 344 HRS.
The proposed project is consistent with the State's long-term environmental policies as well as the State's Land Use Plan because the proposed location is an urban, developed part of campus designated for scientific and research activity.

4. Substantially affects the economic or social welfare of the community or State.
Short-term construction related activities may result in negative impacts, as well as positive economic impact through increased work for a selected contractor and design engineers during implementation of the project. Long-term adverse effects are not foreseeable, as the economic and social welfare of the community should not be affected.

5. Substantially affects public health.
Short-term construction related activities will not impact public health as they are temporary in nature. In addition, construction activities will be regulated by State and County standards to minimize noise, dust, and exhaust emissions.

6. Involves substantial secondary impacts, such as population changes or effects on public facilities.
The proposed project does not directly result in secondary impacts, and will only increase capacity of the communications systems to serve O`ahu's citizens in conformance with the County General Plan.

7. Involves a substantial degradation of environmental quality.
The proposed project antenna site location was selected as a result of consultation with the University's Facilities Planning and Management staff and tenants of Gilmore Hall who specified the need to limit the physical facilities to isolated sections on a rooftop of the building, away from ongoing CTAHR research activities. Therefore the environmental quality of the surrounding campus will be essentially unaffected.

8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.
The proposed project does not have any cumulative effect upon the environment, and no larger commitments are required for the proposed antenna facility.

9. Substantially affects a rare, threatened, or endangered species, or its habitat.
There are no known rare, endangered, or threatened species or habitat associated with the project site. The area has been urbanized and the ground on which Gilmore Hall is located has undergone a relatively sufficient level of disturbance over the years with its subsequent improvements.

10. Detrimentally affects air or water quality or ambient noise levels.
Negative effects on environmental quality will be short-term due to construction and be limited to the areas adjacent to the project. These short-term impacts will be mitigated to meet project plans approvals and specification regulations.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.
The project site is not located in an environmentally sensitive area that would be vulnerable to flooding because it is outside the 500-year flood plain. It is far removed from the tsunami zone, coast, erosion-prone area, geologically hazardous land, estuary, fresh water or coastal waters. Therefore, the project will not affect environmentally sensitive areas.

12. Substantially affects scenic vistas and view planes identified in county or states plans or studies.
The six panel antennas are being installed in recessed sections of the building's rooftop to avoid causing any disruption to existing vistas and view planes. The panel antennas are also being painted to match the color of the structure. Therefore, the proposed project is not expected to having an adverse affect on existing views on campus or surrounding areas.

13. Requires substantial energy consumption.
Energy consumption will consist of short-term construction activities, in which diesel or gas powered equipment will be used. Once completed, the antenna facility will require electrical power and telephone service at levels that UHM infrastructure and utilities systems have capacity enough to supply. Thus, the proposed project would not be a burden on the existing facilities in terms of energy requirements.

10.0 CONSULTED PARTIES

Listed below are the agencies and organizations consulted in the preparation of the DEA.

Federal Government:
1. U.S. Army Corps of Engineers Pacific Ocean Division
   Regulatory Branch
2. U.S. Department of Interior U.S. Fish & Wildlife Service
3. Environmental Protection Agency—PICO
4. Directorate of Facilities Engineer U.S. Army Support Command Hawai`i

State of Hawai`i:
5. Department of Education
6. State Department of Land and Natural Resources
   Historic Preservation Division
7. State Department of Land and Natural Resources Land Division
8. Office of Hawaiian Affairs
9. Office of Planning
10. UHM Environmental Center
11. University of Hawai`i Mānoa Facilities Planning and Management Office
12. State Department of Health Environmental Management Division
13. State Department of Transportation Highways Division

City and County of Honolulu:
14. Board of Water Supply
15. Department of Parks and Recreation
16. Department of Planning and Permitting
17. Department of Environmental Services
18. Department of Transportation Services
19. Fire Department
20. Police Department

Utilities:
21. Verizon Hawai`i Inc.
22. Hawaiian Electric Company
23. Oceanic Time Warner Cable of Hawai`i
24. The Gas Company

Other Organizations:
25. Nature Conservancy
26. Sierra Club
27. Mānoa Neighborhood Board No. 7

28. Ann Kobayashi, Councilmember, District 5

University of Hawai`i Mānoa Campus Facilities Maintenance and Faculty/Administration Consultation:

Project presentations and continuing discussions regarding the proposed Sprint antenna facility on the rooftop of Gilmore Hall were initiated in 2004. Discussions continued among UH CTAHR staff and faculty, Facilities Planning and Management and Sprint representative William Keoni Fox throughout 2005 regarding positioning the panel antennas away from hot houses on the rooftop to avoid any possible impact to entomology research activities.

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Zoning Drawings

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-E
WAY
96822

CORPORATION

FAX: 913-458-8136

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CT TEAM

SHEET	DESCRIPTION	REV
T1	TITLE SHEET	3
A1	SITE PLAN	3
A2	ENLARGED PAN, EQUIPMENT LAYOUT & ANTENNA LAYOUT	3
A3	ELEVATIONS	3
A4	ELEVATIONS	3

SHEET INDEX

	DATE	SIGNATURE
NETWORK OPERATIONS		
RE		
RF ENGINEER		
PE/CONSTRUTION MANAGER		
PLANNING REP.		
SITE ACQ. REP.		
LANDLORD		

APPROVAL SIGN-OFFS

Sprint

6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

PROJECT INFORMATION:

GILMORE HALL
HI60XC115-E
3050 MAILE WAY
HONOLULU, HI 96822
HONOLULU COUNTY

CURRENT ISSUE DATE:

08/23/05

ISSUED FOR:

ZONING

REV	DATE	DESCRIPTION	BY
3	08/23/05	ISSUED FOR REVIEW	JLJ
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1	05/17/05	ISSUED FOR REVIEW	JLJ
0	08/06/04	ISSUED FOR ZONING	HN
A	07/19/04	ISSUED FOR ZONING	HN

PLANS PREPARED BY:

BLACK & VEATCH
CORPORATION
11401 LAMAR
OVERLAND PARK, KANSAS 66211
(913) 458-2000

CONSULTANT:

DRAWN BY:	CHK:	APV:
GJS	KOW	BLG

LICENSURE:

SHEET TITLE:

TITLE SHEET

SHEET NUMBER: T1

REVISION: 3

140406

Sprint

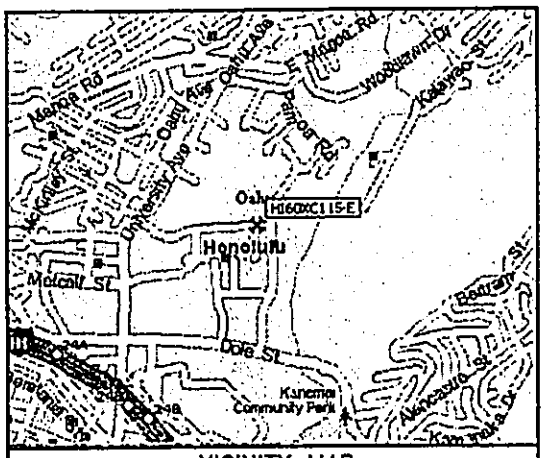
GILMORE HALL
HI60XC115-E
3050 MAILE WAY
HONOLULU, HI 96822

UNDERGROUND SERVICE ALERT
HAWAIIAN ELECTRIC DEPARTMENT
CALL TOLL FREE
1-800-543-7085
TWO WORKING DAYS BEFORE YOU DIG

ALL WORK AND MATERIALS SHALL BE PERFORMED AND INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.

1. CALIFORNIA ADMINISTRATIVE CODE (INCL. TITLES 24 & 25) 1995
2. CALIFORNIA BUILDING CODE 2001
3. ANSE/IA-222-F LIFE SAFETY CODE NFPA-101-1990
4. CALIFORNIA MECHANICAL CODE 2001
5. CALIFORNIA PLUMBING CODE 2001
6. CALIFORNIA ELECTRIC CODE 2001
7. LOCAL BUILDING CODE
8. CITY/COUNTY ORDINANCES

CODE COMPLIANCE



VICINITY MAP

DIRECTIONS FROM NEAREST INTERSTATE EXIT:

H1 EAST TO UNIVERSITY AVE EXIT. TRAVEL NORTH TO MAILE WAY. TURN RIGHT THROUGH CAMPUS GATE. SITE ON IMMEDIATE LEFT BEFORE EAST WEST ROAD.

DRIVING DIRECTIONS

THE PROJECT CONSISTS OF THE INSTALLATION AND OPERATION OF ANTENNAS AND ASSOCIATED EQUIPMENT CABINETS FOR SPRINT WIRELESS. INSTALLATION OF FOUR (4) ROOF MOUNTED EQUIPMENT CABINETS, (123) PANEL ANTENNAS (4 ANTENNAS PER SECTOR, TYP. 3 SECTORS TOTAL, (2) UTILITY CABINETS, AND RUNS FOR POWER/TELCO SERVICE IS PROPOSED.

PROJECT DESCRIPTION

APPLICANT

SPRINT
6560 SPRINT PARKWAY
OVERLAND PARK, KS 66251
CONTACT: IRIS ALFINO, PROJECT MANAGER
PHONE: 913-794-5320

PROPERTY INFORMATION

OWNER:	UNIVERSITY OF HAWAII, STATE OF HAWAII
ADDRESS:	2002 EAST WEST ROAD HONOLULU, HI 96822
CONTACT:	KALVIN KASHIMOTO
PHONE:	(808) 956-8142
AREA OF CONSTRUCTION:	375 SQ. FEET
OCCUPANCY TYPE:	B
CONSTRUCTION TYPE:	II-FR
CURRENT ZONING:	R-5 RESIDENTIAL
JURISDICTION:	--
ZONING APPLICATION #:	TBD
ELEVATION:	90'-6"
LATITUDE:	21° 18' 06" N
LONGITUDE:	157° 49' 50" W
TMK:	(1) 2 - 8 - 023 - 003
HANDICAP REQUIREMENTS:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. HANDICAPPED ACCESS NOT REQUIRED.

PROJECT SUMMARY

BLACK & VEATCH CORPORATION

11401 LAMAR AVE
OVERLAND PARK, KS 66211
PHONE: 913-458-6723 FAX: 913-458-8136

CIVIL ENGINEER:
CONTACT: BRUCE GOCKO
PHONE: 913-458-6723

ELECTRICAL ENGINEER:
CONTACT: TIM ARMENTROUT
PHONE: 913-458-7385

SITE ACQUISITION:
CONTACT: DEB BENNETT
PHONE: 913-458-2238

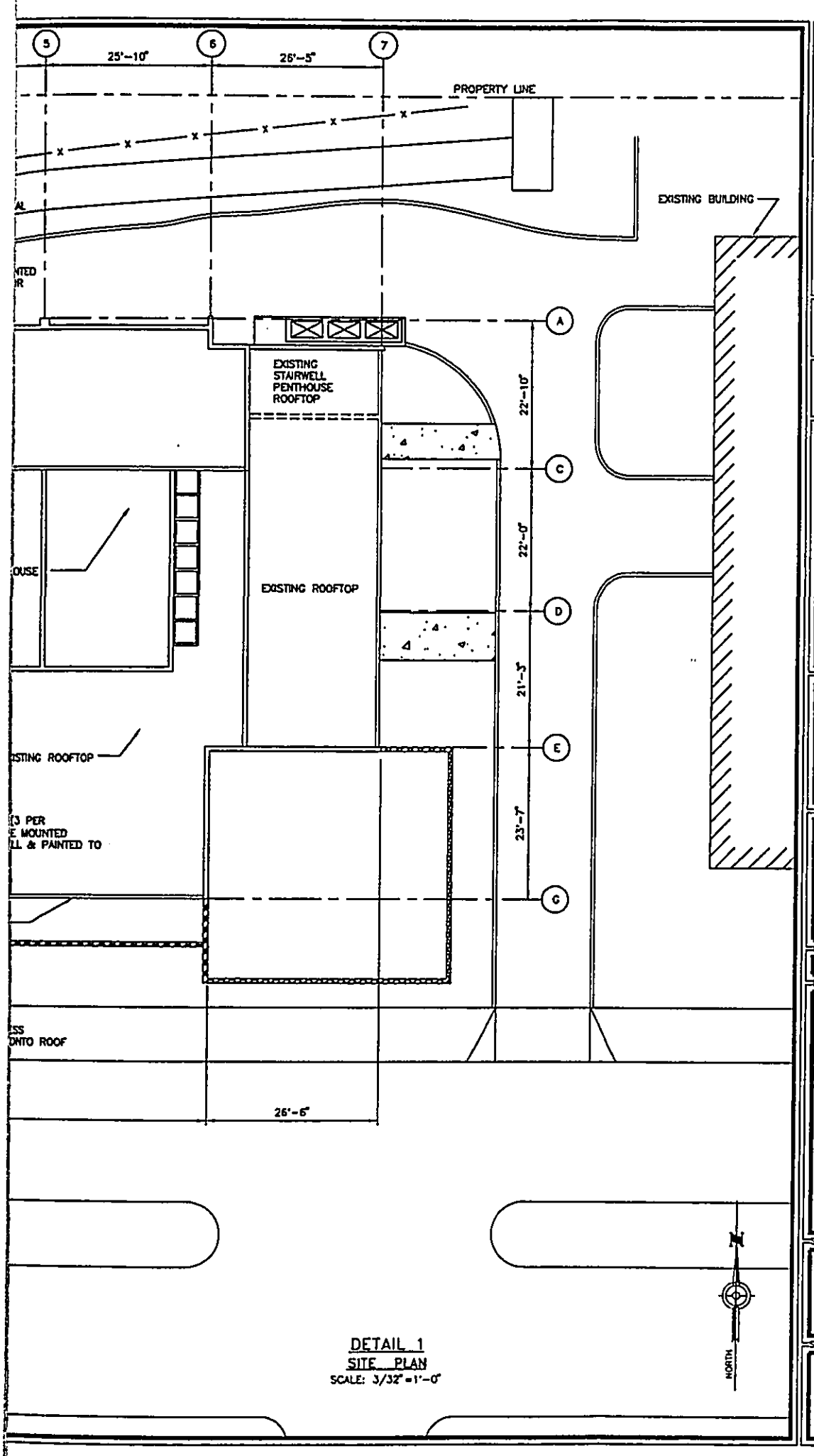
CONSTRUCTION:
CONTACT: BOB BISHOP
PHONE: 858-566-1938

RF ENGINEER:
CONTACT: MAYUR DESAI
PHONE: (808) 581-9725

POWER:
HAWAII ELECT. CO., INC.
P.O. BOX, 2750, HONOLULU, HI 96840-1864
CONTACT: TIMOTHY LABORTE
PHONE: (808) 543-4605

TELCO:
VERIZON
CONTACT: NOEL ROMOO
PHONE: (808) 840-5847

PROJECT TEAM



DETAIL 1
SITE PLAN
SCALE: 3/32"=1'-0"

Sprint
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

PROJECT INFORMATION:

GILMORE HALL
HI60XC115-E
3050 MAILE WAY
HONOLULU, HI 96822
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PLANS PREPARED BY:

BLACK & VEATCH
CORPORATION
11401 LAMAR
OVERLAND PARK, KANSAS 66211
(913) 458-2000

CONSULTANT:

DRAWN BY:	CHK:	APV:
GJS	KDW	BLG

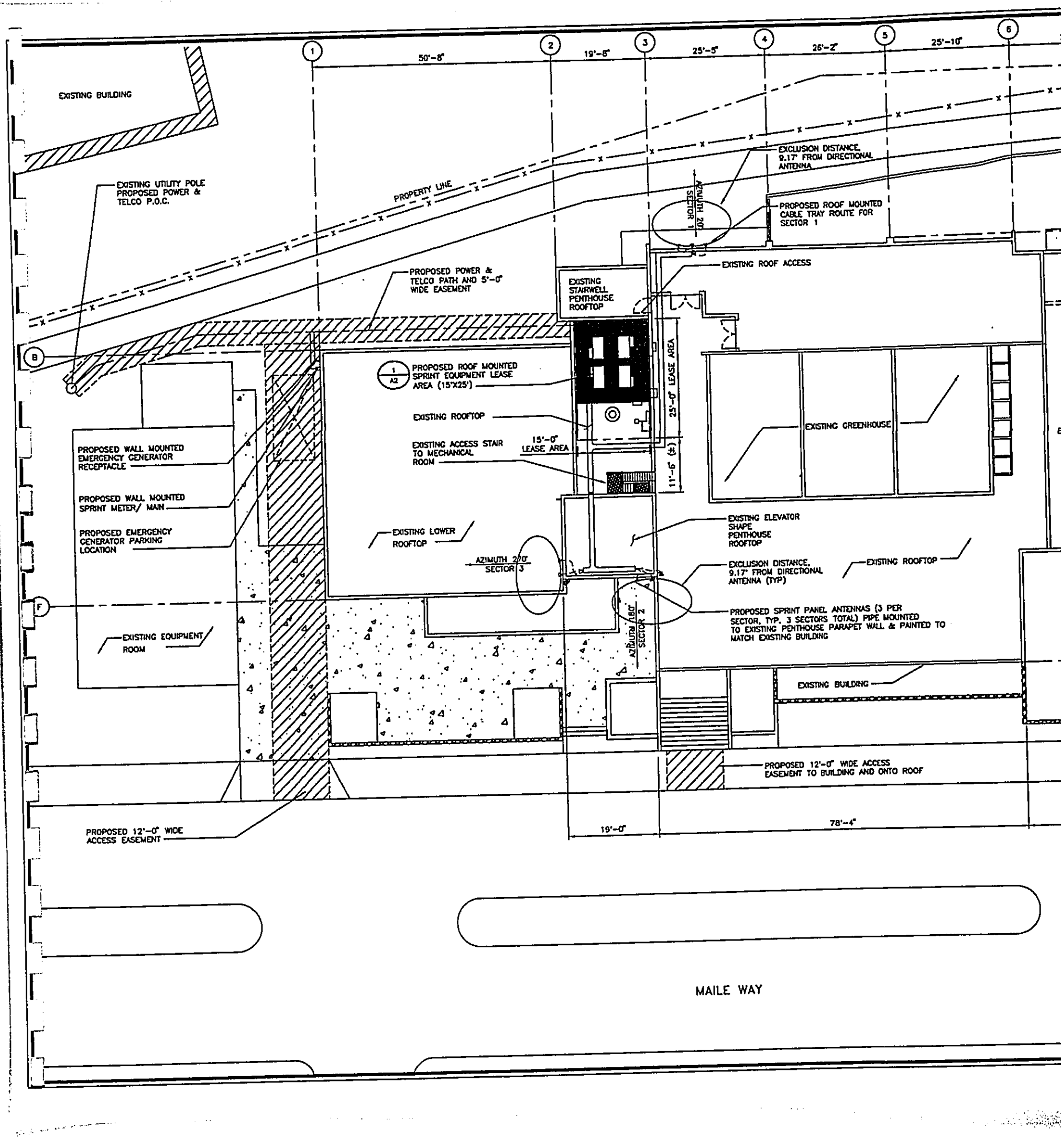
LICENSURE:

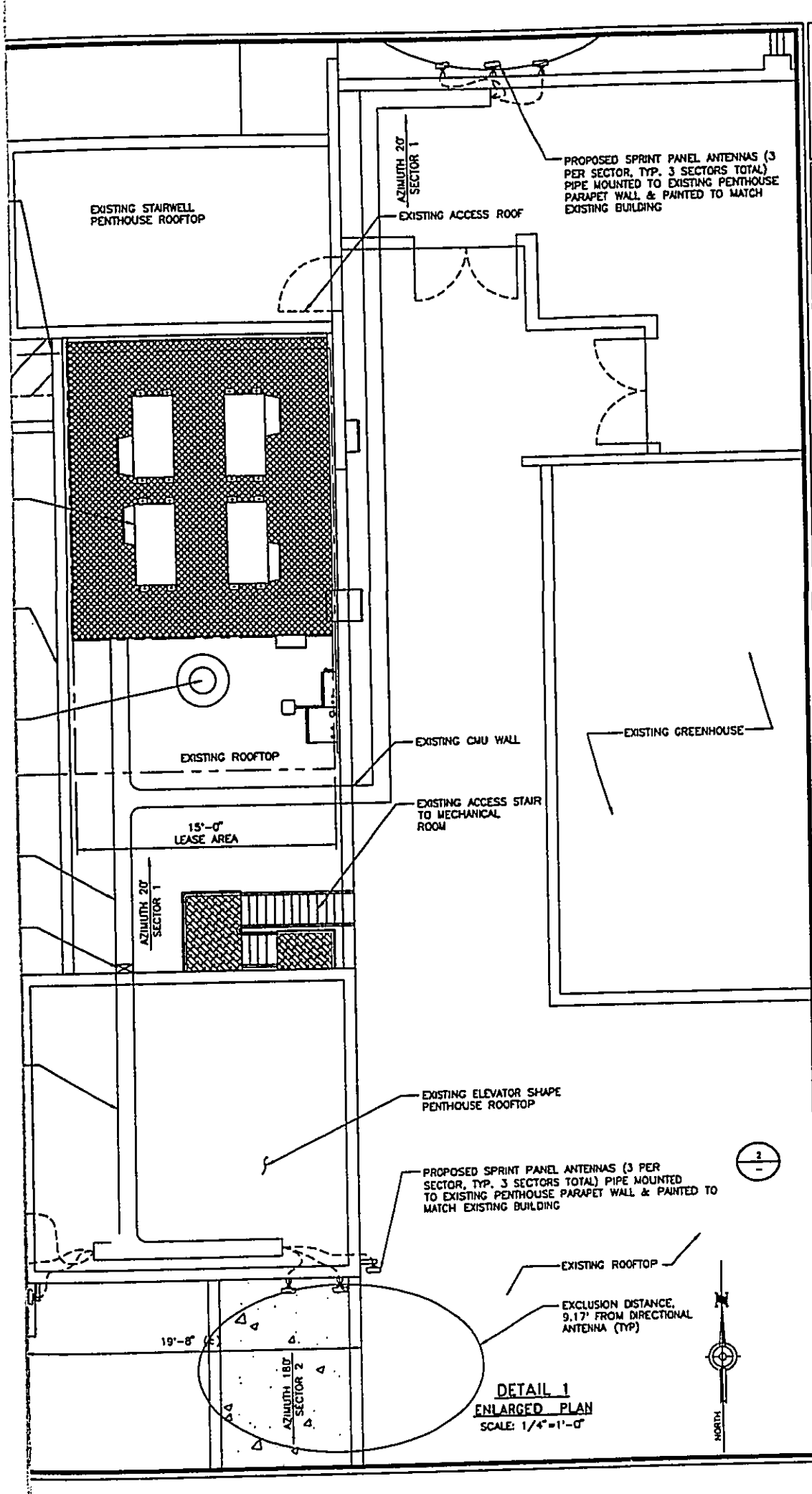
SHEET TITLE:

