DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

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OCT 23 2007

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MAYOR

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DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2007/ED-12(pd)

October 2, 2007

The Honorable Laurence K. Lau, Acting Director
Office of Environmental Quality Control
Department of Health
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

RECEIVED
07 OCT -3 P2:24
OFC. OF ENVTL. QUALITY CONTROL

Dear Mr. Lau:

Subject: Plan Review Use (PRU) Permit
Chapter 343, Hawaii Revised Statutes (HRS)
Environmental Assessment (EA) Determination
Finding of No Significant Impact

Applicant/ Landowner:	Queen's Medical Center
Agent:	Belt Collins Hawaii Ltd.
Location:	1329 Lusitana Street, 1410 Miller Street, 510 South Beretania Street, and 1236 Lauhala Street - Hawaii Capital District
Tax Map Keys:	2-1-35: 1, 3-8, 10; 2-1-18: 48; and, 2-1-37: 2
Request:	Plan Review Use Permit
Proposal:	Electrical system upgrade including a new generator building, four (4) new diesel-powered emergency generators (a total of 9.468 megawatts), relocation of two (2) underground electrical service feeders, and an increase in feeder capacity.
Determination:	A Finding of No Significant Impact is Issued

Attached and incorporated by reference is the Final EA prepared by the applicant for the project. Based on the significance criteria outlined in Title 11, Chapter 200, Hawaii Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

We have enclosed a completed OEQC Bulletin Publication Form, including a project description, and one (1) copy of the Final EA. Should you have any questions, please contact Pamela Davis of our staff at 768-8017.

Very truly yours,

Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:cs

Attachments

Doc570603

FINAL ENVIRONMENTAL ASSESSMENT

The Queen's Medical Center

Electrical Systems Upgrade Project

1301 Punchbowl Street, Honolulu, Hawaii

Submitted to:

Department of Planning and Permitting

City and County of Honolulu

September 2007

Prepared by:

Honolulu, Hawaii

FINAL ENVIRONMENTAL ASSESSMENT

The Queen's Medical Center

Electrical Systems Upgrade Project

1301 Punchbowl Street, Honolulu, Hawaii

Applicant:

The Queen's Medical Center

1301 Punchbowl Street, Honolulu, Hawaii 96813

Submitted to:

Department of Planning and Permitting

City and County of Honolulu

Prepared by:

Belt Collins Hawaii

2153 North King Street, Honolulu, Hawaii

September 2007

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Acronyms and Abbreviations

AAQS	Ambient air quality standards
BACT	Best available technology
BWS	Board of Water Supply (City and County of Honolulu)
CO	Carbon monoxide
dBA	decibels
DEM	Digital elevation model
DLNR	Department of Land and Natural Resources
DOH	Department of Health (State of Hawaii)
EPA	Environmental Protection Agency (U.S.)
FEMA	Federal Emergency Management Area
FONSI	Finding of No Significant Impact
HECO	Hawaiian Electric Company
HRS	Hawaii Revised Statutes
ISC	Industrial Source Complex
kV	kilovolt
kW	kilowatt
LUO	Land Use Ordinance
MkA	Makiki clay loam
NO_2	Nitrogen dioxide
NSI	Neuroscience Institute
O_3	Ozone
Pb	Lead
PM	Particulate matter

POB	Physician's Office Building
PRU	Plan Review Use
QCI	Queen's Cancer Institute
QMC	Queen's Medical Center
SHPD	State Historic Preservation Division
SO_2	Sulfur dioxide
THC	Total hydrocarbons
TMK	Tax Map Key
TCC	Tantalus silty clay loam
USGS	U.S. Geological Survey
VOC	Volatile organic compounds

GENERAL INFORMATION

Project: Queen's Medical Center – Electrical Upgrade Project

Applicant: Queen's Medical Center
1301 Punchbowl Street
Honolulu, Hawaii 96813
Les Chinen, Vice President, Corporate Development

Recorded Fee Owner: Queen's Medical Center
1301 Punchbowl Street
Honolulu, Hawaii 96813
Les Chinen, Vice President, Corporate Development

Approving Agency: Department of Planning and Permitting
City and County of Honolulu

EA Preparer: Belt Collins Hawaii, Ltd..
2153 North King Street, Suite 200
Honolulu, Hawaii 96817
Contact: Mr. Lee Sichter, Principal Planner
Phone: 808-521-5361

Property Profile:

Location:	1301 Punchbowl Street, Honolulu, Hawaii
TMKs:	The Generator Building will be located on Tax Map Key (TMK) 2-1-35:003
Land Area:	The footprint of the Generator Building will be approximately 2,266 square feet including stairway areas. The land area of TMK 2-1-35:003 is 472,163 square feet.
State Land Use District:	Urban
Development Plan Land Use Map:	Public Facility and Medium Density Apartment
Zoning:	The Generator Building is located on a parcel located in the B-2 Community Business District.

Agencies Consulted State of Hawaii
Department of Health (DOH)
Clean Air Branch
Office of Environmental Quality Control

City and County of Honolulu
Department of Planning and Permitting
Land Use Permits Division

Anticipated Determination Finding of No Significant Impact (FONSI)

1 DESCRIPTION OF THE PROPOSED ACTION

1.1 Project Objective

The Queen's Medical Center (QMC) proposes to expand its existing emergency generator system and upgrade the service entrance capacity from Hawaiian Electric Company (HECO). The proposed action, referred to in this document as the "Electrical Systems Upgrade Project," is the construction of a new multi-level Generator Building between the existing Central Utility Plant Building and the Physician's Office Building (POB) 1 Parking Garage. The new Generator Building will house four new 2.367 megawatt diesel emergency generators and associated auxiliary equipment. The purpose of the new generators is to provide power to QMC during power outages or under conditions when the local utility, i.e., HECO, determines that a system emergency is imminent and that HECO must reduce overall load by temporarily disconnection of large customers, such as QMC, which have the capability of providing their own power.

The new generators are needed to ensure a normal level of continued electricity for hospital operations in times of such emergencies, including natural disasters, which may cause a loss of electrical power. Figures 1, 2, and 3 in the "Figures" appendix, show the location of the proposed new Generator Building. Figure 4 shows the site plan. Appendix D contains half-size drawings.

The proposed project will also upgrade the existing service feeder capacity. Power provided by HECO's two underground service feeders will be relocated from the Utility Plant to Level 01 of the Generator Building. Peak usage at the medical center currently exceeds eighty percent (80%) of the feeder capacity, necessitating the need to expand QMC's service entrance capacity.

The following is an expanded discussion of the existing conditions and the proposed action.

1.1.1 Existing Emergency Power

The existing emergency generating capacity at QMC is approximately 2.7 megawatts of power produced by a combination of five generators. All of the existing generators will be retained to enhance the overall reliability of the system by increasing the redundancy of available equipment. Currently, there are three diesel powered generators located in the Utility Plant Building: two 210 kilowatt (kW) and one 250 kW. These are used to supply emergency power to critical equipment (pumps, controllers, lights, etc.) that is located in the Utility Plant Building, life safety circuits in POB 1, and the QMC Computer Center. Two of the three generators are

used to provide emergency power, while the remaining one serves as a back-up spare. Photos of the existing generators are shown in Figure 5.

The remaining two 1,000 kW diesel powered emergency generators are located below grade in the Pauahi Service Court. Both generators are used to supply emergency power to critical, life safety, and equipment loads served by the Queen Emma Tower 1 and Queen Emma Tower 2 switchboards at 480 volts via the emergency switchboard in the Queen Emma Tower 1 switchroom. Under the current conditions, both generators must be operated to provide sufficient capacity for emergency power loads.

1.1.2 New Generator Building

The Generator Building will be a relatively narrow building with the main structure just 21 feet wide and 92 feet long (not including *mauka* exterior stairs which are not enclosed). The building will be situated between the Utility Plant Building and the POB 1 Parking Garage with a stairway connection to the Utility Plant. The Site Plan in Figure 4 illustrates the location of the new building.

Figures 5 and 6 contain elevation drawings of the new building. It is anticipated that the Generator Building will be constructed atop a concrete foundation supported by micropiles. The lower levels of the Generator Building will contain the new electrical switchgear equipment and the existing switchgear equipment in the Utility Building will be removed. The upper levels of the Generator Building will contain the four new generators. Acoustical panels will be installed on the walls where the generators are located to serve as sound buffers and the generators will be equipped with silencers to mitigate generator exhaust noise.

Figure 8 contains section drawings and illustrates the location of the new Generator Building in relationship to the POB 1 Parking Garage. The Generator Building will have three access doors from the POB 1 Parking Garage at three different parking levels for maintenance purposes. Also, the Generator Building will be connected to the Utility Plant Building via enclosed stairs on the makai side of the new Generator Building.

On Figure 8, there is a notation that a cooling tower will be relocated. This is due to the large air intake silencers that are required to ensure adequate noise mitigation measures for the generators. The silencers, which are approximately seven feet in length, impose the need for additional

building width which is achieved by cantilevering the new Generator Building over the existing Utility Plant Building. The existing cooling tower #3 (labeled as CT-3 in the drawings) and the existing boiler diesel fuel tank #2 are both impacted by the required cantilever. Therefore, it is necessary to relocate cooling tower CT-3 and the boiler Diesel Fuel Tank 2 elsewhere on the Utility Plant Building roof. Plans of the Utility Plant rooftop work are shown in Figures 14 and 15.