SITE PLAN

SHEET NUMBER: **A1** REVISION: **3**

140408


1
2
3
4
5
6
50'-8"
19'-8"
25'-5"
26'-2"
25'-10"
B
F
EXISTING BUILDING
EXISTING UTILITY POLE
PROPOSED POWER &
TELCO P.O.C.
PROPERTY LINE
EXCLUSION DISTANCE,
9.17' FROM DIRECTIONAL
ANTENNA
AZIMUTH 20°
SECTOR 1
PROPOSED ROOF MOUNTED
CABLE TRAY ROUTE FOR
SECTOR 1
EXISTING ROOF ACCESS
PROPOSED POWER &
TELCO PATH AND 5'-0"
WIDE EASEMENT
EXISTING
STAIRWELL
PENTHOUSE
ROOFTOP
1
A2
PROPOSED ROOF MOUNTED
SPRINT EQUIPMENT LEASE
AREA (15'X25')
25'-0" LEASE AREA
EXISTING ROOFTOP
EXISTING GREENHOUSE
EXISTING ACCESS STAIR
TO MECHANICAL
ROOM
15'-0"
LEASE AREA
11'-6" (±)
PROPOSED WALL MOUNTED
EMERGENCY GENERATOR
RECEPTACLE
PROPOSED WALL MOUNTED
SPRINT METER/ MAIN
PROPOSED EMERGENCY
GENERATOR PARKING
LOCATION
EXISTING LOWER
ROOFTOP
EXISTING ELEVATOR
SHAPE
PENTHOUSE
ROOFTOP
AZIMUTH 270°
SECTOR 3
EXCLUSION DISTANCE,
9.17' FROM DIRECTIONAL
ANTENNA (TYP)
EXISTING ROOFTOP
PROPOSED SPRINT PANEL ANTENNAS (3 PER
SECTOR, TYP. 3 SECTORS TOTAL) PIPE MOUNTED
TO EXISTING PENTHOUSE PARAPET WALL & PAINTED TO
MATCH EXISTING BUILDING
AZIMUTH 180°
SECTOR 2
EXISTING EQUIPMENT
ROOM
EXISTING BUILDING
PROPOSED 12'-0" WIDE ACCESS
EASEMENT TO BUILDING AND ONTO ROOF
PROPOSED 12'-0" WIDE
ACCESS EASEMENT
19'-0"
78'-4"
MAILE WAY



Sprint

6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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HI60XC115-E
3050 MAILE WAY
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BLACK & VEATCH
CORPORATION
11401 LAMAR
OVERLAND PARK, KANSAS 66211
(913) 458-2000

CONSULTANT:

DRAWN BY:	CHK:	APV:
GJS	KDW	BLG

LICENSURE:

SHEET TITLE:

ENLARGED PLAN, EQUIPMENT LAYOUT & ANTENNA LAYOUT

SHEET NUMBER:	REVISION:
A2	3
	140408

EXISTING PENTHOUSE PARAPET WALL

2'-0" TYP.

2'-0" TYP.

2'-0" TYP.

AZIMUTH 270°
SECTOR 3

PROPOSED CABLE TRAY

PROPOSED SPRINT PANEL ANTENNAS (4 PER SECTOR, TYP. 3 SECTORS TOTAL), PIPE MOUNTED TO EXISTING PARAPET WALL & PAINTED TO MATCH EXISTING BUILDING

DETAIL 2
ANT. LAYOUT, TYP. @ 3 SECTOR
SCALE: 1"=1'-0"

PROPOSED WALL MOUNTED POWER & TELCO CONDUIT

PROPOSED U.G. POWER & TELCO PATH AND 5'-0" WIDE EASEMENT

11'-4" (±)

EXISTING STAIRWELL PENTHOUSE ROOFTOP

PROPOSED ROOF MOUNTED SPRINT EQUIPMENT CABINET

3

25'-0" LEASE AREA

EXISTING 16" HIGH PARAPET

EXISTING A/C CONDENSING UNIT

EXISTING ROOFTOP

EXISTING LOWER ROOFTOP

PROPOSED ROOF MOUNTED CABLE TRAY

PROPOSED WALL MOUNTED VERTICAL CABLE TRAY

11'-6" (±)

15'-0" LEASE AREA

AZIMUTH 20°
SECTOR 1

PROPOSED ROOF MOUNTED CABLE TRAY

17'-9" (±)

AZIMUTH 270°
SECTOR 3

19'-8" (±)

4" 15'-0" PLATFORM/LEASE AREA 4"

3'-8" 2'-4" 3'-0" 2'-4" 3'-8"

3'-2" 4'-8" 1'-6" 4'-8" 3'-0"

17'-0" PLATFORM

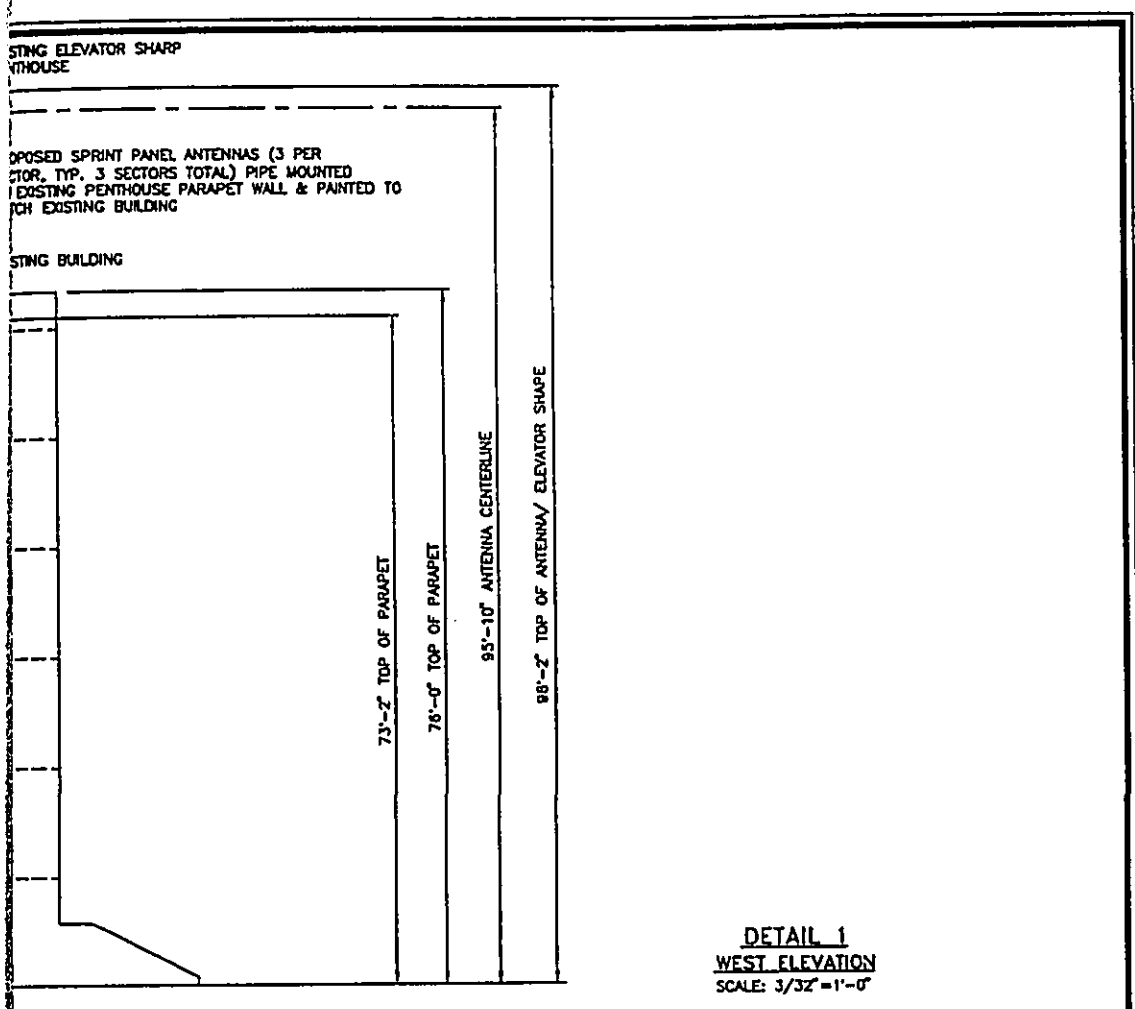
25'-0" LEASE AREA

7'-9"

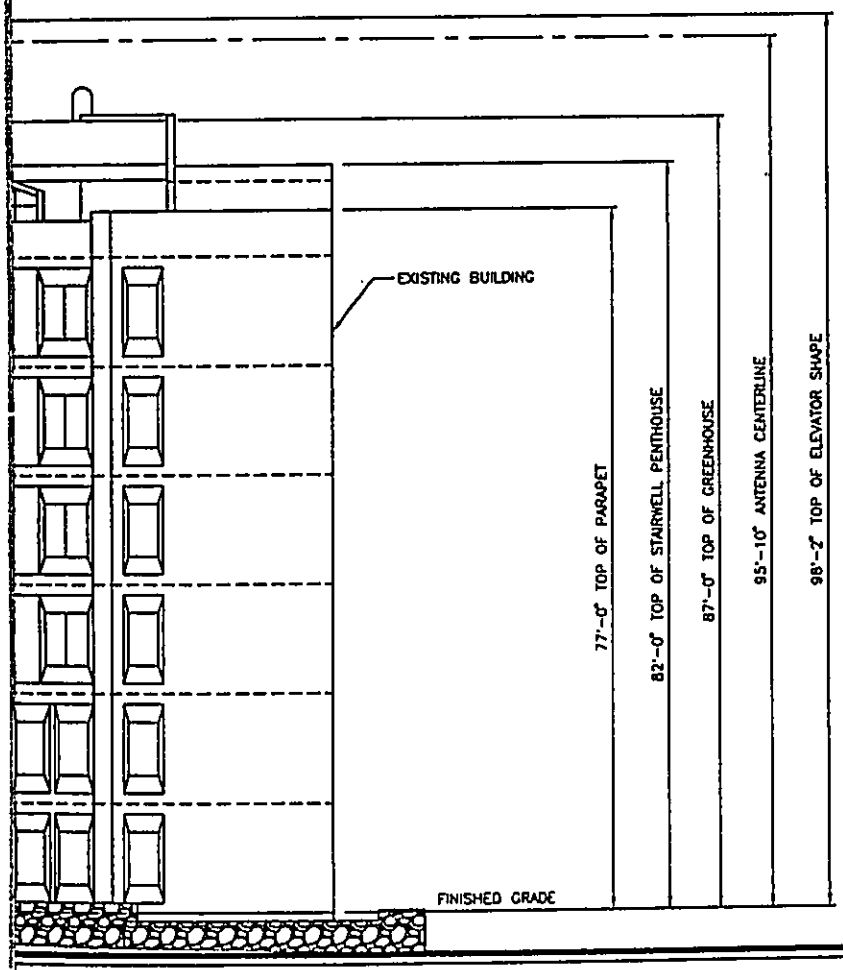
1. SERVICE LIGHT (1)
2. PPC RACK
3. CABLE TRAY
4. STEEL PLATFORM
5. ELECTRICAL CABINET
6. TELCO CABINET
7. RF CABINET
8. POWER CABINET
9. ACCESS LADDER
10. HANDRAL
11. LIGHT SWITCH
12. EXISTING PARAPET
13. EXISTING CMU WALL
14. EXISTING ACCESS LADDER TO ROOF
15. EXISTING STAIRWELL PENTHOUSE WALL
16. EXISTING A/C CONDENSING UNIT

N
NORTH

DETAIL 3
EQUIPMENT LAYOUT
SCALE: 3/8" = 1'-0"



DETAIL 1
WEST ELEVATION
SCALE: 3/32"=1'-0"



DETAIL 2
SOUTH ELEVATION
SCALE: 3/32"=1'-0"

Sprint
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OVERLAND PARK, KANSAS 66251

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CORPORATION
11401 LAMAR
OVERLAND PARK, KANSAS 66211
(913) 458-2000

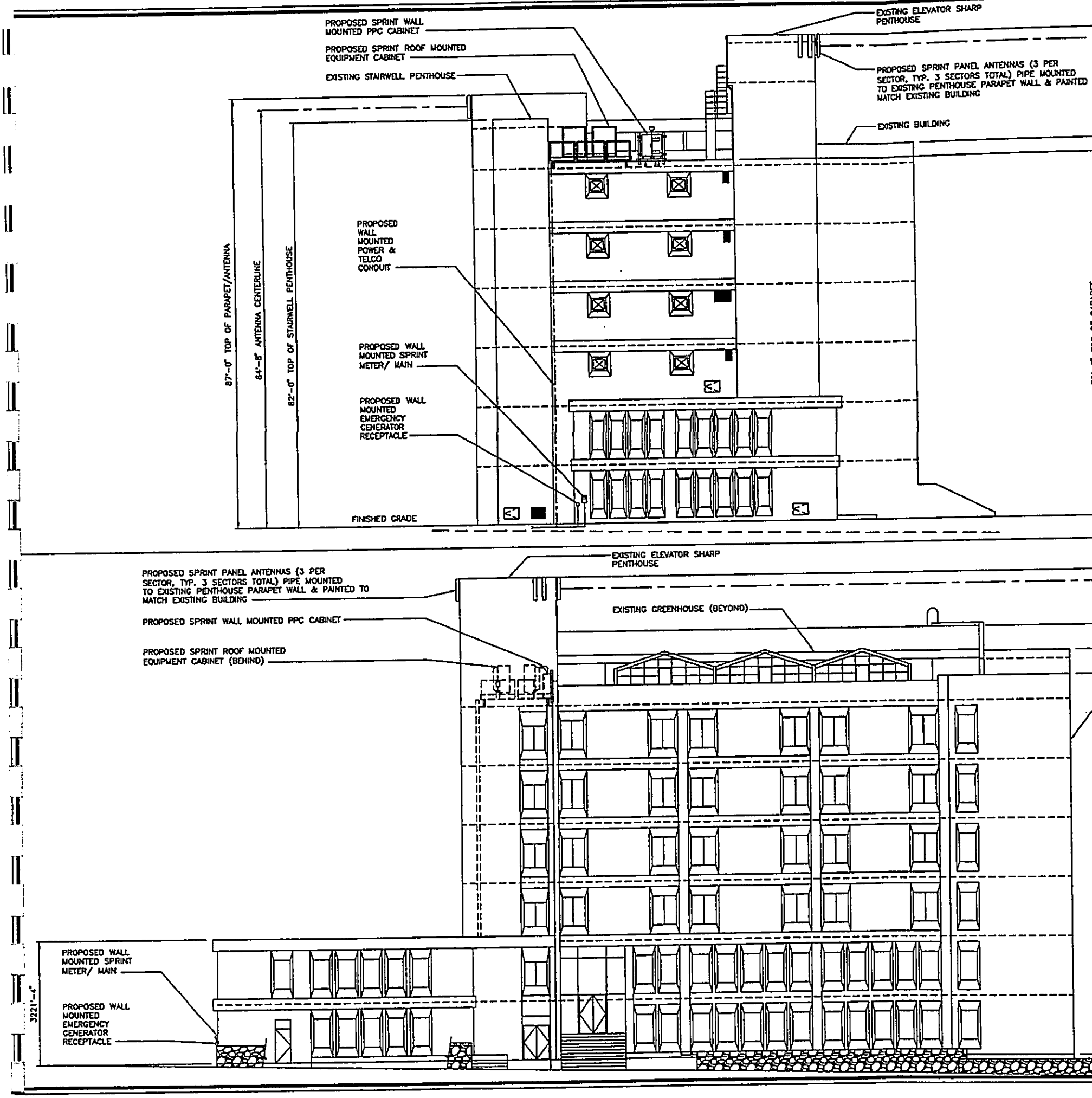
CONSULTANT:

DRAWN BY:	CHK:	APV:
GJS	KDW	BLG

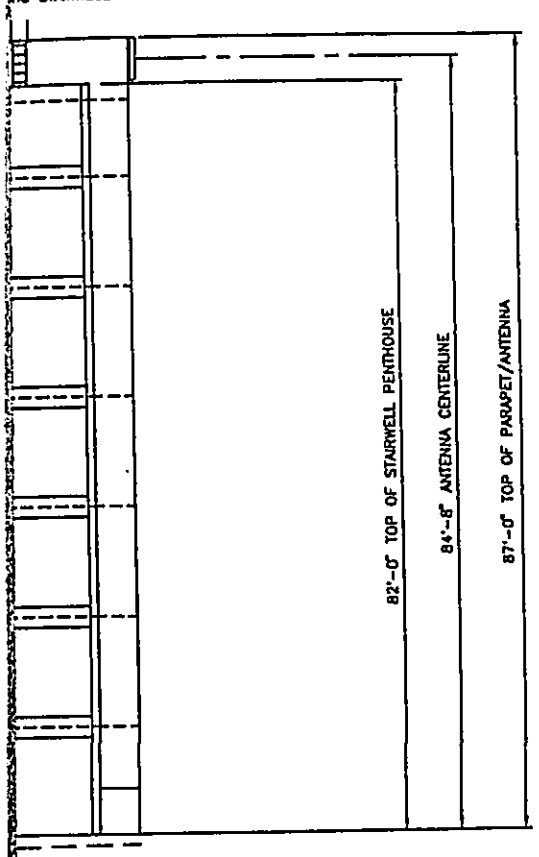
LICENSURE:

SHEET TITLE:
ELEVATIONS

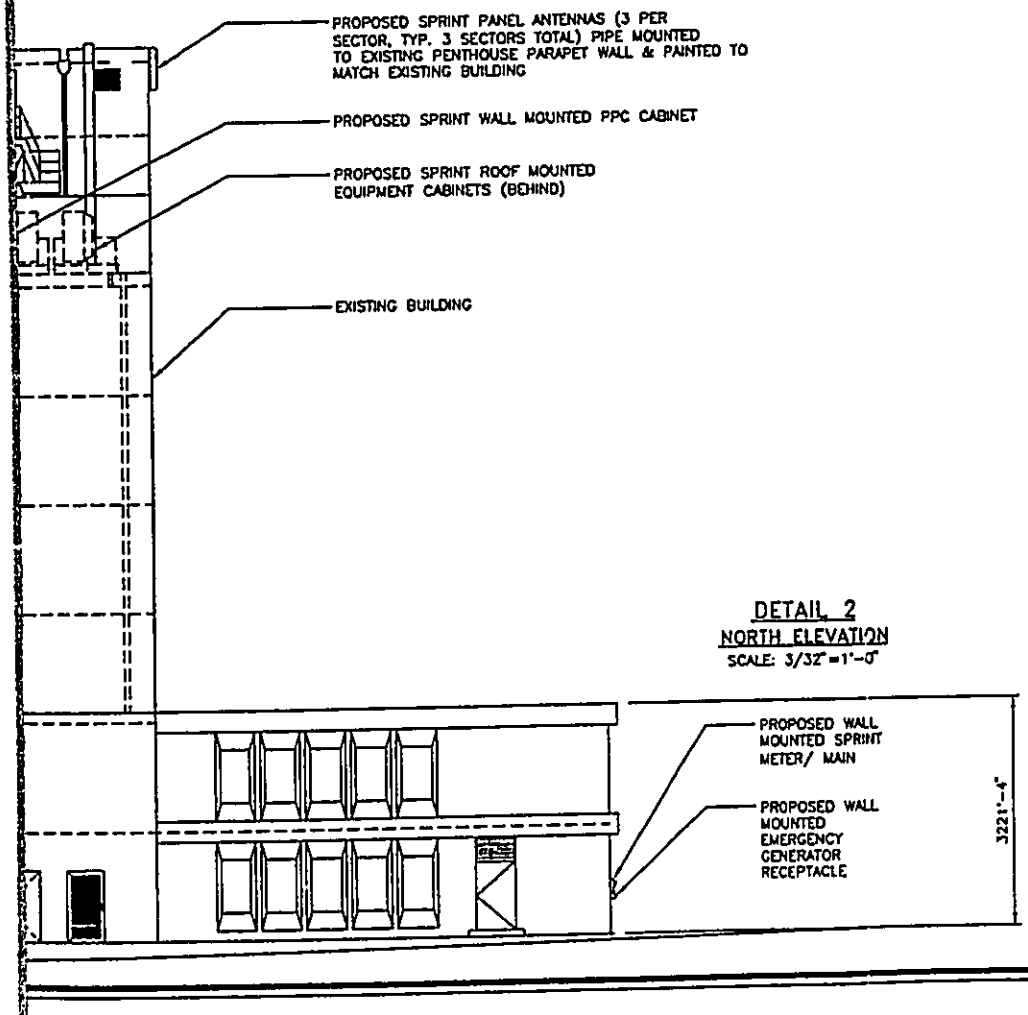
SHEET NUMBER: A3
REVISION: 3
140408


PROPOSED SPRINT WALL MOUNTED PPC CABINET
PROPOSED SPRINT ROOF MOUNTED EQUIPMENT CABINET
EXISTING STAIRWELL PENTHOUSE
EXISTING ELEVATOR SHARP PENTHOUSE
PROPOSED SPRINT PANEL ANTENNAS (3 PER SECTOR, TYP. 3 SECTORS TOTAL) PIPE MOUNTED TO EXISTING PENTHOUSE PARAPET WALL & PAINTED MATCH EXISTING BUILDING
EXISTING BUILDING
PROPOSED WALL MOUNTED POWER & TELCO CONDUIT
PROPOSED WALL MOUNTED SPRINT METER/ MAIN
PROPOSED WALL MOUNTED EMERGENCY GENERATOR RECEPTACLE
87'-0" TOP OF PARAPET/ANTENNA
84'-8" ANTENNA CENTERLINE
82'-0" TOP OF STAIRWELL PENTHOUSE
FINISHED GRADE
EXISTING ELEVATOR SHARP PENTHOUSE
PROPOSED SPRINT PANEL ANTENNAS (3 PER SECTOR, TYP. 3 SECTORS TOTAL) PIPE MOUNTED TO EXISTING PENTHOUSE PARAPET WALL & PAINTED TO MATCH EXISTING BUILDING
EXISTING GREENHOUSE (BEYOND)
PROPOSED SPRINT WALL MOUNTED PPC CABINET
PROPOSED SPRINT ROOF MOUNTED EQUIPMENT CABINET (BEHIND)
PROPOSED WALL MOUNTED SPRINT METER/ MAIN
PROPOSED WALL MOUNTED EMERGENCY GENERATOR RECEPTACLE
32'11"-4"

ING STAIR TO MECHANICAL ROOM @ TOP OF PENTHOUSE
ING GREENHOUSE ON ROOFTOP
OSED SPRINT WALL MOUNTED PPC CABINET
OSED SPRINT ROOF MOUNTED EQUIPMENT CABINETS
ING STAIRWELL PENTHOUSE



DETAIL 1
EAST ELEVATION
SCALE: 3/32"=1'-0"



DETAIL 2
NORTH ELEVATION
SCALE: 3/32"=1'-0"

Sprint
6580 SPRINT PARKWAY
OVERLAND PARK, KANSAS 66251

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0	08/06/04	ISSUED FOR ZONING	HN
A	07/19/04	ISSUED FOR ZONING	HN

PLANS PREPARED BY:
BLACK & VEATCH
CORPORATION
11401 LAMAR
OVERLAND PARK, KANSAS 66211
(913) 458-2000

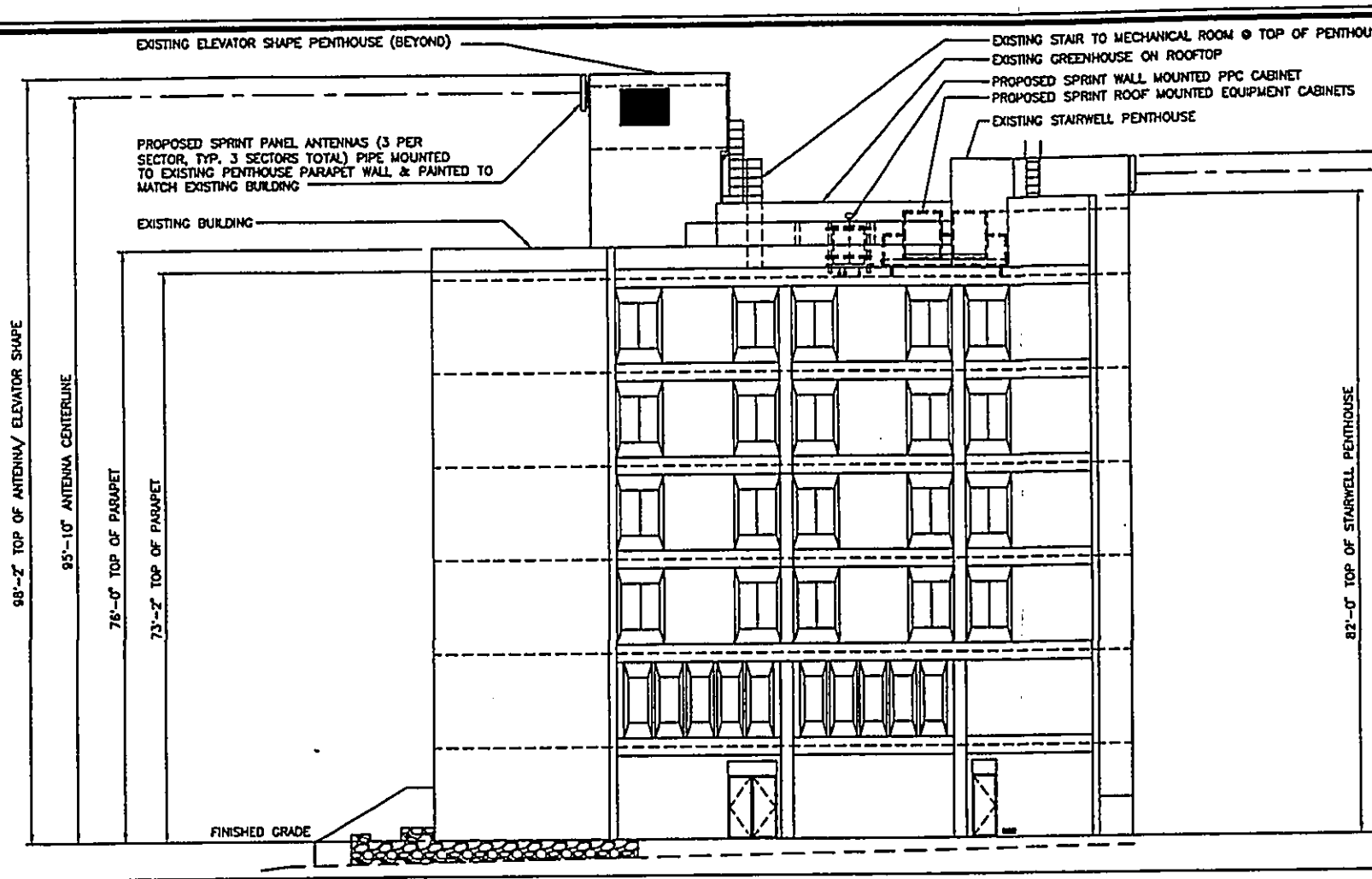
CONSULTANT:

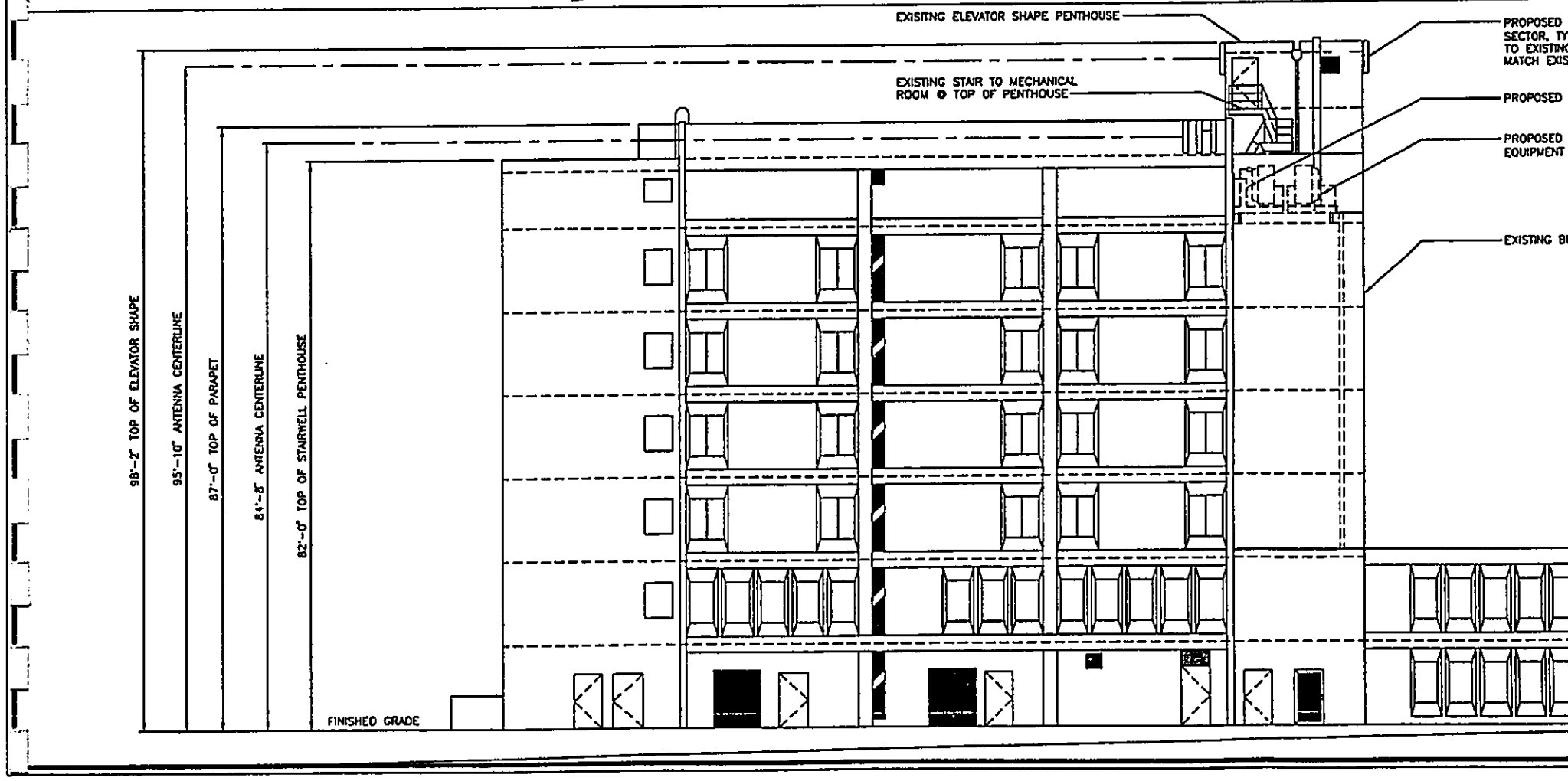
DRAWN BY:	CHK:	APV:
GJS	KDW	BLG

LICENSURE:

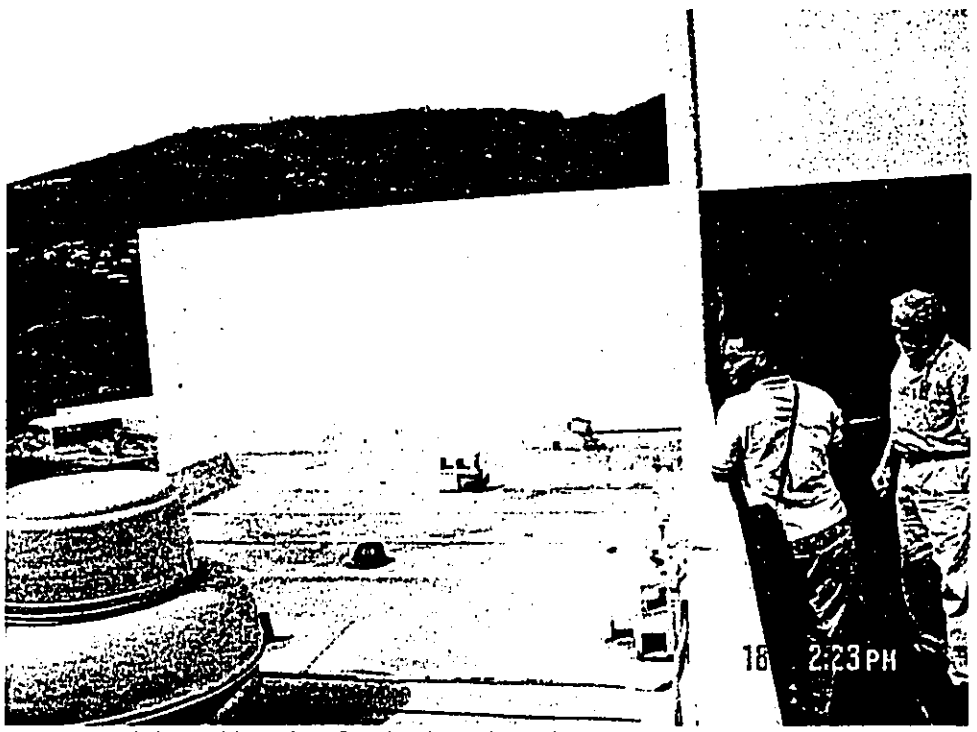
SHEET TITLE:
ELEVATIONS

SHEET NUMBER: A4
REVISION: 3
140408

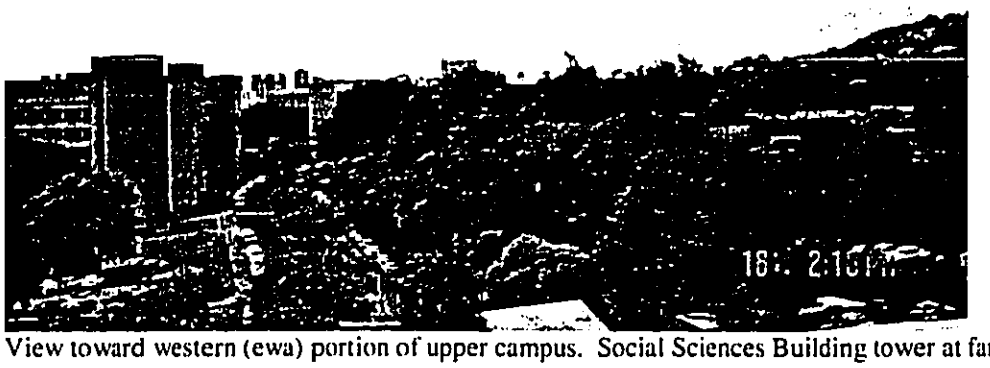

EXISTING ELEVATOR SHAPE PENTHOUSE (BEYOND)
EXISTING STAIR TO MECHANICAL ROOM @ TOP OF PENTHOU
EXISTING GREENHOUSE ON ROOFTOP
PROPOSED SPRINT WALL MOUNTED PPC CABINET
PROPOSED SPRINT ROOF MOUNTED EQUIPMENT CABINETS
EXISTING STAIRWELL PENTHOUSE
PROPOSED SPRINT PANEL ANTENNAS (3 PER SECTOR, TYP. 3 SECTORS TOTAL) PIPE MOUNTED TO EXISTING PENTHOUSE PARAPET WALL & PAINTED TO MATCH EXISTING BUILDING
EXISTING BUILDING
98'-2" TOP OF ANTENNA/ ELEVATOR SHAPE
95'-10" ANTENNA CENTERLINE
76'-0" TOP OF PARAPET
73'-2" TOP OF PARAPET
82'-0" TOP OF STAIRWELL PENTHOUSE
FINISHED GRADE


EXISITNG ELEVATOR SHAPE PENTHOUSE
PROPOSED
SECTOR, TY
TO EXISTIN
MATCH EXIS
EXISTING STAIR TO MECHANICAL ROOM @ TOP OF PENTHOUSE
PROPOSED
PROPOSED
EQUIPMENT
EXISTING BU
98'-2" TOP OF ELEVATOR SHAPE
95'-10" ANTENNA CENTERLINE
87'-0" TOP OF PARAPET
84'-8" ANTENNA CENTERLINE
82'-0" TOP OF STAIRWELL PENTHOUSE
FINISHED GRADE

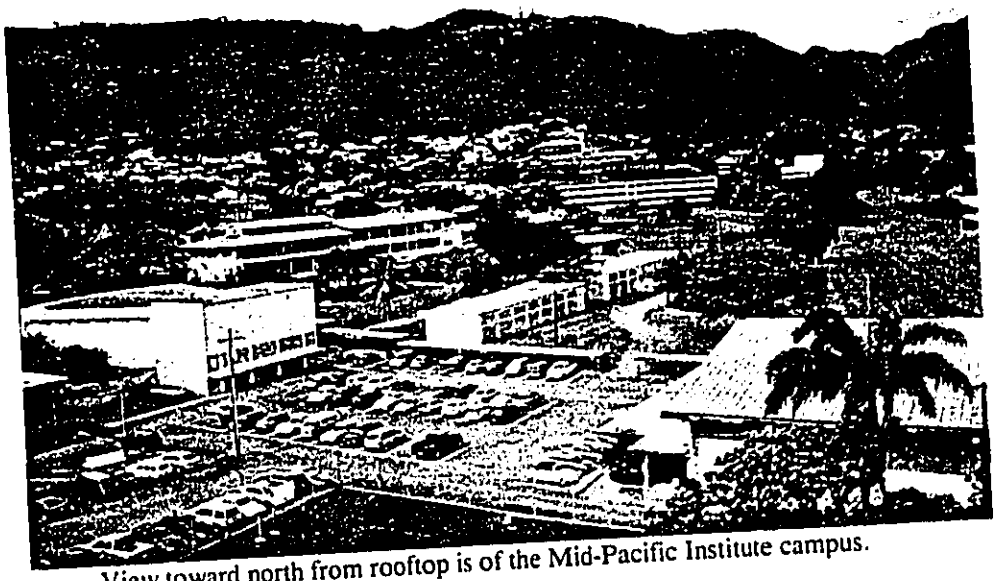
PHOTOGRAPHS



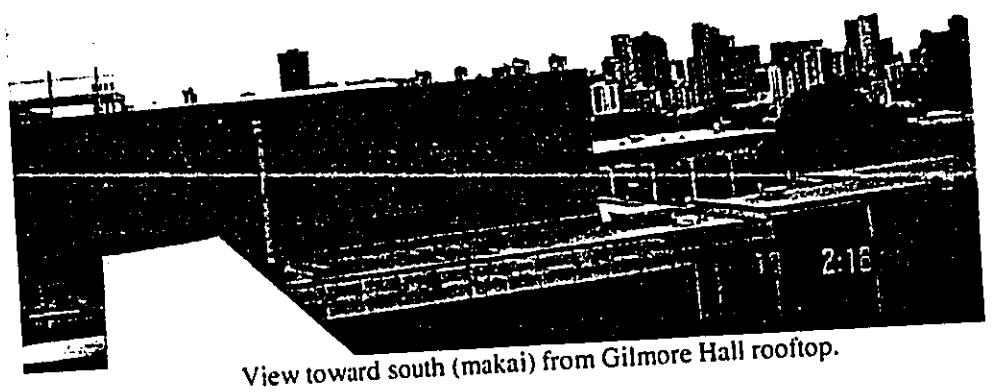
Anticipated location for the 2 BTS equipment cabinets.



View toward western (ewa) portion of upper campus. Social Sciences Building tower at far left.



View toward north from rooftop is of the Mid-Pacific Institute campus.



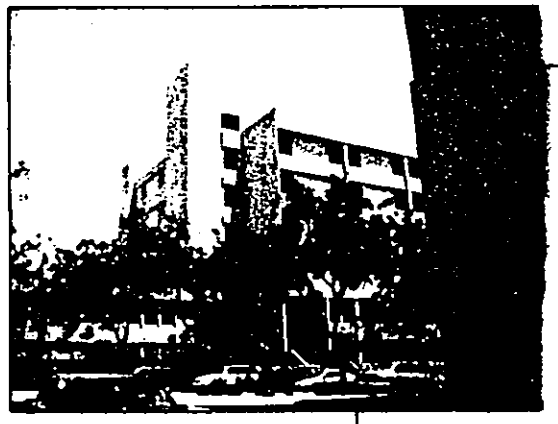
View toward south (makai) from Gilmore Hall rooftop.

Sprint Together with NEXTEL

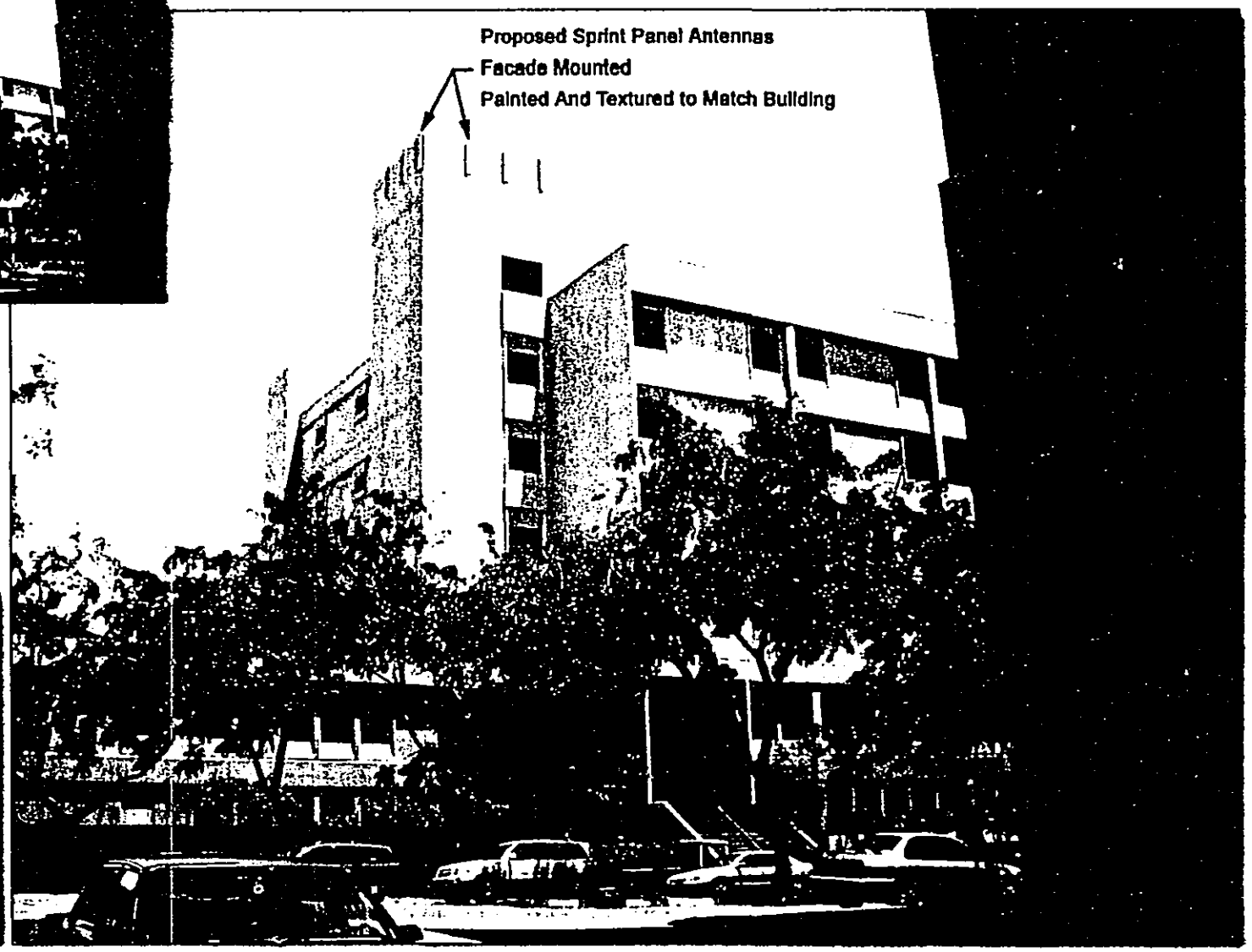
GILMORE HALL HI60XC115-E

3050 Maile Way, Honolulu, HI 96822

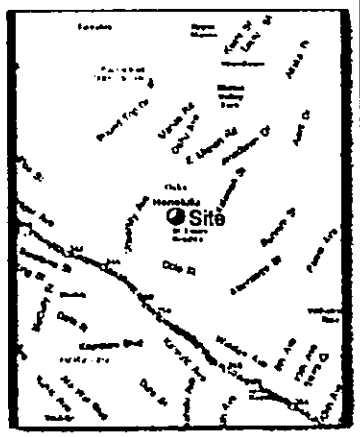
(View from Maile Way to Site)



Existing



BLACK & VEATCH CORPORATION



Vicinity Map

Proposed

(951) 654-3134

Appendix A

Pre-Assessment Phase: Agency Correspondence and DEA Comments and Responses

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

February 16, 2006

Mr. William Keoni Fox
SprintCom
925 Dillingham Boulevard
Honolulu, Hawai'i 96819

Ms. Kathleen Cutshaw
Vice Chancellor for Administration, Finance and Operations
University of Hawai'i at Mānoa
Honolulu, Hawai'i 96822

Ms. Colette Sakoda
Environmental Planning Solutions, Inc.
945 Makaīwa Street
Honolulu, Hawai'i 96816

Dear Mesdames Cutshaw and Sakoda, and Mr. Fox:

The Office of Environmental Quality Control has reviewed the draft environmental assessment for the Sprint Antenna Site at Gilmore Hall Rooftop, Tax Map Key (1st) 2-8-023, parcel 3, situated at Mānoa in the judicial district of Honolulu. We offer the following comments for your consideration and response.

Cumulative and Indirect Impact Assessment and Antennae Co-location Policy at the University of Hawai'i at Mānoa: We have examined out data base of projects related to antennae and subject to Chapter 343, Hawai'i Revised Statutes and find the following projects at the Mānoa campus, for which environmental assessments have been prepared by your agency.

1. January 8, 1984, Negative Declaration (ND), Replacement of Dish Antenna on Holmes Hall, University of Hawai'i at Mānoa
2. March 8, 1986, ND, Installation of Dish Antenna on Hawai'i Institute of Geophysics Building, University of Hawai'i at Mānoa
3. February 8, 1995, ND, PEACESAT 10 Meter Telecommunication Antenna Modification
4. March 8, 2005, FONSI - Nextel Partners, Inc., Proposed University of Hawai'i Hamilton Annex Antenna Facility.
5. July 8, 2005, FONSI - Cingular Wireless Antenna Facility at the Bilger Hall Addition, University of Hawai'i at Mānoa
6. October 8, 2005, FONSI – University of Hawai'i Kuykendall Annex Telecommunications Antennae
7. January 23, 2006, DEA - T Mobile West Corporation, Inc., Antenna at Mānoa Gateway House
8. January 23, 2006, DEA – SprintCom Antenna Site at Gilmore Hall Rooftop

In the past two years, antennae have been installed at various locations on campus. We respectfully recommend that the present project include an assessment of the indirect cumulative impacts over time and

space of the antenna projects listed above. If you have not already done so, we would respectfully recommend that you consider a plan for placement of sources (such as antennae) of electromagnetic fields in the extremely low frequency range (0.003 to 3 KHz) in light of a policy of "prudent avoidance of exposure" to biological receptors. With respect to exposure to these electromagnetic fields, please consult with Dr. Leslie Au, Environmental Epidemiologist, Office of Hazard Evaluation and Emergency Response, Department of Health.

Thank you for the opportunity to comment. If there are any questions, or if you would like to discuss this matter further, please call Mr. Leslie Segundo, Environmental Health Specialist, at (808) 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

Environmental Planning Solutions, LLC
945 Makaiwa Street, Honolulu, Hawaii 96816-5401
Phone: (808) 732-8602 ▫ Fax: (808) 538-3168

March 21, 2006

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawai`i
235 South Beretania Street, Suite 702
Honolulu, Hawai`i 96813

Dear Ms. Salmonson:

Subject: SprintCom UH Mānoa Gilmore Hall Rooftop Draft Environmental Assessment

We received your letter addressed to Ms. Kathleen Cutshaw, the University of Hawaii at Mānoa Mānoa's Vice Chancellor for Administration dated February 16, 2006 regarding the subject project. The following has been prepared following our consultation with Dr. Leslie Au, toxicologist, Office of Hazard Evaluation and Emergency Response, State Department of Health, in response to your questions and concerns:

1. Comment: ***Request for a Cumulative and Indirect Impact Assessment and Antennae Co-location Policy at the University of Hawai`i at Mānoa.***

Response: There are several misconceptions with respect to broadcasted energy from telecommunications antenna. First there is a misconception is that the broadcasted energy from antennae is the same thing as electric-power magnetic fields. It is not, according to Dr. Au. Adequate research of the health effects of broadcasted energy does exist. There is a health standard, which is published by the Federal Communications Commission (FCC) in its bulletin, FCC 96-326, Appendix A, Table 3, "NCRP Exposure Criteria for RF Fields (1986)," where the National Commission on Radiation Protection established standards for RadioFrequency Fields. Also, in that bulletin's Appendix C, the evaluation of all rooftop antennae are provided for, and Paragraph 1.1310, "Radiofrequency radiation exposure limits " reviews the health- based limits."

The second misconception is that radio energy which is broadcast from an antenna is the same thing as nuclear radiation. Again, it is not, states Dr. Au. Radio energy, within a certain distance, might have enough energy to heat up the water in a person's cells, like a microwave oven or sunlight, if the person stands within range for a long enough time period. When a person walks out of range, his cells may be (sun)burned, but they will cool down with no further effect, with little or no risk of DNA damage or cancer. Nuclear radiation has many times more energy that a person's water molecules are actually split and ionized, which makes the free radicals that damage DNA.

A third misconception is that there is cumulative exposure from all antennae on the UH Mānoa campus. Using the FCC's exposure standard for radiofrequency fields, it is possible to calculate a "safe distance" (also referred to as "exclusion distance") for every antenna. Radio engineers who help design antennas for facilities such as those on the UH Mānoa campus, estimate that the typical cellular telephone 100-watt antenna has a "safe distance" of about 13 feet. A person standing farther than 13 feet for a half hour would probably not have his cells' water heated up or experience an adverse effect. Even for an antenna as powerful as KGMB TV's antenna, which effectively radiates a power of 100,000 watts, its "safe distance" has been calculated to be less than 175 feet. With each UH Mānoa antenna's limited harmful or exclusion range, it would be highly unlikely for a person to be simultaneously within the harmful range of more than one antenna at a time. Consequently, there would be no cumulative exposure. Therefore, the cumulative and indirect impact from multiple antennae on the Mānoa campus rooftops listed in your letter would be insignificant.

2. Comment: ***Consider use of "prudent avoidance" policy.***

Response: Yet another misconception is that the Department of Health's prudent avoidance policy applies to broadcasting antennae. The policy only applies to the magnetic fields originating from electric power lines and appliances, whether in the walls of buildings or outdoors on power poles. In 1994 when the policy was written, the scientific evidence was sparse, and magnetic fields had not been proven to be a health hazard, so the DOH advised avoiding magnetic fields wherever it was easily feasible. However, by 1997, sufficient research had been done, so that the National Academy of Sciences published its judgment that there is no hazard. (Possible Health Effects of Exposure to Residential Electric and Magnetic Fields, National Academy Press, Washington D.C., 1997).

Thank you for your participation in the planning phase of this project.

Sincerely,

Colette M. Sakoda

cc: Wallace Gretz, UH Mānoa Facilities Planning & Management
William Keoni Fox, SprintCom

UNIVERSITY OF HAWAI'I

Environmental Center

FEBRUARY 22, 2006
EA:0326

Ms. Colette Sakoda
Environmental Planning Solutions LLC
945 Makaīwa Street
Honolulu, HI 96816

Dear Ms. Colette Sakoda,

Draft Environmental Assessment
Proposed Sprint Antenna Facility
Gilmore Hall Rooftop
University of Hawai'i at Mānoa
O'ahu, Hawai'i

SprintCom is proposing to install wireless voice and data coverage equipment on the rooftop of Gilmore Hall at the University of Hawai'i at Mānoa (UHM). The project includes installation of nine panel antennas measuring six feet high and eight inches long and, two rooftop radio equipment cabinets and two power cabinets, each measuring sixty-six inches high, fifty-six inches long, and thirty-eight inches wide. The total project area will occupy 375-square feet on the rooftop of Gilmore Hall.

SprintCom's installation will be regulated by the Federal Communications Commission and requires additional zoning and building permits from the City & County of Honolulu (CCH). This installation is classified as a Utility Installation and required medication to the Plan Review Use from the Department of Planning and Permitting CCH.

This review was conducted with the assistance of James Hollyer, College of Tropical Agriculture and Human Resources, Kenneth Kanneshiro, Center for Conservation Research & Training, and Amelia Hicks of the Environmental Center.

General Comments

The proper name of the college discussed in the document is the College of Tropical Agriculture and Human Resources. Additionally, the Center for Conservation Research and Training is also in Gilmore Hall, 4th floor thus, the use of the word "department", which appears throughout the document, is incomplete and incorrect.

Specific Comments

Description of the affected environment, anticipated impacts and mitigative measures (§3.5, §3.7, §3.9, §3.10)

Flora and Fauna (§3.5, Page 12)

The applicant adequately considers the site area surrounding Gilmore Hall yet fails to recognize the specific use of Gilmore Hall and, thus, the potential environmental impact of the project on organisms *within* Gilmore Hall. Our reviewers strongly suggest that the faculty and staff who work within Gilmore Hall be consulted as to the potential adverse effects on the organisms being researched therein.

Our reviewers would like to know if there will be any significant electromagnetic fields emanating from the antennae on the rooftop of this building such that they may effect the insect species in laboratories, some of which are about to be placed on the Federal Endangered Species List.

Traffic and Parking (§3.7, Page 14)

While the applicant briefly addresses the potential impacts on traffic and parking, our reviewers feel that the applicant underestimates the overall impact that the project will have on traffic and parking. The applicant suggests that the "number of project workers is expected to be small" (page 14) however does not clarify, in actual numbers, how many workers will be entering/exiting the project site area and with what frequency. We agree that UHM facilities planning and management office, all faculty and staff, and the security office should be informed well in advance of proposed peak construction/installation times that may impede with traffic and parking and further suggest that these parties be consulted prior to heavy construction days and time.

The applicant states that construction activities will occur over as many as eight weeks. During this time, will installation trucks be blocking the loading area and for exactly how long? Similarly, will the trucks be given faculty and staff parking spaces thereby displacing paying UHM employees?

Noise (§3.9, Page 16)

Our reviewers are concerned noise from construction will impede with the research, work, and study of UHM faculty, staff, and student. While the applicant list the many sources of short-term noise impacts, it is not clear what is meant by "minor" disruptions. Will there be periods of loud drilling or pounding? Such disruptions will create an environment difficult for maintaining routine work and study activities.

Air Quality (§3.10, Page 16-17)

The applicant states that the proposed action will generate fugitive dust in the area surrounding the project site. Our reviewers would like to know if there will be dust in the elevator shaft and in the elevator within Gilmore Hall.

Thank you for the opportunity to review this Draft EA.

Sincerely,

John T. Harrison Ph.D
Environmental Coordinator

cc: OEQC
James Moncur
James Hollyer
Kenneth Kanneshiro
Amelia Hicks

2500 Dole Street, Krauss Annex 19, Honolulu, Hawaii 96822
Phone: (808) 956-7361

Environmental Planning Solutions, LLC
945 Makaiwa Street, Honolulu, HI 96816-5401
Phone: (808) 732-8602; Fax: (808) 538-3168

March 21, 2006

Dr. John T. Harrison, Environmental Coordinator
Environmental Center
University of Hawai`i at Manoa
2500 Dole St., Krauss Annex 19
Honolulu, Hawai`i 96822

Dear Dr. Harrison:

Subject: SprintCom UH Mānoa Gilmore Hall Rooftop Draft Environmental Assessment

We received your letter dated February 22, 2006 regarding the subject project. The following has been prepared in response to your questions and concerns:

General Comments

The proper name of the College of Tropical Agriculture and Human Resources (CTAHR) as well as the fact that the Center for Conservation Research and Training is located on the 4th floor of Gilmore Hall have been noted, and the text of the final environmental assessment has been revised accordingly.

Specific Comments

Flora and Fauna (Section 3.5, page 12)

We are aware of the CTAHR faculty's concern for the project's potential impact on organisms within Gilmore Hall. SprintCom's representative, in coordination with the UHM Facilities Planning and Management project manager, conducted consultations with CTAHR faculty members beginning in 2004 and continued through 2005 as part of the project planning phase. As stated in Section 9.1, page 29, SprintCom made presentations to CTAHR representatives at Gilmore Hall and continued to consult with the College's faculty and staff through last year. The broadcast antennae facility on the Gilmore Hall rooftop would not pose a threat to the organisms due to the following reasons: (1) the antennae broadcast outward in a narrow cone, not equally in every direction, so that radio emissions do not even touch the roof, and they are certainly not directed downward through the rooftop. (2) if the emissions were directed downward at the rooftop, the concrete rooftop reduces the energy to one-half or one-third of its strength by the time it gets through the rooftop (Honolulu Police radio antenna, Leahi Hospital EA, 1996). It should be noted that the police antenna is much more powerful than a cellular antenna. It was determined that the Leahi Hospital antenna site did not

pose a health risk to the patients or staff within the hospital, and consequently the site was erected 10 years ago. It should be noted that there have not been any health complaints since.

There is a misconception that broadcasted energy from antennae is the same thing as electric-power magnetic fields. It is not. Adequate research of the health effects of broadcasted energy does exist. There is a health standard, which is published by the Federal Communications Commission (FCC) in its bulletin, FCC 96-326, Appendix A, Table 3, "NCRP Exposure Criteria for RF Fields (1986)," where the National Commission on Radiation Protection established standards for RadioFrequency Fields. Also, in that bulletin's Appendix C, the evaluation of all rooftop antennae are provided for, and Paragraph 1.1310, "Radiofrequency radiation exposure limits " reviews the health- based limits." Using the FCC's exposure standard for radiofrequency fields, it is possible to calculate a "safe distance" (also referred to as "exclusion distance") for every antenna. Radio engineers estimate that the typical cellular telephone 100-watt antenna has a "safe distance" of about 13 feet. A person standing farther than 13 feet for a half hour would probably not have his cells' water heated up or experience an adverse effect. Because the bottom of SprintCom antennae will clear the rooftop floor, and be oriented outward and away from the interior of Gilmore Hall, tenants, both humans and micro-organisms, would be outside of the 13-foot exclusion distance. Therefore, in-building micro-organisms will be free from harm.

Traffic and Parking (Section 3.7, page 14)

The number of workers expected to be on-site during construction will range from 4 and 5 people. During the construction period, contractor trucks will likely be parked at the UHM Facilities Planning and Management baseyard located at the mauka most corner of the campus. The largest pieces of hardware which are the BTS cabinets and antenna panels would be delivered via a boom truck on a weekend when there would be less activity on campus. All other antenna installation equipment and hardware would be carried or hand-trucked to the rooftop via the building elevators.

Noise (Section 3.9, page 16)

There will be periods of drilling and pounding. However, the contractor will be required to closely coordinate this phase of construction with UHM Facilities Planning and Management staff to ensure minimal disruption to ongoing in-building faculty and staff's activities. For example, if night or weekend hours work best to mitigate noise concerns, this alternative may be considered.

Air Quality (Section 3.10, pages 16-17)

Dust generation associated with the antenna site installation will be confined to the area where drilling is being done or electrical equipment is being installed during brief periods over the installation period. There will probably be very little dust

in the elevator shaft and in the elevator due to the contractor's rooftop installation activities. Please be mindful that cell site installation on building rooftops is a far less dust-generating activity than actual heavy construction work that typically involves earthmoving and open trenching.

Thank you for your participation in the planning phase of this project.

Sincerely,

Colette M. Sakoda

cc: Wallace Gretz, UH Mānoa Facilities Planning & Management
William Keoni Fox, SprintCom

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
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MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

October 31, 2005

2005/ELOG-2319(lk)
88/PRU-3

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Re: Sprint PCS
University of Hawaii at Manoa
2563 Dole Street - Manoa
Tax Map Key 2-8-23: 3

This is in response to your September 28, 2005 letter, requesting comments on a proposed telecommunications facility on the rooftop of the Gilmore Hall building at the University of Hawaii at Manoa (UH).

You indicate that the project will involve the following:

- Nine (9) panel antennas will be flush-mounted on the south, west and north walls of the elevator shaft on the rooftop of the Gilmore Hall building.
- The antennas will measure six (6) feet high and eight (8) inches long and will be painted to match the existing building.
- Two (2) radio equipment cabinets and two (2) power cabinets (66 inches high, 56 inches long and 38 inches wide) will be placed on the rooftop, north of the elevator shaft. The cabinets are connected to a small telephone demarcation cabinet and a power protection cabinet.
- The equipment will occupy about a 375-square foot area on the rooftop of the existing building.

We are not able to determine the permit requirements based on the information provided. However, if the proposed antenna facility is necessary to improve telecommunication service at the UH, then the proposal can be reviewed as a minor modification to the Plan Review Use

(PRU) File No. 88/PRU-3. If the project is a "stand-alone" facility intended to improve regional service, then a Conditional Use Permit-Minor (CUPm) for a Utility Installation, Type B, and possibly a Zoning Waiver for the height will be required.

In addition, the following must be provided:

1. Documentation of compliance with Chapter 343 must be provided prior to submittal of a request for land use permits.

2. Documentation confirming that the proposal was presented to the Neighborhood Board. Include a description of all issues or concerns relating to the project and the measures taken to mitigate such issues or concerns.

3. Elevation views of the proposed facility and the existing building. Indicate the height of the existing building and the proposed structures.

4. A photo simulation illustrating the visual impact of the proposed facility.

5. Fencing or other barriers to restrict public access within the area exposed to a power density of 0.1 milliwatt/cm^2 for all associated antennas involving radio frequency (RF) or microwave transmissions shall be provided.

6. Clarify if nine (9) or twelve (12) panel type antennas are proposed?

7. We have already reviewed requests from Cingular Wireless, Nextel Partners, Voicestream PCS II, Coral Wireless, and Sprint PCS to locate their telecommunication facilities at the UH. Please explain why so many antenna facilities are needed to support the UH Campus. How many other facilities are proposed?

8. If the project is reviewed as a minor modification to the PRU, a $300 filing fee will be required if the UH is not the applicant. The filing fee for a CUPm is $300, and an additional $300 for a Zoning Waiver.

Should you have any questions, please call Lynne Kauer of our staff at 527-6278.

Very truly yours,

for Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:pl
g:\landuse\posseworkingdirectory\lkauer\05lg2319.doc

Environmental Planning Solutions, LLC
945 Makaiwa Street, Honolulu, Hawaii 96816-5401
Phone: 732-8602 • Fax: 538-3168

March 27, 2006

Mr. Henry Eng, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai`i 96813

Dear Mr. Eng:

Subject: SprintCom Proposed Gilmore Hall UH Mānoa Draft Environmental Assessment (DEA)

We received your letter dated October 31, 2005 regarding the preparation of a Chapter 343 HRS DEA for the subject project. As stated in Section 2.1 Purpose and Need, the proposed antenna facility is necessary to improve telecommunication service at the UH Mānoa campus. Therefore, a minor modification to the University's PRU File No. 88/PRU-3, and not a Conditional Use Permit-Minor, is appropriate for the proposed project. Per the University of Hawaii's policy, SprintCom is complying with the requirements of Chapter 343.

In response to your question as to the need for numerous antenna facilities on the UH campus, SprintCom like other wireless carriers, is being responsive to the University's demand for service. Additionally, like other carriers, SprintCom is under the University's direction regarding location of antenna facilities on separate rooftops within the Mānoa campus.

Thank you for your participation in the planning phase of this project.

Sincerely,

Colette M. Sakoda

cc: Wallace Gretz, UH Mānoa Facilities Planning & Management
William Keoni Fox, SprintCom

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

March 15, 2006

Mr. William Keoni Fox
SprintCom
2333 Kapiloani Boulevard, #2410
Honolulu, Hawai'i 96826

LOG NO: 2006.06
DOC NO: 0603CM45
Archaeology
Architecture

Dear Mr. Fox:

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
Sprint Gilmore Hall Rooftop Antenna Site, University of Hawaii-Manoa
Mānoa Ahupua'a, Honolulu [Kona] District, Island of O'ahu
TMK: (1) 2-8-023:003 (portion)

Thank you for the opportunity to review the aforementioned project. We received your documents on January 25, 2006. We apologize for the delay in responding. The proposed undertaking consists of flush mounting panel antennas just below the top of the highest parapet on the rooftop, and constructing mechanical cabinets.

We believe that **no historic properties will be affected** by this undertaking because:

- ☐ a) intensive cultivation has altered the land
- ☐ b) residential development/urbanization has altered the land
- ☐ c) previous grubbing/grading has altered the land
- ☐ d) an acceptable archaeological assessment or inventory survey found no historic properties
- ☐ e) this project has gone through the historic review process, and mitigation has been completed
- ☒ f) other: *There are no historic structures within or near the Area of Potential Effect. Gilmore Hall is not listed on the National and/or State Register of Historic Places. No significant visual impacts will result from the proposed undertaking*

Please contact Dr. Chris Monahan at (808) 692-8015 if you have any questions or concerns about this letter.

Aloha,

for Melanie Chinen, Administrator
State Historic Preservation Division

CM

Cc: Mr. Wallace Gretz, UH-Manoa
Ms. Colette Sakoda, Environmental Planning Solutions

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

February 16, 2006

HRD05/2216

Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, HI 96816

RE: Draft Environmental Assessment for the Proposed Sprint Gilmore Hall *Rooftop* Antenna Site, Mānoa, O'ahu, TMK (1) 2-8-023: 003.

Dear Colette Sakoda,

The Office of Hawaiian Affairs (OHA) is in receipt of your February 17, 2006 request for comment on the above listed proposed project. OHA offers the following comments:

Our staff has no comment specific to the above-listed project. Thank you for your continued correspondence.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 Koapaka Street, Suite H425
Honolulu, Hawaii 96819-1869
Phone: (808) 831-7781 Fax: (808) 831-7750 Internet: www.honolulufire.org

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ALVIN K. TOMITA
DEPUTY FIRE CHIEF

January 30, 2006

Mr. William Keoni Fox
SprintCom
2333 Kapiolani Boulevard, Suite 2410
Honolulu, Hawaii 96826

Dear Mr. Fox:

Subject: Draft Environmental Assessment (DEA)
Sprint Gilmore Hall Rooftop Antenna Site
University of Hawaii at Manoa
Manoa, Oahu, Hawaii
Tax Map Key: 2-8-023: 003

We received a letter dated January 19, 2006, from Ms. Colette Sakoda of Environmental Planning Solutions, LLC requesting that our comments on the above-mentioned DEA be submitted to you.

The Honolulu Fire Department has no objections to the above-mentioned project.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 831-7778.

Sincerely,

KENNETH G. SILVA
Fire Chief

KGS/DL:jl

cc: Genevieve Salmonson, Office of Environmental Quality Control
Wallace Gretz, University of Hawaii at Manoa
Colette Sakoda, Environmental Planning Solutions, LLC

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 3RD FLOOR
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MUFI HANNEMANN
MAYOR

MELVIN N. KAKU
ACTING DIRECTOR

ALFRED A. TANAKA, P.E.
DEPUTY DIRECTOR

TP1/06-137650R

February 24, 2006

Mr. William Keoni Fox
SprintCom
2333 Kapiolani Boulevard, #2140
Honolulu, Hawaii 96826

Dear Mr. Fox:

Subject: Sprint Gilmore Hall Rooftop Antenna Site

Thank you for the January 19, 2006 letter from Environmental Planning Solutions LLC, requesting our review of and comments on the draft environmental assessment for the subject project. We have reviewed the document and do not have any comments to submit at this time.

Should you have any questions regarding this matter, please contact Ms. Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

MELVIN N. KAKU
Acting Director

cc: Ms. Genevieve Salmonson
OEQC

Mr. Wallace Gretz
UH – Manoa

✓Ms. Collette Sakoda
Environmental Planning Solutions LLC

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

February 2, 2006

Ms. Colette Sakoda
Environmental Planning Solutions LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Your Letter of January 19, 2006, on the Draft Environmental Assessment for University of Hawaii Gilmore Hall Rooftop Antenna Site
TMK: 2-8-023:003

Thank you for the opportunity to comment on the proposed project.

We do not have any comments on the proposed antenna facility.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

K. Shida

KEITH S. SHIDA
Principal Executive
Customer Care Division

Hawaiian Telcom

February 3, 2006

SprintCom
Attention: William Keoni Fox
2333 Kapiolani Boulevard, #2410
Honolulu, Hawaii 96826

Subject: SprintCom Antenna Facility – Gilmore Hall Rooftop, UH of Manoa

To Mr. Fox:

Thank you for the opportunity to review the above project. We have the following comments to make:

- As far as Hawaiian Telcom, Inc. is concern, providing telephone service should not negatively impact the environment within the project area
- All electrical work shall conform to all electrical codes.
- Telephone service connection shall be determined once electrical drawings are submitted.

Should you have any questions, please call Noel Remigio at 840-5847.

Sincerely,

Jill Lee
Manager – OSP Engineering, East & West Oahu

C: File (Punahou)
N. Remigio
Univeristy of Hawaii at Manoa, Wallace Gretz
2444 Dole Street
Honolulu, Hawaii 96822
Environmental Planning Solutions LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
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MUFI HANNEMANN
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

October 21, 2005

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Environmental Preassessment Consultation
Sprint PCS Proposed Telecommunications Facility
University of Hawaii at Manoa
Gilmore Hall Antenna Site
Honolulu, Oahu, Hawaii
Tax Map Key: 2-8-023: 003

We received your letter dated September 28, 2005, requesting our comments on the above-mentioned subject.

The Honolulu Fire Department has no objections to the above-mentioned project.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 831-7778.

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

AKL/SY:bh

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD05/2066

October 24, 2005

Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, HI 96816

RE: Sprint PCS Proposed University of Hawai'i Gilmore Hall Antenna Site, Mānoa, O'ahu, TMK 2-8-023: 003.

Dear Colette Sakoda,

The Office of Hawaiian Affairs (OHA) is in receipt of your September 28, 2005 request for comment on the above listed proposed project, TMK 2-8-023: 003. OHA offers the following comments:

Our staff asks for assurance that the proposed cell antenna installation will not have any adverse effects on the health of the University's staff, faculty or students. As has been stipulated in similar Environmental Assessments, access to the Gilmore Hall site should be restricted to maintenance staff and kept fenced and locked at all times.

OHA further requests your assurances that if the project goes forward, should iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU HAWAII 96813
TELEPHONE (808) 523-4529 • FAX (808) 523-4730 • INTERNET www.co.honolulu.hi.us

MUFI HANNEMANN
MAYOR

ALFRED A. TANAKA, P.E.
ACTING DIRECTOR

TP9/05-122330R

October 27, 2005

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Sprint PCS Proposed University of Hawaii
Gilmore Hall Antenna Site

Thank you for your September 28, 2005 letter, requesting our comments related to the subject project. At this time, we have no comments to offer for your consideration as you prepare the draft environmental assessment.

Should you have any questions regarding this matter, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

ALFRED A. TANAKA, P.E.
Acting Director

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.1931

October 25, 2005

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Proposed Sprint PCS Gilmore Hall Antenna Site
University of Hawaii
Pre-Assessment Consultation

Thank you for your transmittal requesting our review on the subject application.

The proposed telecommunications facility is not expected to have an impact on any of our State transportation facilities.

We appreciate the opportunity to provide our comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF THE SUPERINTENDENT

October 25, 2005

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawai`i 96816

Dear Ms. Sakoda:

SUBJECT: Pre-assessment Consultation, University of Hawaii,
Gilmore Hall Antenna Site, Oahu TMK: 2-8-23:3

The Department of Education has no comment or concern about the proposed telecommunications facility on the campus of the University of Hawaii at Manoa.

If you have any questions, please call Rae Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Heidi Meeker of the Facilities Development Branch at 733-4862.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:ly

cc: Rae Loui, Asst. Supt., OBS

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.honolulu.gov

MUFI HANNEMANN
MAYOR

BOISSE P. CORREA
CHIEF

GLEN R. KAJIYAMA
PAUL D. PUTZULU
DEPUTY CHIEFS

OUR REFERENCE BS-DK

October 3, 2005

Ms. Colette Sakoda, President
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Thank you for the opportunity to review and comment on the Pre-Assessment Consultation for the Sprint PCS Proposed University of Hawaii Gilmore Hall Antenna Site in Manoa.

This project should have no significant impact on the facilities or operations of the Honolulu Police Department.

If there are any questions, please call Major Bart Huber of District 7 at 529-3362 or Mr. Brandon Stone of the Executive Bureau at 529-3644.

Sincerely,

BOISSE P. CORREA
Chief of Police

By
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

Serving and Protecting with Aloha

DEPARTMENT OF PARKS & RECREATION

CITY AND COUNTY OF HONOLULU

1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 692-5561 • Fax: (808) 692-5131
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LESTER K. C. CHANG
DIRECTOR

DANA L. TAKAHARA-DIAS
DEPUTY DIRECTOR

October 7, 2005

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Thank you for your letter of September 28, 2005, requesting comments on the proposed Sprint PCS Antenna Site at the University of Hawaii.

We have no comments as we do not foresee this project causing any impact on City and County park properties.

Should you have any questions, you may contact Ms. Toni Robinson, East Honolulu District Manager, at 973-7250.

Sincerely,

LESTER K. C. CHANG
Director

LKCC:fe
(122466)

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

October 5, 2005

Ms. Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

Subject: Your Letter of September 28, 2005, on the Environmental Assessment Pre-Assessment Consultation for University of Hawaii Gilmore Hall Antenna Site, TMK: 2-8-23:3

Thank you for the opportunity to comment on the proposed project.

We do not have any comments on the proposed antenna facility.

If you have any questions, please contact Joseph Kaakua at 748-5442.

Very truly yours,

K. Shida

KEITH S. SHIDA
Principal Executive
Customer Care Division

200 Akamainui Street
Mililani, Hawaii 96789-3999
Tel 808-625-2100
Fax 808-625-5868

OCEANIC
TIME WARNER
CABLE

October 7, 2005

Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Attn: Ms. Colette Sakoda

Subject: Sprint PCS Proposed UH Gilmore Hall Antenna Site, Manoa

Dear Ms. Sakoda,

Thank you for allowing us the opportunity to comment on the proposed project. Oceanic Time Warner Cable will not be affected by the proposed Sprint PCS Antenna site. Our existing facilities will not cause any interference to the new equipment being placed. Should you have any further questions, please contact me at #625-8346.

Sincerely,

Randy Makizuru
OSP Engineer

Appendix B

PWC Electromagnetic Emissions Prediction Study

ELECTRO-MAGNETIC EMISSIONS (EME) PREDICTION STUDY

SPRINT

SITE:
UNIVERSITY OF HAWAII AT MANOA
GILMORE HALL ROOFTOP

DECEMBER 2005

PWC

Pacific Wireless Communications · PWC Building · 710 Kakoi St · Honolulu, HI 96819
837-4300 · Toll Free to Oahu 800-327-1949 · www.pwchi.com

TABLE OF CONTENTS

SPRINT – UH MANOA, GILMORE HALL

Section 1
Introduction

FOREWORD

The following is provided to assist in complying with the following regulatory requirements:

FCC passed law 96-326, August 1996
FCC Title 47 CFR 1. & 2. and OET Bulletin 65 with Supplements
OSHA Title 29 CFR 1910. 147, Control of Hazardous Energy (Lockout/Tagout)

This document is not intended to substitute for or supersede the requirements of the foregoing law and regulation. It should be reviewed for relevancy to your particular work applications and modified, as necessary, in order to develop an effective, comprehensive RF/Microwave Emissions Program. Employers should note that program documentation is expected to be reviewed at least annually and updated as necessary.

APPLICATION

This document applies to operations where employees, visitors and the general public may be exposed to levels of RF and Microwave Emissions at or above maximum permissible exposure (MPE) limits.

BACKGROUND

In August 1996 the Federal Communication Commission (FCC) adopted new guidelines for evaluating the environmental effects of radiofrequency (RF) energy from transmitters on wireless communication sites. While there is no scientific evidence that RF emissions from these sites operating within established safety guidelines pose a health risk, fields close to antennas on transmitter sites must be understood and care must be taken to assure safe operation during maintenance. The guidelines adopted by the FCC provide considerable margins of protection from any known health risk.

The Telecommunications Act of 1996 mandated that the FCC implement regulations to protect public and workers from potentially hazardous exposure to non-ionizing radiation. The Act of Congress was driven by the National Environmental Policy Act (NEPA) of 1969, which requires agencies of the federal government to evaluate the effects of their actions on the quality of the human environment. In addition, recent studies indicated existing standards did not adequately protect workers and the general public from continuously increasing presence of Emissions associated with radio frequency transmissions.

In response to this mandate, the FCC passed law 96-326 in August 1996. The new guidelines implement more recent scientific studies of the biological effects of RF emissions and were recommended for adoption by the American National Standards Institute (ANSI), the Institute of Electrical and Electronic Engineers

(IEEE), and the National Council on Radiation Protection and measurements (NCRP). The FCC received favorable support for these stricter standards from the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the Occupational Safety and Health Administration (OSHA), as well as from a number of nongovernmental groups and companies.

The FCC's rules on evaluation of environmental RF emissions are found in Section 1.1307(b) of the FCC's Rules and Regulations [47 CFR 1.1307(b)]. Guidelines for compliance with the FCC's rules can be found in an FCC technical bulletin (OET Bulletin No.65). Subsequent FCC items adopted since the first Order have dealt primarily with which RF sources are subject to the RF environmental rule and which are excluded [52 Federal Register 13240, 1987; 52 Federal Register 49032, 1987; 53 Federal Register 28223, 1988; 53 Federal Register 40918, 1988].

EXPOSURE STANDARDS AND LIMITS

With the publication of the SCC28 standard as ANSI/IEEE C95.1-1992, a number of new elements were added to prior ANSI standards. These changes included modification of the exposure limits and the classification of exposure environments as Occupational/Controlled and General Population Uncontrolled. Exposure limits in the new guidelines adopted by the FCC are specified in terms of Maximum Permissible Exposure (MPE) as a function of frequency; MPE's are given in units of electric and magnetic field strength and power densities. For exposure to multiple frequencies, the fraction (or percentage) of the MPE produced by each frequency is determined and these fractions (or percentages) must not exceed unity (or 100 percent).

Different limits apply to different circumstances, based on whether a person at or near a specific site knows or is informed and has control of potential RF exposure. **Occupational/Controlled Environment** limits apply to individuals who should know that there is a potential for exposure as a requirement of employment, or as the incidental result of transient passage through areas that may exceed exposure levels beyond the General Population Uncontrolled environment MPE's. For example, a maintenance technician who performs work on transmitters should be aware -- due to training and the nature of his work -- that transmitters produce RF energy. Because of the knowledge and understanding that exposure is possible, this individual would be evaluated against the Occupational/Controlled environment limits. **General Population Uncontrolled Environment** limits apply to individuals assumed to have no knowledge of or control over their possible exposure to RF energy. If the technician in the example above brought his family to the same area, the situation would change. Since the family members would not be assumed to have knowledge or understanding of the RF environment, their exposures would be judged against the limits for General Population Uncontrolled environments. The technician, however, would be evaluated against the Occupational/Controlled environment limits. Simple understanding or precautions can assure that RF levels at or near an antenna site do not exceed maximum permitted exposure levels. The MPE exposure levels for General Population controlled environments are five times lower than the MPE exposure levels for Occupational/Controlled environments (see Table 1 & Figure 1).

Table 1. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electrical Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3 - 3.0	614	1.63	(100)*	6
3.0 - 30	1842/f	4.89/f	$(900/f^2)$*	6
30 - 300	61.4	0.163	1.0	6
300 – 1500	--	--	f/300	6
1500 – 100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electrical Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3 – 1.34	614	1.63	(100)*	30
1.34 - 30	824/f	2.19/f	$(180/f^2)$*	30
30 - 300	27.5	0.073	0.2	30
300 – 1500	--	--	f/1500	30
1500 – 100,000	--	--	1.0	30

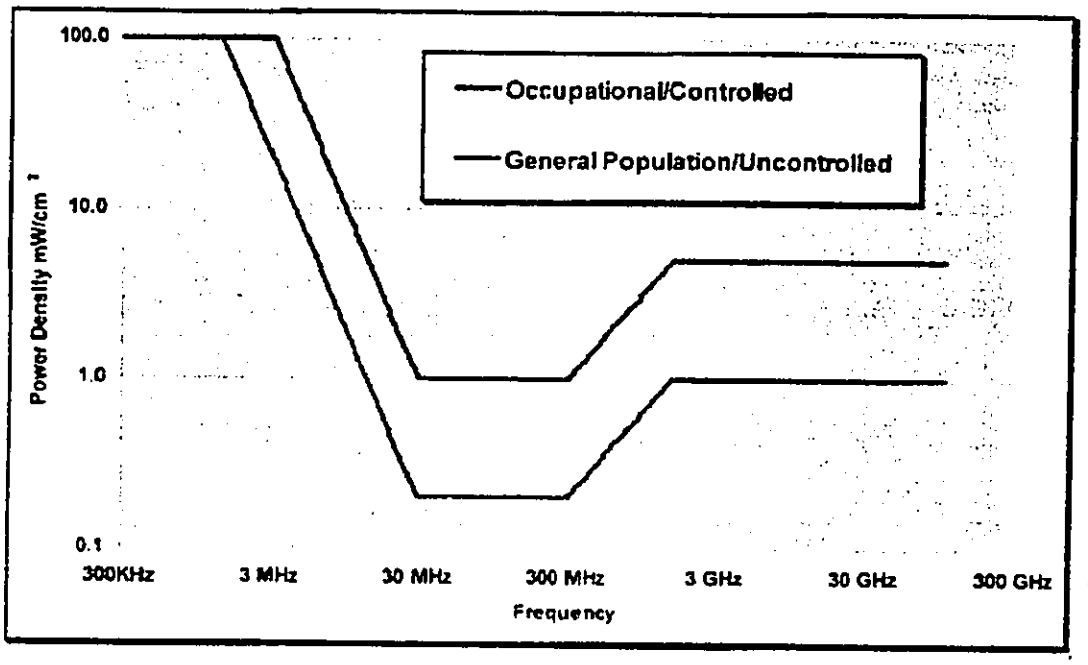
f = frequency in MHz

*Plane-wave equivalent power density

NOTE 1: ***Occupational/controlled*** limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2: ***General population/uncontrolled*** exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Figure 1. FCC ADOPTED MAXIMUM PERMISSIBLE EXPOSURE LIMITS



TERMS AND NOTES NEEDED FOR THIS PREDICTION REPORT

Prediction Surveys

These models are intended to give an estimated indication of the MPE levels present around an antenna system. Personnel working around antennas should always make use of a personal RF monitor and follow all pertaining safety rules.

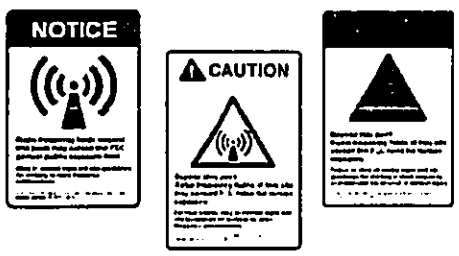
Actual Survey Diagrams

The Hot Zones - blue, yellow, and red - depicted in these diagrams are color-coded to match appropriate signage, which should be placed in the vicinity of any Hot Zone(s). These signs are used to alert personnel of the EME levels present in the area.

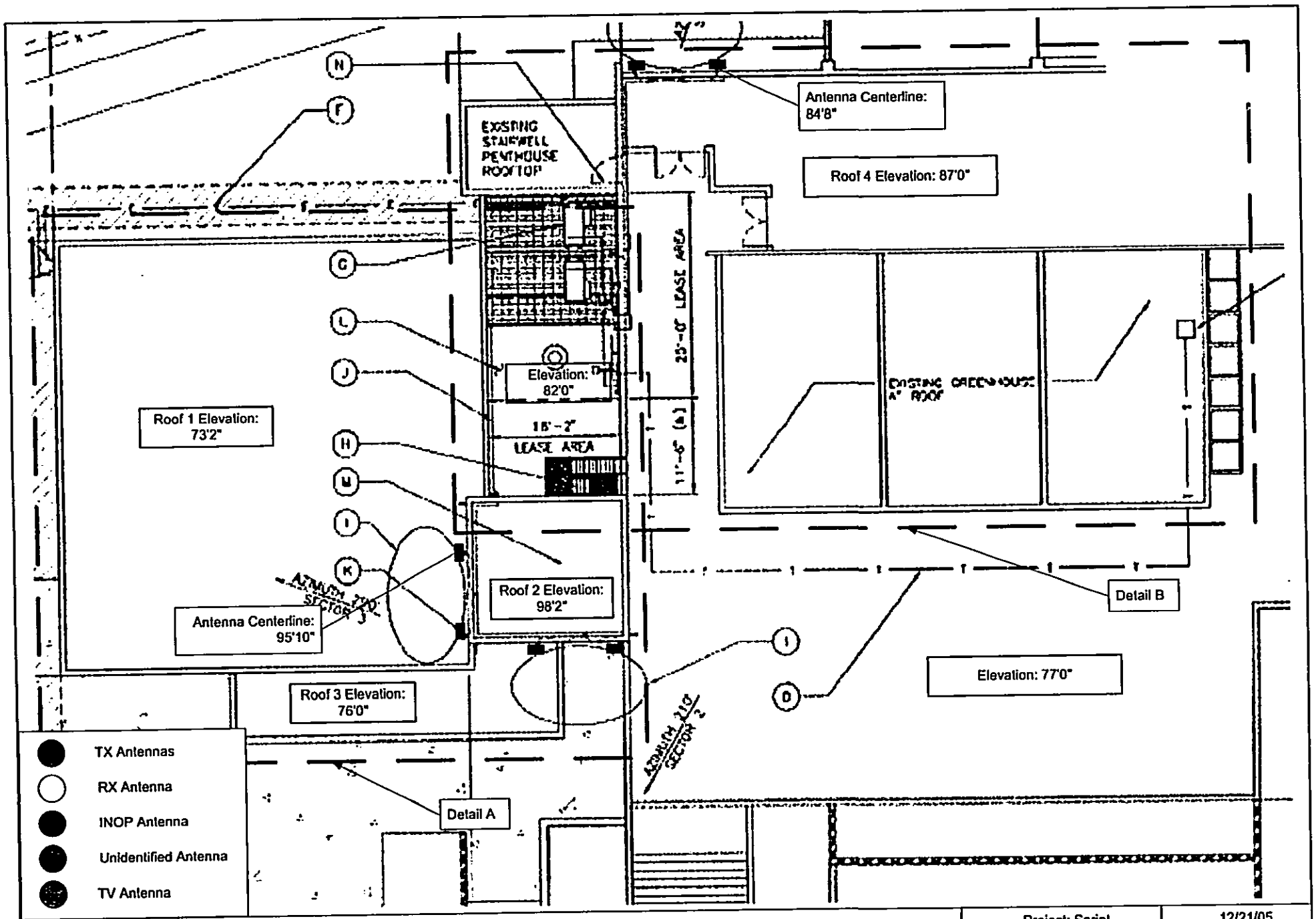
ACTUAL SURVEY KEY

- Over 1001% Broadcast Contractors Allowed
- 101% - 1000% MPE RF Qualified/Trained worker
- 21% - 100% MPE General Site Worker
- 0% - 20% MPE General Population

SIGNAGE



Section 2
Site Information

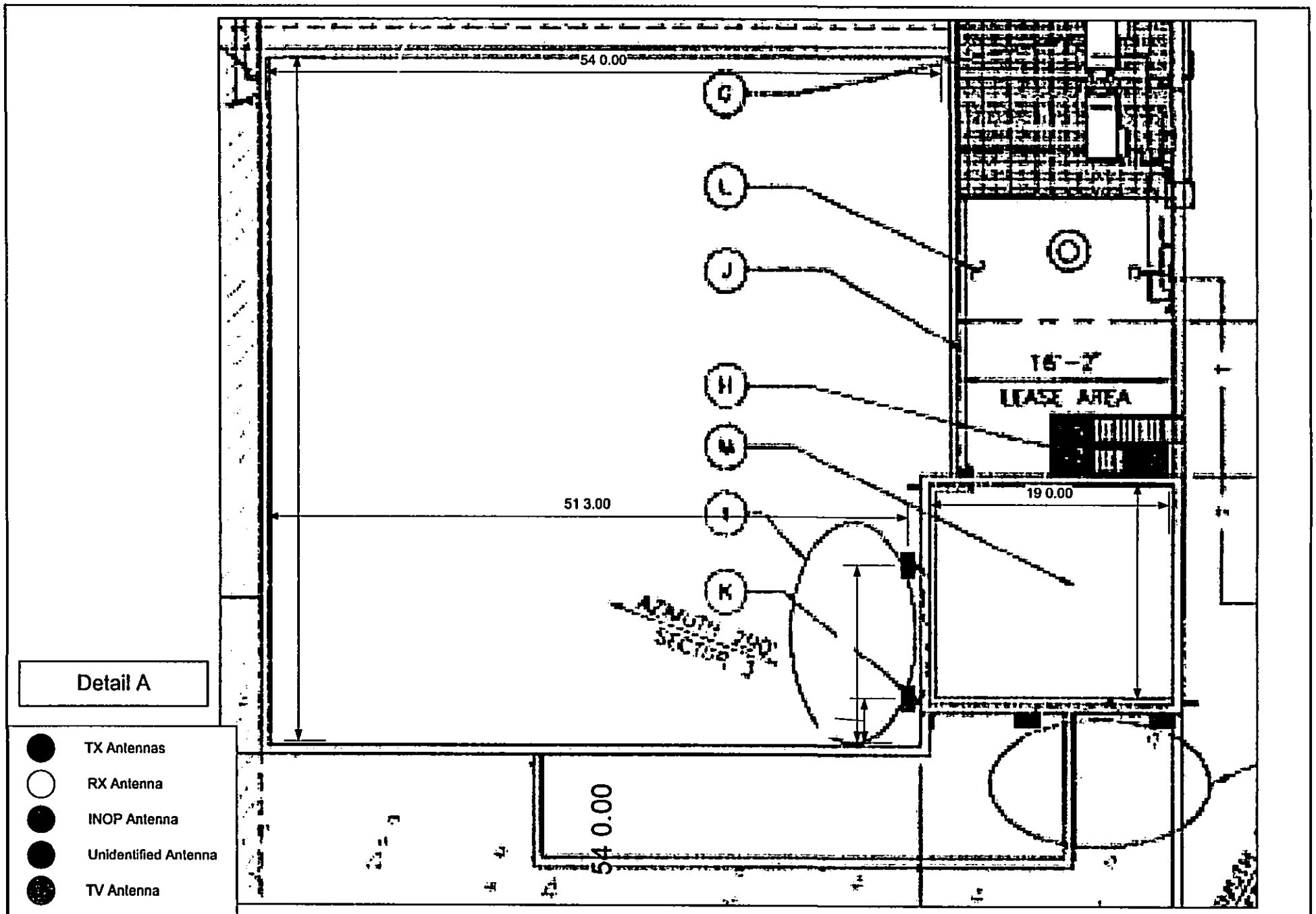


PWC

TITLE

Sprint - UH Manoa, Gilmore Hall

Project: Sprint	12/21/05
Dwg: UH Manoa	Rev. 1
Scale : 0.0625" = 1'	Pg. 1 of 12

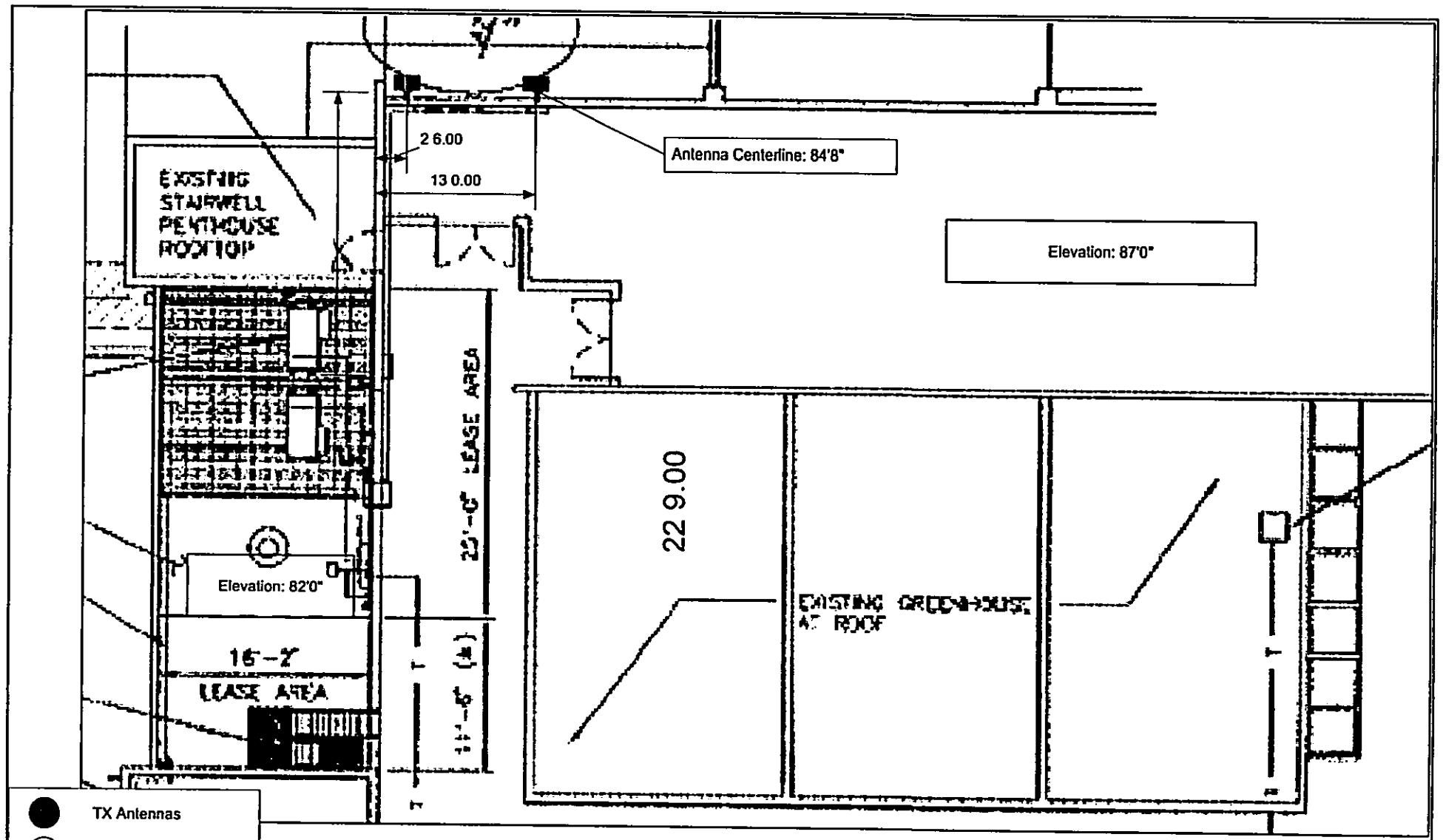


PWC

TITLE

Sprint - UH Manoa, Gilmore Hall

Project: Sprint	12/21/05
Dwg: UH Manoa	Rev. 1
Scale : 0.1" = 1'	Pg. 2 of 12



Detail B

PWC	TITLE **Sprint - UH Manoa, Gilmore Hall**	Project: Sprint	12/21/05
		Dwg: UH Manoa	Rev. 1
		Scale : 0.09" = 1'	Pg. 3 of 12

Customer:	Sprint
Site:	University of Hawaii, Manoa Campus, Gilmore Hall
Study:	Prediction Analysis

	Antenna ERP							
Antenna Description	transmitter power	number of transmitters	total power (watts)	combiner loss (dB)	7/8 length (ft)	jumper loss (dB)	antenna gain (dB)	erp (watts)
Antenna 1, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 2, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 1, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 2, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 1, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090
Antenna 2, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090

Renum | Del BlankID | Clear | Ins Copy | Hide Power Detail | Pwr Hide | -> Col <- | Update Linking | X ApHt | Calculator | Export | Import | All | On | All | Off | 1.50 | ApHt Factor | Show Uptime

Antenna Data Table

Last File Imported-> RoofView Sprint UH Gilmore Hall Roof 1.xls

Ant Num	ID	Name	(MHz) Freq	Trans Power	Trans Count	Coax Len	Coax Type	Other Loss	Input Power	Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	(ft) Aper	dBd Gain	BWdth Pt Dir	ON flag	ver 3500021003 Antenna Pixel X	Y	Z	Ant Num
1	Ant 1		1870.00000	16.0	2	80	7/8 LDF	1.0		19.7	EMS	RV651800DP	51.0	3.0	22.0	Panel	4.5	16	65;290	ON	51	3	22.0	1
2	Ant 2		1870.00000	16.0	2	80	7/8 LDF	1.0		19.7	EMS	RV651800DP	51.0	14.0	22.0	Panel	4.5	16	65;290	ON	51	14	22.0	2

Information used for the predicted analysis of Roof 1

PWC	TITLE	Project: Sprint	12/21/05
	Sprint - UH Manoa, Gilmore Hall	Dwg: UH Manoa	Rev. 1
		Scale :	Pg. 9 of 12

Customer:	Sprint
Site:	University of Hawaii, Manoa Campus, Gilmore Hall
Study:	Prediction Analysis

Antenna Description	Antenna ERP transmitter power	number of transmitters	total power (watts)	combiner loss (dB)	7/8 length (ft)	jumper loss (dB)	antenna gain (dB)	erp (watts)
Antenna 1, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 2, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 1, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 2, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 1, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090
Antenna 2, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090

Renum | Del BlankID | Clear | Ins Copy | Hide Power Detail | Pwr Hide | -> Col <- | Update Linking | X ApHt | Calculator | Export | Import | All On | All Off | 1.50 ApHt Factor | Show Uptime

Antenna Data Table

Last File Imported-> RoofView Sprint UH Gilmore Hall Roof 2.xls

Ant Num	ID	Name	(MHz) Freq	Trans Power	Trans Count	Coax Len	Coax Type	Other Loss	Input Power	Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	(ft) Aper	dBd Gain	BWdth Pt Dir	ON flag	Ant X	Ant Y	Ant Z	Ant Num
1	Ant 1		1870.00000	16.0	2	80	7/8 LDF	1.0		19.7	EMS	RV651800DP	0.0	0.0	-3.0	Panel	4.5	16	65;290	ON	0	0	-3.0	1
2	Ant 2		1870.00000	16.0	2	80	7/8 LDF	1.0		19.7	EMS	RV651800DP	0.0	10.0	-3.0	Panel	4.5	16	65;290	ON	0	10	-3.0	2
3	Ant 3		1870.00000	16.0	2	90	7/8 LDF	1.0		19.1	EMS	RV651700DP	7.5	0.0	-3.0	Panel	4.5	15	65;210	ON	8	0	-3.0	3
4	Ant 4		1870.00000	16.0	2	90	7/8 LDF	1.0		19.1	EMS	RV651700DP	18.0	0.0	-3.0	Panel	4.5	15	65;210	ON	18	0	-3.0	4

Information used for the predicted analysis of Roof 2

PWC	TITLE: Sprint - UH Manoa, Gilmore Hall	Project: Sprint	12/21/05
		Dwg: UH Manoa	Rev. 1
		Scale :	Pg. 10 of 12

Customer:	Sprint
Site:	University of Hawaii, Manoa Campus, Gilmore Hall
Study:	Prediction Analysis

	Antenna ERP							
Antenna Description	transmitter power	number of transmitters	total power (watts)	combiner loss (dB)	7/8 length (ft)	jumper loss (dB)	antenna gain (dB)	erp (watts)
Antenna 1, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 2, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 1, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 2, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 1, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090
Antenna 2, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090

Renum | Del BlankID | Clear | Ins Copy | Hide Power Detail | Pwr Hide | -> Col <- | Update Linking | X ApHt | Calculator | Export | Import | All | On | All | Off | 1.50 ApHt Factor | Show Uptime

Antenna Data Table

Last File Imported-> RoofView Sprint UH Gilmore Hall Roof 3.xls

Ant Num	ID	Name	(MHz) Freq	Trans Power	Trans Count	Coax Len	Coax Type	Other Loss	Input Power	Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	Aper (ft)	dBd Gain	BWdth Pt Dir	ON flag	ver 3500021003 Antenna Pixel X	Y	Z	Ant Num
1	Ant 1		1870.00000	16.0	2	80	7/8 LDF	1.0		19.7	EMS	RV651800DP	29.6	12.0	19.0	Panel	4.5	16	65;290	ON	30	12	19.0	1
2	Ant 2		1870.00000	16.0	2	90	7/8 LDF	1.0		19.1	EMS	RV651700DP	39.0	11.0	19.0	Panel	4.5	15	65;210	ON	39	11	19.0	2
3	Ant 3		1870.00000	16.0	2	90	7/8 LDF	1.0		19.1	EMS	RV651700DP	49.5	11.0	19.0	Panel	4.5	15	65;210	ON	50	11	19.0	3

Information used for the predicted analysis of Roof 3

PWC	TITLE: Sprint - UH Manoa, Gilmore Hall	Project: Sprint	12/21/05
		Dwg: UH Manoa	Rev. 1
		Scale :	Pg. 11 of 12

Customer:	Sprint
Site:	University of Hawaii, Manoa Campus, Gilmore Hall
Study:	Prediction Analysis

	Antenna ERP							
Antenna Description	transmitter power	number of transmitters	total power (watts)	combiner loss (dB)	7/8 length (ft)	jumper loss (dB)	antenna gain (dB)	erp (watts)
Antenna 1, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 2, Sector 1, Model: RV65-18-00DPL2	16	2	32	0.5	85	0.5	17.8	1,067
Antenna 1, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 2, Sector 2, Model: RV65-17-02DPL2	16	2	32	0.5	90	0.5	16.8	830
Antenna 1, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090
Antenna 2, Sector 3, Model: RV65-18-00DPL2	16	2	32	0.5	80	0.5	17.8	1,090

Renum | Del BlankID | Clear | Ins Copy | Hide Power Detail | Pwr Hide | -> Col <- | Update Linking | X ApHt | Calculator | Export | Import | All | On | All | Off | 1.50 ApHt Factor | Show Uptime

Antenna Data Table — Last File Imported-> RoofView Sprint UH Gilmore Hall Roof 3.xls

Ant Num	ID	Name	(MHz) Freq	Trans Power	Trans Count	Coax Len	Coax Type	Other Loss	Input Power	Calc Power	Mfg	Model	(ft) X	(ft) Y	(ft) Z	Type	Aper (ft)	dBd Gain	BWdth Pt Dir	ON flag	Ver 350002 1003 Antenna Pixel X	Y	Z	Ant Num
1	Ant 1		1870.00000	16.0	2	85	7/8 LDF	1.0		19.4	EMS	RV651800DP	2.5	22.5	-3.0	Panel	4.5	16	65;20	ON	3	23	-3.0	1
2	Ant 2		1870.00000	16.0	2	85	7/8 LDF	1.0		19.4	EMS	RV651800DP	13.0	22.5	-3.0	Panel	4.5	16	65;20	ON	13	23	-3.0	2

Information used for the predicted analysis of Roof 4

PWC	TITLE: Sprint - UH Manoa, Gilmore Hall	Project: Sprint	12/21/05
		Dwg: UH Manoa	Rev. 1
		Scale :	Pg. 12 of 12

Section 3
MPE Prediction

ELECTRO-MAGNETIC EMISSIONS STUDY
SPRINT – UH MANOA, GILMORE HALL

HORIZONTAL MAXIMUM PERMISSIBLE EXPOSURE PREDICTION

Prediction Site: UH Manoa – Gilmore Hall Rooftop, Roof 1

Antenna(s) included in Prediction:
Sector 3: (2) Cellular Panel Antennas, Make: EMS Wireless, Model: RV65-18-00DPL2

The following profile is a prediction that depicts the Maximum Permissible Exposure (MPE) readings at the 6' level on the rooftop. The software used for this prediction study is RoofView version 4.15. For an ideal environment, the software produces a model that shows how the MPE readings of the antenna(s) are distributed over the rooftop.

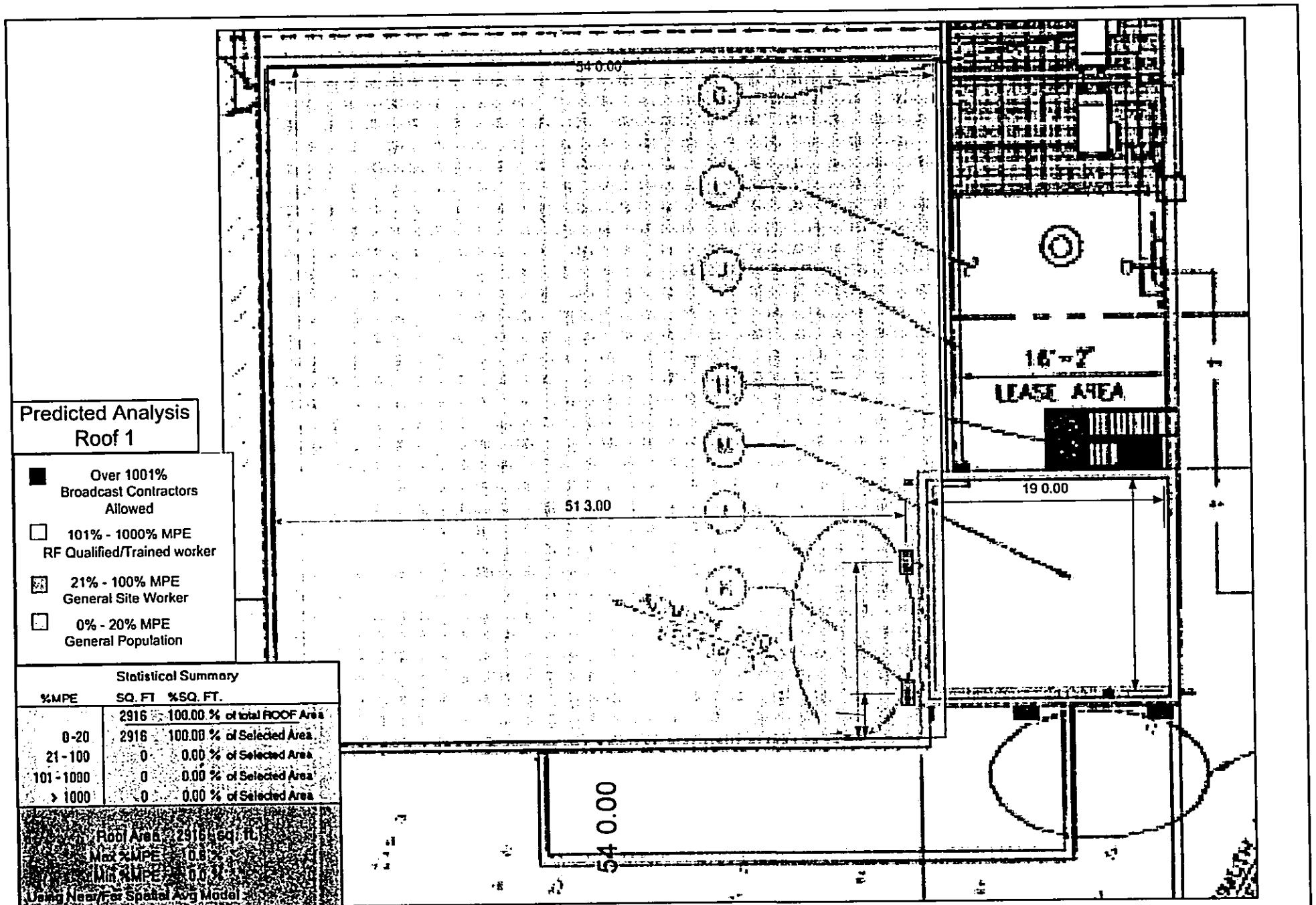
The following horizontal profile shows the environmental effects of the antenna(s) at the 6' rooftop level:
The area shown is the rooftop of Gilmore Hall. The area applied to the predicted analysis is designated as Roof 1, which is approximately 2,916 square feet. Of this area, 100% (2,916 sq. ft.) shows that there are readings between 0 – 20% of the Controlled Standard MPE. There is a maximum average MPE reading of about 0.6% of the Controlled Standard MPE and a minimum average MPE reading of about 0.0%.

Of the total area, 0% (0 sq. ft.) has readings that exceed the 20% Controlled Standard MPE, therefore there are no "Hot Zones" located on Roof 1 of Gilmore Hall.

Please note that this Prediction includes the *Antennas of Sector 3* only. The other antennas on the rooftop are not included in this predicted analysis.

Note: "Hot Zones" are any areas greater than 20% of the Controlled Standard (i.e. deeming the area an Occupational/Controlled Environment and exceeding General Population guidelines. See Section One for definition).

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.



Predicted Analysis
Roof 1

- Over 1001% Broadcast Contractors Allowed
- 101% - 1000% MPE RF Qualified/Trained worker
- 21% - 100% MPE General Site Worker
- 0% - 20% MPE General Population

Statistical Summary

%MPE	SQ. FT	%SQ. FT.
	2916	100.00 % of total ROOF Area
0-20	2916	100.00 % of Selected Area
21 - 100	0	0.00 % of Selected Area
101 - 1000	0	0.00 % of Selected Area
> 1000	0	0.00 % of Selected Area

Roof Area = 2916 SQ. FT.
Max %MPE = 10.8 %
Min %MPE = 0.0 %
Using Near/Far Spatial Avg Model
With FCC 1997 Occupational Standard

PWC

TITLE

Sprint - UH Manoa, Gilmore Hall

Project: Sprint	12/21/05
Dwg: UH Manoa	Rev. 1
Scale : 0.1" = 1'	Pg. 5 of 12

ELECTRO-MAGNETIC EMISSIONS STUDY
SPRINT – UH MANOA, GILMORE HALL

HORIZONTAL MAXIMUM PERMISSIBLE EXPOSURE PREDICTION

Prediction Site: UH Manoa – Gilmore Hall Rooftop, Roof 2

Antenna(s) included in Prediction:
Sector 3: (2) Cellular Panel Antennas, Make: EMS Wireless, Model: RV65-18-00DPL2
Sector 2: (2) Cellular Panel Antennas, Make: EMS Wireless, Model: RV65-17-02DPL2

The following profile is a prediction that depicts the Maximum Permissible Exposure (MPE) readings at the 6' level on the rooftop. The software used for this prediction study is RoofView version 4.15. For an ideal environment, the software produces a model that shows how the MPE readings of the antenna(s) are distributed over the rooftop.

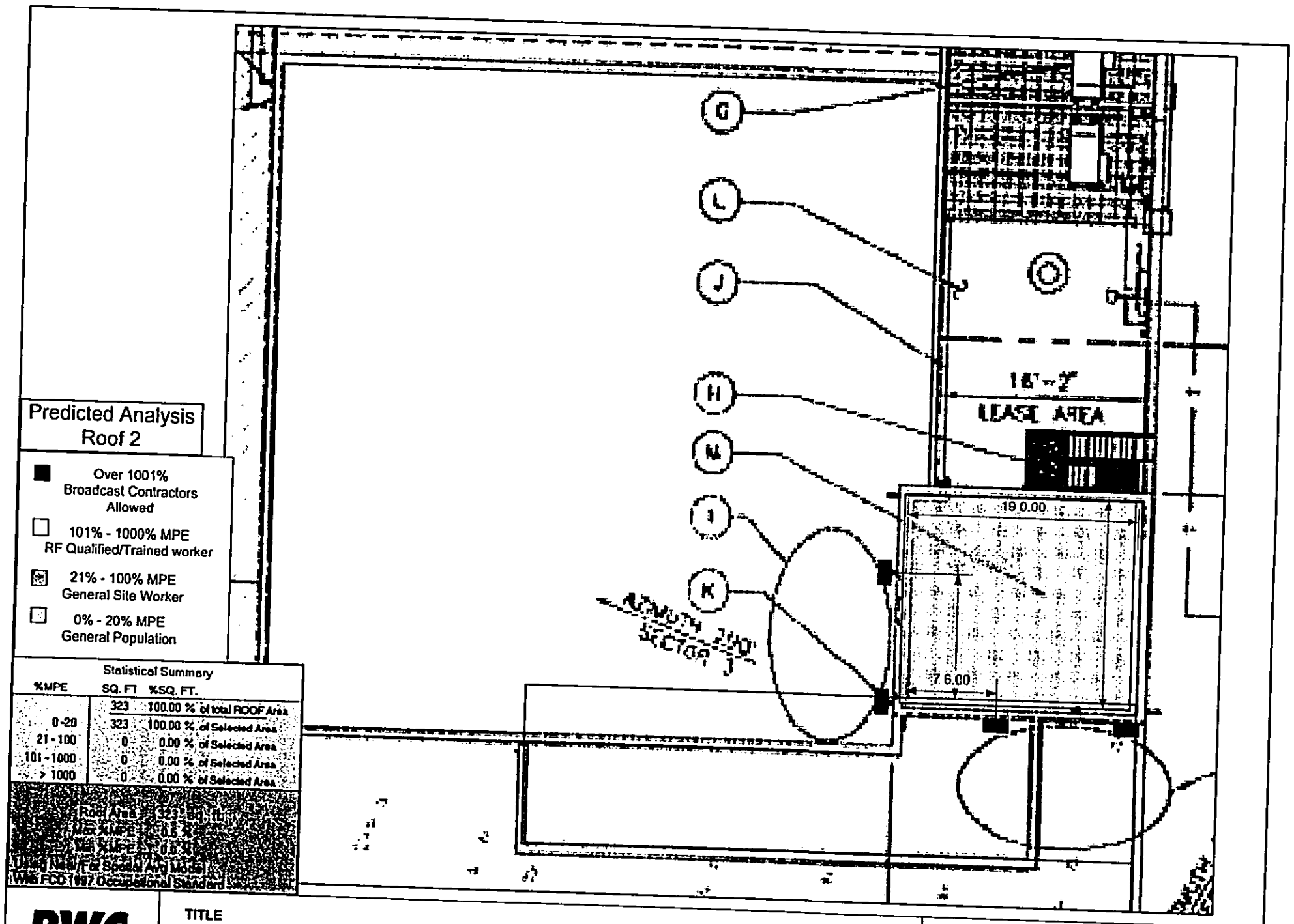
The following horizontal profile shows the environmental effects of the antenna(s) at the 6' rooftop level:
The area shown is the rooftop of Gilmore Hall. The area applied to the predicted analysis is designated as Roof 2, which is approximately 323 square feet. Of this area, 100% (323 sq. ft.) shows that there are readings between 0 – 20% of the Controlled Standard MPE. There is a maximum average MPE reading of about 0.5% of the Controlled Standard MPE and a minimum average MPE reading of about 0.0%.

Of the total area, 0% (0 sq. ft.) has readings that exceed the 20% Controlled Standard MPE, therefore there are no "Hot Zones" located on Roof 2 of Gilmore Hall.

Please note that this Prediction includes the *Antennas of Sector 3 & Sector 2* only. The other antennas on the rooftop are not included in this predicted analysis.

Note: "Hot Zones" are any areas greater than 20% of the Controlled Standard (i.e. deeming the area an Occupational/Controlled Environment and exceeding General Population guidelines. See Section One for definition).

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.



PWC

TITLE

Sprint - UH Manoa, Gilmore Hall

Project: Sprint	12/21/05
Dwg: UH Manoa	Rev. 1
Scale : 0.1" = 1'	Pg. 6 of 12

ELECTRO-MAGNETIC EMISSIONS STUDY
SPRINT – UH MANOA, GILMORE HALL

HORIZONTAL MAXIMUM PERMISSIBLE EXPOSURE PREDICTION

Prediction Site: UH Manoa – Gilmore Hall Rooftop, Roof 3

Antenna(s) included in Prediction:
Sector 3: (1) Cellular Panel Antenna, Make: EMS Wireless, Model: RV65-18-00DPL2
Sector 2: (2) Cellular Panel Antennas, Make: EMS Wireless, Model: RV65-17-02DPL2

The following profile is a prediction that depicts the Maximum Permissible Exposure (MPE) readings at the 6' level on the rooftop. The software used for this prediction study is RoofView version 4.15. For an ideal environment, the software produces a model that shows how the MPE readings of the antenna(s) are distributed over the rooftop.

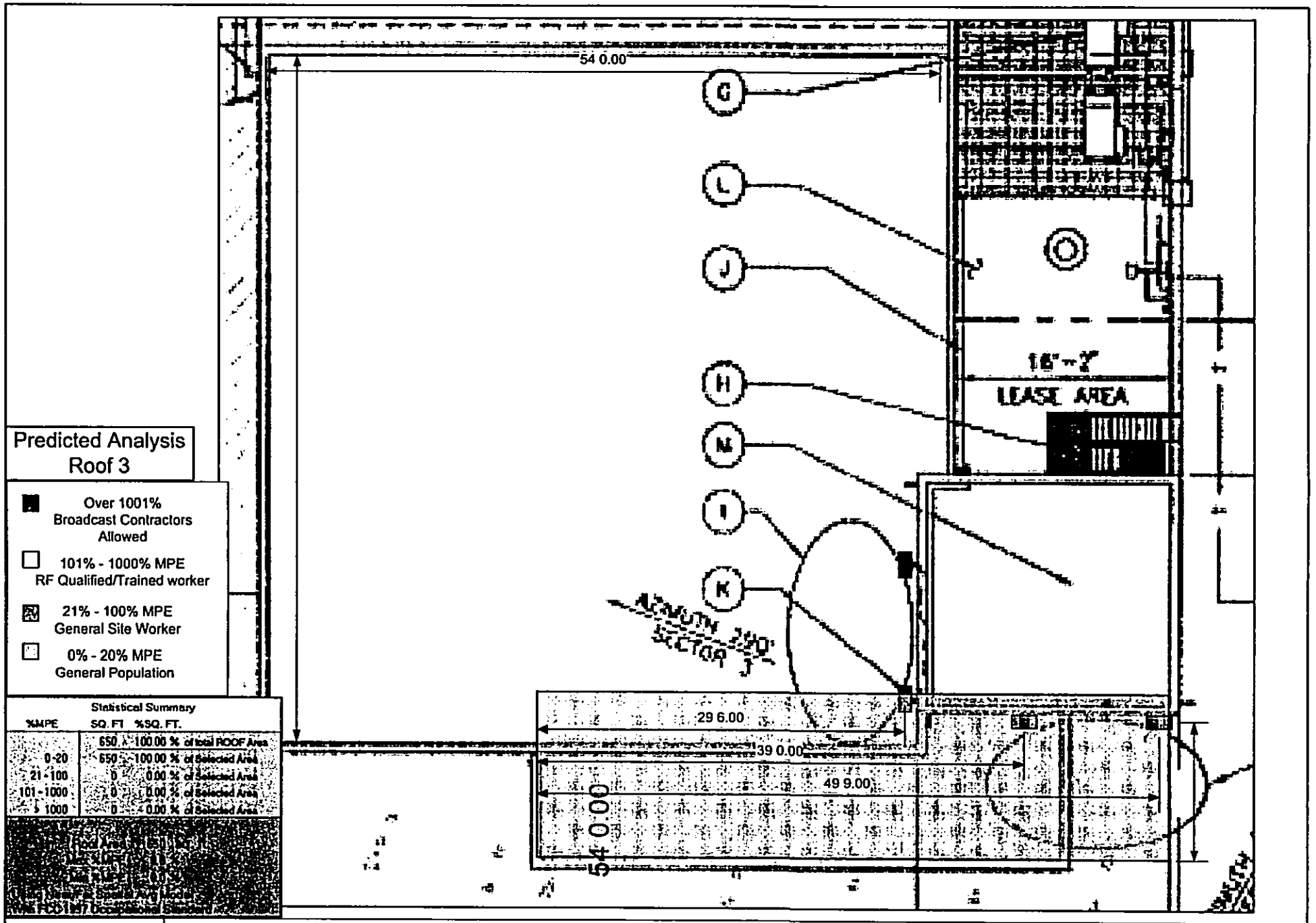
The following horizontal profile shows the environmental effects of the antenna(s) at the 6' rooftop level:
The area shown is the rooftop of Gilmore Hall. The area applied to the predicted analysis is designated as Roof 3, which is approximately 650 square feet. Of this area, 100% (650 sq. ft.) shows that there are readings between 0 – 20% of the Controlled Standard MPE. There is a maximum average MPE reading of about 0.8% of the Controlled Standard MPE and a minimum average MPE reading of about 0.0%.

Of the total area, 0% (0 sq. ft.) has readings that exceed the 20% Controlled Standard MPE, therefore there are no "Hot Zones" located on Roof 3 of Gilmore Hall.

Please note that this Prediction includes the *Antennas of Sector 3 & Sector 2* only. The other antennas on the rooftop are not included in this predicted analysis.

Note: "Hot Zones" are any areas greater than 20% of the Controlled Standard (i.e. deeming the area an Occupational/Controlled Environment and exceeding General Population guidelines. See Section One for definition).

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.



PWC

TITLE

Sprint - UH Manoa, Gilmore Hall

Project: Sprint	12/21/05
Dwg: UH Manoa	Rev. 1
Scale : 0.1" = 1'	Pg. 7 of 12

ELECTRO-MAGNETIC EMISSIONS STUDY
SPRINT – UH MANOA, GILMORE HALL

HORIZONTAL MAXIMUM PERMISSIBLE EXPOSURE PREDICTION

Prediction Site: UH Manoa – Gilmore Hall Rooftop, Roof 4

Antenna(s) included in Prediction:
Sector 1: (2) Cellular Panel Antennas, Make: EMS Wireless, Model: RV65-18-00DPL2

The following profile is a prediction that depicts the Maximum Permissible Exposure (MPE) readings at the 6' level on the rooftop. The software used for this prediction study is RoofView version 4.15. For an ideal environment, the software produces a model that shows how the MPE readings of the antenna(s) are distributed over the rooftop.

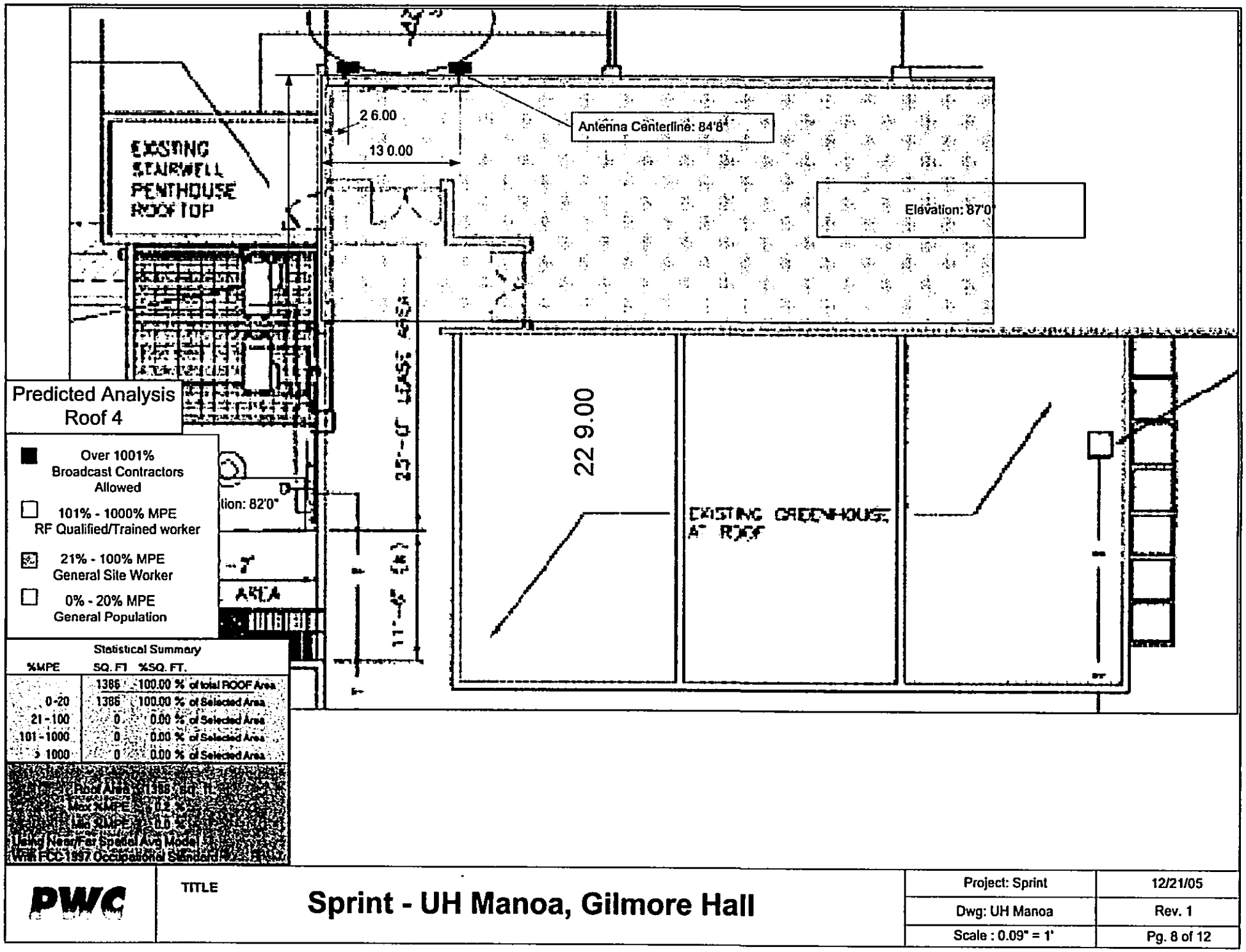
The following horizontal profile shows the environmental effects of the antenna(s) at the 6' rooftop level:
The area shown is the rooftop of Gilmore Hall. The area applied to the predicted analysis is designated as Roof 4, which is approximately 1,386 square feet. Of this area, 100% (1,386 sq. ft.) shows that there are readings between 0 – 20% of the Controlled Standard MPE. There is a maximum average MPE reading of about 0.2% of the Controlled Standard MPE and a minimum average MPE reading of about 0.0%.

Of the total area, 0% (0 sq. ft.) has readings that exceed the 20% Controlled Standard MPE, therefore there are no "Hot Zones" located on Roof 4 of Gilmore Hall.

Please note that this Prediction includes the *Antennas of Sector 1* only. The other antennas on the rooftop are not included in this predicted analysis.

Note: "Hot Zones" are any areas greater than 20% of the Controlled Standard (i.e. deeming the area an Occupational/Controlled Environment and exceeding General Population guidelines. See Section One for definition).

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.



PWC	TITLE		
	Sprint - UH Manoa, Gilmore Hall	Project: Sprint	12/21/05
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		Scale : 0.09" = 1'	Pg. 8 of 12

Section 4
Conclusion

CONCLUSION

Equipment Recommendations

In conclusion, according to the results from the predicted analysis, the Sprint Cellular Panel Antennas on top of the Gilmore Hall rooftop does not emit spatially-averaged MPE readings above 20% of the Controlled MPE Standard.
To ensure further safety, PWC strongly recommends either of the following two options:

Option 1

Requirements needed for a controlled site:
In accordance with *OSHA RF* General Industries Standards (1910.97)

1. **Written Safety Plan**
Preparation of a written safety plan is needed if there is a potential for exposure that may exceed the allowable standard. This plan accounts for both routine and non-routine operations.

2. **Restrict Access**
Establishing site-specific security measures to prevent exposure and site hazards to unauthorized, unprotected people.

3. **Warning Signs**
Appropriate sign designation and implementation.

   - Blue Notice Signs recommended for readings between 20-100% of the Controlled MPE Standard.
   - Yellow Caution Signs for readings between 101% - 1000% of the Controlled MPE Standard.
   - Red Warning Signs for readings over 1001% of the Controlled MPE Standard.
   - Guidelines for Working in Radiofrequency Environments Sign recommended.

4. **Train Workers**
Training on site-specific RF Safety Guidelines as well as RF Awareness.

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.

Option 2

Requirements for mitigation (either of three options):
Actions to moderate/alleviate dangerous levels of EME exposure.

1. **Raise Antenna**
   Raising an antenna would direct the RF pattern above the critical areas where employees or the general public may frequent (in turn lowering MPE levels at 6' human height levels).

2. **Lower Output Power**
   Lowering output power decreases MPE levels.

3. **Moving Antenna**
   Relocating an antenna to an area that is not accessible by employees or the general public would prevent unauthorized access.

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.

CONCLUSION (CONT'D.)

Site Recommendation(s)

- It is recommended that an actual site survey of the MPE readings be taken and recorded to supplement this report.

Note: The EME study and site recommendations pertain to equipment planned for the site on 12/22/2005. In the event there are plans for a site change in transmitter or antenna characteristic, the study would need to be re-evaluated to include the changes.

Section 5
Disclaimer

DISCLAIMER

The purpose of this plan is to provide information to assist *Sprint and the University of Hawaii, Manoa* in understanding the concepts required to comply with FCC guidelines for human exposure to Electromagnetic Energy at antenna sites. Pacific Wireless Communications, LLC disclaims all warranties, expressed or implied including, without limitation, the implied warranties of merchantability and fitness for a particular purpose. In no event shall PWC be liable for incidental, special, consequential, or punitive damage (including without limitation loss of profit, revenue, savings, opportunity, or advantage of any kind), whether arising under contract, tort, or any other legal theory or cause of action, even if PWC has been advised of the possibility of such damages. PWC's aggregate monetary liability for any cause or causes shall in no event exceed the total of all amounts paid to PWC by *Sprint* the one-year period on which any claim is made.

The procedures presented in this document represent one approach for meeting FCC requirement and the procedures presented may be revised from time to time to reflect engineering advances and technology changes.

Appendix C

V. Peterson Statement Regarding Electromagnetic Radiation Levels

STATEMENT
Regarding Electromagnetic Radiation Levels
Associated with Proposed KTUH FM Radio Transmission
by
Prof. Vincent Z. Peterson
Department of Physics, UHM

INTRODUCTION:

At the request of ASUH I agreed to review the proposed increase in power of KTUH's FM radio CW (continuous-wave) transmission in order to calculate the expected FM radiation power levels in the top-floor offices of Porteus Hall.

I agreed to do this, on a "pro-bono" basis, since I am impressed with the dedication and hard work of the students concerned, who hope to have KTUH reach a wider audience than can now be reached with the present power limitation (100 watts). Although the proposed increase in radiated power (to 3000 watts) may seems major (30x factor), it is really quite modest --in comparison with power radiated by commercial FM stations. Yet it is also prudent to be concerned with possible effects of electromagnetic radiation on nearby members of the campus community. Since I've been involved in advising the State Department of Health, and the National Weather Service/FAA, on the effects of electromagnetic radiation, ASUH asked me --- as a member of the Physics faculty at UHM -- to calculate the expected maximum radiation intensity which KTUH might project, and compare that with accepted standards.

Since ASUH already has competent electronic engineering advice from Mr. Dale Machado of KSSK (knowledgeable on FCC regulations for FM radio) I will confine my remarks to the "physics and biophysics" of electromagnetic radiation in the FM radio band (specifically, at about 90 Megaherz, or 90 MHz).

Standards of permissible radiation exposure of human to electromagnetic fields (EMF) are determined by ANSI (American National Standards Institute) for a wide range of frequencies, including FM radio. The Federal Communications Commission (FCC) had adopted the ANSI standards. The FCC OST-Bulletin No. 65 "Evaluating Compliance with FCC-Dpecified Guidelines for Hkuman Exposure to Radiofrequency Radiation") also included useful graphs and tables for determining the minimum height of antenna.

MY QUALIFICATIONS AS AN "EXPERT" ON ELECTROMAGNETIC RADIATION:

Besides a PhD in Physics (UC-Berkeley, 1950), I have 38 years of experience in teaching physics courses, at CalTech and (since 1964) at UHM. I have taught the full range of courses in Electricity and Magnetism (E&M), including the most advanced physics courses in Electromagnetic Fields (EMF). Radiation of electromagnetic waves is a prime topic in these courses. While involved with research at the Caltech Electron Synchrotron (1950-1962) I served part-time as Radiation Safety Officer. I also was a member of the CalTech campus Health and Safety Committee, chaired by George Beadle (Nobel prize in genetics).

In recent years, a series of articles in the New Yorker aroused public concern over "Does EMF cause cancer?". The UH School of Public Health was asked (by the Hawaii Legislature) to convene a Symposium on "Electromagnetic Fields: Scientific Facts and Community Concerns". I was asked to participate, as a physicist with expertise on EMF. In 1993 Dr. Bruce Anderson (State Board of Health Deputy Director for Environmental Health) asked me to serve on an Advisory Committee concerned with possible health effects of powerline frequency EMF. Other members of the panel included medical doctors, two EEs, a HECO official, and community group representatives. My role was nominally as a physicist but it turned out I was the only member with personal contact with scientists directly involved in setting national radiation exposure standards. The data obtained covered potential medical effects of radiation over a wide range of frequencies. Our panel achieved unanimous agreement on the lack of convincing evidence that ordinary powerline frequency EMFs provide a serious hazard to human health. This advice was accepted by the Legislature.

Later on (in 1994) I was asked to serve as a Consultant to a group of National Weather Service/FAA officials in charge of explaining the impact of installing the new "NEXRAD" Weather radars (pulsed Doppler radars) at four different sites in the State of Hawaii. My role was to explain the "physics of electromagnetic radiation (and its relationship to biophysical parameters)" to the Boards of Supervisosrs of the Counties of Maui/Molokai, Kauai, and the Big Island. (My testimony was complementary to that of a medical radiologist from the East Coast.) Despite some initial concerns about the possible health effects of NEXRAD's pulsed radar by various Supervisors, and after substantial discussion, all the Boards of Supervisors declared themselves satisfied that NEXRAD radar would not pose a danger to human health in their communities.

Although I am NOT a medical doctor, I've been stimulated to learn more about the potential effects on the human body by EMFs at various frequencies and power levels. Fortunately, several of my close friends in physics and biophysics are national figures in Radiation Protection and I have corresponded regularly with them regarding the basis for the ANSI (American National Standards Institute) radiation levels for "maximum permissible exposures". For example, Dr. E. Adair of Yale Biophysics is co-chairperson of COMAR (Committee on Man and Radiation) which included representaatives from ANSI, NCRP (National Committee on Radiation Protection) and the EPA. Dr. Adair has provided me with detailed information on these matters, for EMF frequencies extending from 60 Hz to ultra-high frequencies (radar).

ELECTROMAGNETIC RADIATION EFFECTS ON HUMANS: (simplified summary)

There are two major aspects to consider:

(a) Damage caused by ionizing radiation (radiation able to ionize atoms knocking electrons free from their atomic bonds). Ionization is the most direct way electromagnetic fields (of sufficient strength) can cause biological damage and is capable of modifying DNA in the human body.

(b) The local heating of human flesh, such that local body temperatures are raised beyond acceptable limits (i.e., beyond the range which natural body mechanisms can control, a few degrees Fahrenheit from 98.6)

Let us consider each aspect in turn.

Ionization of atoms in the body: Fortunately, in dealing with EMFs at FM-radio frequencies (KTUH operates at 90.3 Megaherz), we don't need to worry about KTUH radiation ionizing any atom: KTUH's frequency is much too low to ionize even the least tightly-bound electron. (The energy of the smallest "packet" of EMF -- called the "photon" -- is given by $E = hf$, where f = frequency, and h = Planck's constant.) Since electromagnetic waves can be labelled by wavelength (λ) as well as by frequency (f), it is useful to write down the simple formula relating the two:

$$f \times \lambda = c = \text{velocity of light} = 186{,}300 \text{ miles/second}$$
$$= 300{,}000{,}000 \text{ meters per second.}$$

Thus, 90 MHz frequency corresponds to a wavelength of 3.3 meters = 330 cm.
In general, high frequencies (short wavelengths) pack more "power" into each photon. (Example: in sunbathing, UV photons can be dangerous and cause skin cancer directly (by ionization), whereas IR (infrared) photons are not dangerous unless incident at high intensity (lots of photons/second per unit area of skin)).

To illustrate the frequency (or wavelength) dependence of EMF, Figure 1 displays the of various bands of frequencies, on a logarithmic scale (linear in powers of 10), with labels for various types ofB radiation.

(Project Figure 1 at this point, and explain the Figure,
pointing out where KTUH frequency lies relative to UV, IR, etc).

In particular, note that all ionizing radiations have frequencies above about 10^{15} Hz Herz (or cycles/second), the lowest ionizing frequency corresponding to the least tightly-bound electron.

Since KTUH's frequency is ~~100,000~~ $> 10{,}000$ times lower than the threshold frequncy for ionizing radiation, we can dismiss any worry about direct (ionizing) damage to human flesh from KTUH radiation.

Local heating of human flesh: from thorough studies of the effects of EMF on human biology, all other (non-ionizing) effects on mammalian flesh (human or otherwise) can be attributed to local heating, which raises the local temperature of the body more than a critical amount (ΔT_c). For the human body it is well known

that a fever of more than a few degrees Fahrenheit can be serious, since it causes the body's natural heat-regulating system to lose control. The (very conservative) ANSI standards for Maximum Permissible radiation intensity, in the non-ionizing EMF range, roughly correspond to $\Delta T = 0.1$ deg. Fahrenheit, for exposures sustained for at least 6 minutes. (The body can handle higher intensity radiation for shorter exposures, since the body fluids distribute the heat fairly rapidly over a large volume.)

One example (from NEXRAD radar, whose frequency closely matches those of microwave ovens, yet is non-ionizing): It is the <u>average</u> power/unit area, averaged over some seconds exposure, which is important. Microwave ovens (HIGH power consumption of 300 watts) can "cook" meat very efficiently by raising the meat's temperature by hundreds of degrees. Yet the NEXRAD radar, pulsed at high power (450,000 watts in a narrow beam) for very short time intervals (a few microseconds for about 1000 times per second), has very low <u>average</u> power, even in the main beam. The radiation intensity (in milliwatts per square centimeter) is less than one milliwatt/square centimeter at the nearest accessible distance. (The radiation from a home "nightlight", used to illuminate the hallway at night, is more dangerous than NEXRAD radiation outside the perimeter fence around the transmitter/antenna).

The FCC regulations for radiated power levels include the ANSI limits on radiation intensity levels wherever humans are involved. Thus, the radiation intensity from KTUH must be less than 1.0 mW/cm^2 (one milliwatt per square centimer) at all regions where humans might possibly occupy.

ESTIMATE OF RADIATION INTENSITY FROM THE PROPOSED KTUH ANTENNA (on top of Porteus Hall), at a power level of 3000 watts:

The present KTUH transmitting, located on top of Porteus hall, radiates a maximum of 100 watts of electromagnetic power. It is proposed to increase the power to 3000 watts (a factor of 30). A new "4-bay" FM antenna would be installed, to emit FM power in a relatively narrow beam pattern (vertically) but distributed over all azimuthal directions in a horizontal plane.

A rough sketch (not to scale) of the KTUH antenna, mounted on top of Porteus, is shown in Figure 2. Dimensions are in meters. Note that the center of the antenna would be 15.75 meters (52 feet) above the roof of Porteus.The smallest vertical angle of radiation which would impact any portion of the top floor of Porteus Hall would be about 45-degrees.

The angular distribution (in the vertical plane) of the electric field (E) from a 4-bay antenna is shown in Figure 3. Note that the value of the E-field in the secondary peaks does not exceed 0.25 of the maximum value of the E-field in the main beam. Since the power (or intensity) in the beam varies as the square of the electric field, this means that the intensity reaching Porteus' to floor will always be less than (0.25)-squared times that in the main beam, or 1/16th the main beam power.

The radiation intensity in the main beam can be calculated from the standard antennae formula,

$$S = \frac{K \cdot P\ G}{4\pi R^2}$$

where P = total radiated power (in watts), R = radial distance from antenna to observation point, G = antenna "gain" (r.m.s. value), and "K" takes into account beam polarization and time-averaging effects. For KTUH the power is 3000 watts, and R = 16 to 24 meters (various distances from Antenna midpoint to Porteus rooftop points). If the power were radiated in an exactly spherical pattern, and if K = 1, the radiation intensity over a spherical surface of radius R would be just $P/(4\pi R^2)$ ~~R~~) --- "isotropic radiation".

The antenna concentrates the radiation in a fairly narrow horizontal plane, in order to reach greater distances with a detectable signal. The "antenna gain factor, G" is a measure of this concentration of power into the main beam; i.e., G is how much more intense the FM intensity is at zero degrees than a completely isotropic radiation pattern. A detailed calculation for this 4-bay turnstile antenna yields G= 2.1, so that the main beam intensity is 2.1 times greater than it would be for an *isotropic radiation pattern.*

The factor K/4 = 0.64, so that the formula for the radiation intensity (power per unit area) in the main beam becomes:

$$S = 0.64\ \frac{P\ G}{\pi R^2}$$

showing that the intensity falls off as the square of the distance from the antenna (if R is at least several wavelengths). For a nominal distance of R = 15 meters, P = 3000 watts, and G = 2.1, the FM radiation intensity in the main beam calculates to be:

$$S\ (0\ deg) = 0.57\ mW/cm\hat{}2,$$

FCC permissible radiation intensity (for 24-hr. continuous exposure of humans) is 1.0 mW/cm^2, so that even in the main beam (15 meters distant) the KTUH beam is within the FCC limit of "maximum permissible intensity".

The angular distribution (in the vertical plane) of the electric field (E) from a 4-bay antenna is shown in Figure 3. Note that the value of the electric-field in the secondary peaks does not exceed 0.25 of the maximum value of the E-field in the main beam. Since the power (or intensity) in the beam varies as the square of the electric field, this means that the intensity reaching Porteus' to floor will always be less than (0.25)-squared times that in the main beam, or 1/16th the main beam power. Thus the maximum intensity on Porteus' roof wil be"

$$S\ (max,\ roof) = (0.57/16) = 0.035\ mW/cm\hat{}2$$

Which is 30x lower than FCC-acceptable radiation levels of 1.0 mW/cm^2.

I conclude, therefore, that the FM radiation from KTUH 4-bay antenna as described, with 3000 total radiated power, does NOT constitute a radiation hazard to occupants of the top floor (or ANY floor) of Porteus Hall.

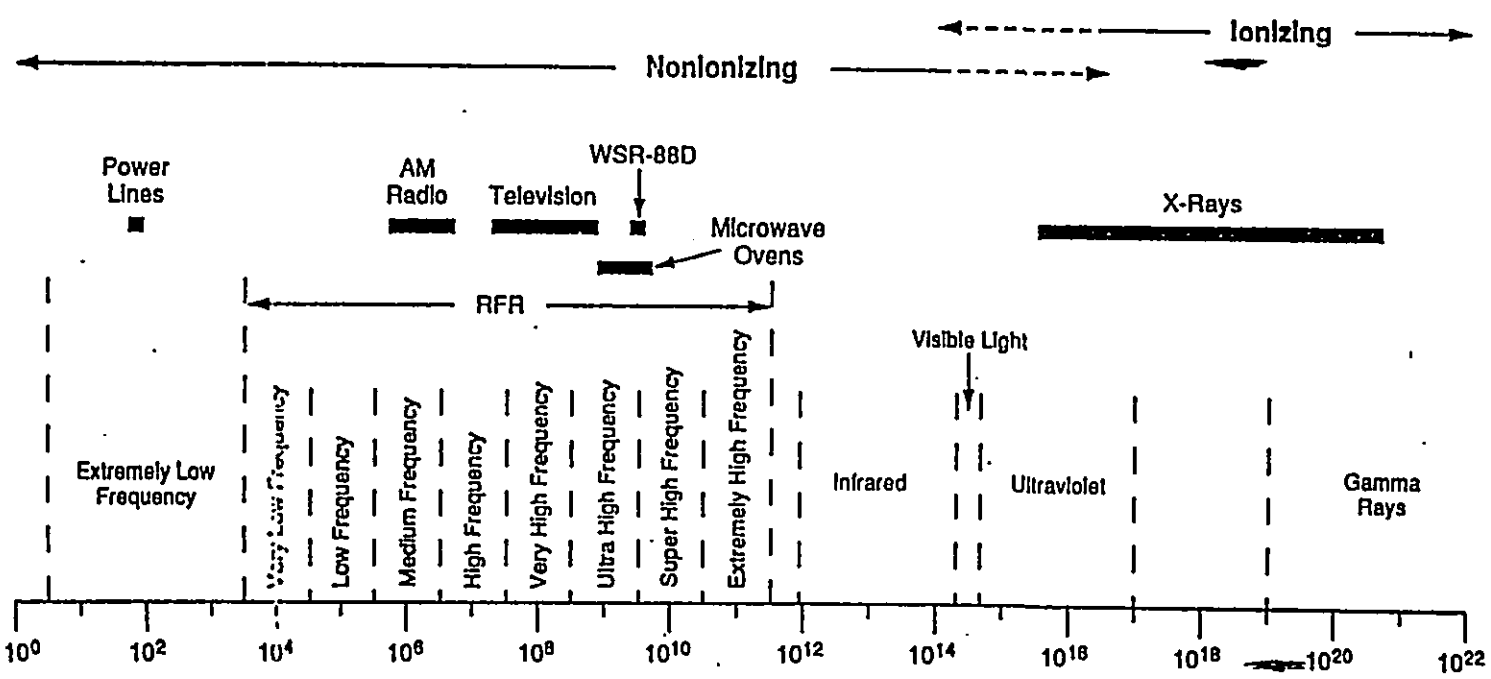
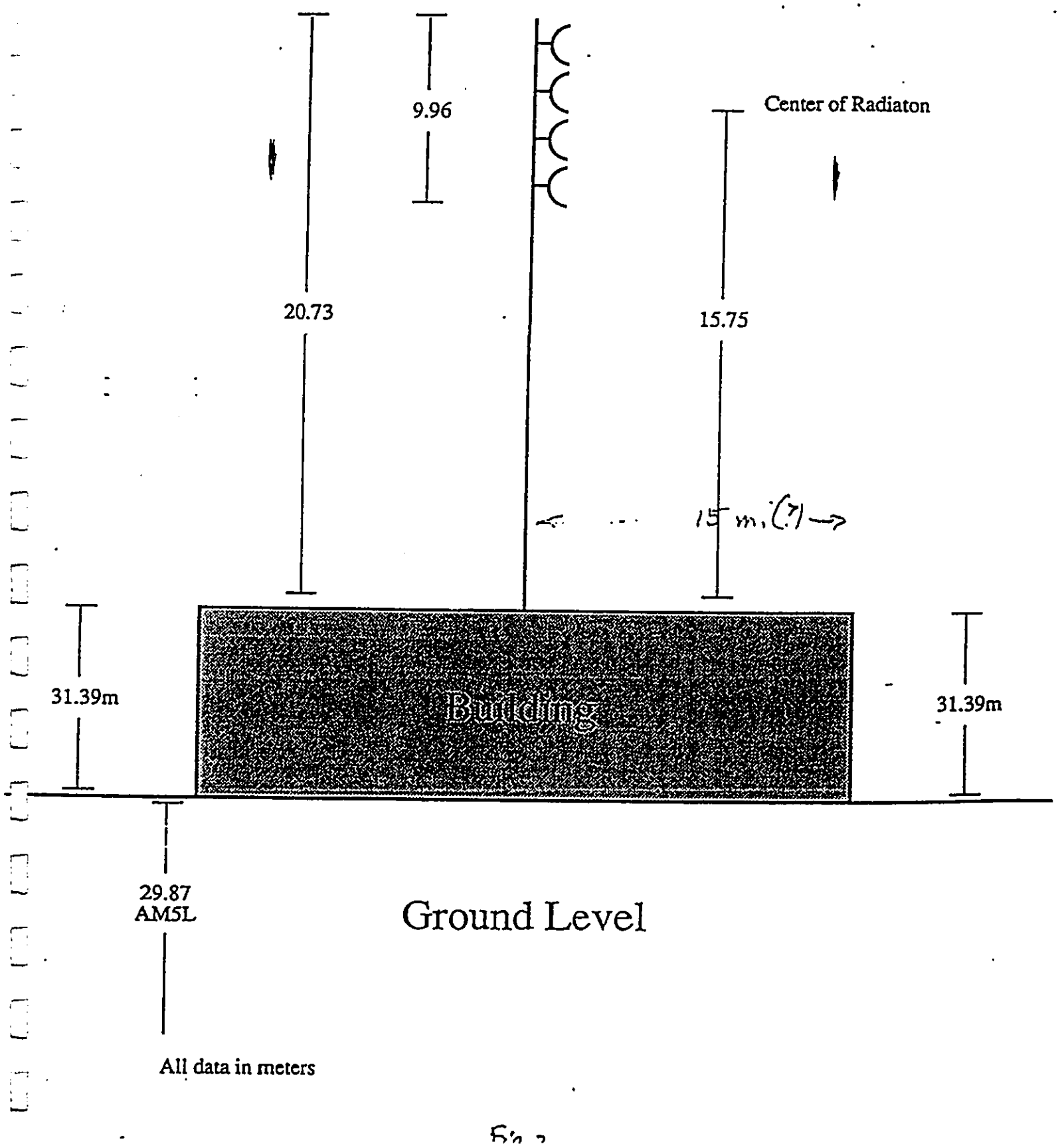


FIGURE 1-1 The Electromagnetic Spectrum

PROPOSED INSTALLATION OF KTUH ANTENNA ON PORTEUS HALL



Cetec Antennas

ELEVATION PATTERN
JSCP - 4

DATE: 9/1/79
RMS GAIN= 2.1

BEAM TILT= 0
NULL FILL= 0%

FIELD	ELEVATION	.1	.2	.3	.4	.5	.6	.7	.8	.9	1
.236	20.00	:									
.188	18.00	:	*								
.095	16.00	:		*							
.039	14.00	:	*								
.205	12.00	:		*							
.389	10.00	:			*						
.575	8.00	:						*			
.745	6.00	:								*	
.881	4.00	:									*
.970	2.00	:									
1.000	0.00	:									*
.970	-2.00	:								*	
.881	-4.00	:									*
.745	-6.00	:								*	
.575	-8.00	:						*			
.389	-10.00	:			*						
.205	-12.00	:		*							
.039	-14.00	:	*								
.095	-16.00	:		*							
.188	-18.00	:			*						
.236	-20.00	:				*					
.243	-22.00	:				*					
.213	-24.00	:				*					
.156	-26.00	:			*						
.082	-28.00	:		*							
.004	-30.00	:	*								
.068	-32.00	:		*							
.128	-34.00	:			*						
.169	-36.00	:			*						
.189	-38.00	:			*						
.187	-40.00	:			*						
.165	-42.00	:			*						
.128	-44.00	:			*						
.079	-46.00	:		*							
.024	-48.00	:	*								
.034	-50.00	:	*								
.090	-52.00	:		*							
.142	-54.00	:			*						
.186	-56.00	:			*						
.223	-58.00	:				*					