Because two cooling towers are always required for the operation of the hospital, QMC would be at a substantial risk while cooling tower #3 is being relocated. Thus, in order to alleviate this risk, QMC intends to construct a new cooling tower #3 to be a direct replacement for the existing cooling tower CT-3. The new cooling tower #3 would be in service before the old cooling tower is removed to make way for the new generator building. The availability of the boiler diesel fuel tank #2 is not as critical as the cooling towers. Therefore, the existing diesel fuel tank #2 will simply be relocated from its present location shown in Figure 14 to the new location as shown in Figure 15.

1.1.3 New Emergency Generators

The new Generator Building will house four 2.367 megawatt diesel powered emergency generators for a total of 9.468 megawatts. QMC has already purchased the generators which are being stored on the mainland until construction of the new Generator Building is underway.

The new generators are needed to provide for a continued normal level of hospital operations in times of emergency or natural disaster that may cause a loss of electrical power at the hospital. The existing five emergency generators provide only enough capacity to power critical, life safety, and selected equipment loads. Prolonged power outages, such as the island-wide earthquake-related black-out that occurred on October 15, 2006, severely hinder QMC's ability to provide comprehensive health care to those in need. This prolonged outage demonstrated that the existing generators are insufficient to fully replace power during a complete electric utility power outage. The new generators will provide a normal level of service and will allow QMC to provide comprehensive health care in the event of a loss of electrical service from HECO.

1.1.4 Feeder Capacity

Power is currently provided by HECO to QMC via 2 underground service feeders to a single service entrance located in the Central Plant Utility Building. Each service feeder has a capacity of 400 Amps at 12 kilovolt (kV). Normal operations at the QMC campus currently require only one HECO service feeder. However, with the projected and continued growth of the medical facility, peak electrical demands have steadily increased over time, exceeding 80% of the one dedicated feeder capacity which necessitates the need to increase feeder capacity.

The existing 12 kV service entrance will be relocated from the existing Utility Plant Building to Level 01 of the new Generator Building. The existing feeder capacity configuration will change from two 400 Amp, 12 kV feeders to three 400 Amp, 12 kV feeders. Two feeders will be in service at any given time, thereby increasing feeder capacity from 400 Amps to 800 Amps.

1.2 Purpose of the Environmental Assessment

According to Hawaii Revised Statutes (HRS) Section 343-5(9), an environmental assessment is required for actions that propose any "power-generating facility" where the electrical output exceeds 5.0 megawatts. QMC's four new 2.367 megawatt diesel powered emergency generators will have a combined power generating capacity of 9.468 megawatts, which surpasses the definition of a "power-generating facility." The existing emergency power generating capacity at QMC is approximately 2.7 megawatts of power produced by a combination of five generators. Therefore, the proposed electrical system upgrade project requires the environmental review process to be completed. The relevant Section of the HRS is cited below.

> Per *HRS 343-2 Definitions*, a "Power-generating facility" means:
>
> (1) A new, fossil-fueled, electricity generating facility, where the electrical output rating of the new equipment exceeds 5.0 megawatts; or
>
> (2) An expansion in generating capacity of an existing, fossil-fueled, electricity-generating facility, where the incremental electrical output rating of the new equipment exceeds 5.0 megawatts.

1.3 Description of Construction

The Generator Building will be constructed atop a concrete foundation supported by micropiles. Micropiles involve the use of a drill rig that drills out the area for the column. The piles will be

constructed by drilling, casing, and grouting cylindrical forms into the ground and pouring concrete into the form to create the pile in place. There will be no pile driving because the micropiles will be cast in place.

The contractor, Dick Pacific, intends to utilize a "storybook" method of construction which entails starting on one end of the building for the full height and then proceeding towards the other end (i.e. from the *mauka* end to the *makai* end of the building), as compared to building from the ground level up. The contractor will use pre-engineered concrete forms for walls and floors to expedite construction and minimize on-site form work fabrication. The construction staging area will be located in the open area adjacent to the POB 2 Parking Garage. The small open area in between the POB and the POB 1 Parking Garage will be used as a laydown/fabrication/field office for the project.

1.4 Staffing and Construction Jobs

The number of construction jobs will range from a low of approximately 10 workers to a high of approximately 40 workers. Workers will be transported to and from the jobsite via shuttles to minimize traffic, and reduce the need for on-site parking requirements.

1.5 Preliminary Development Schedule

Construction of the Generator Building is anticipated to begin in late 2007 after all government permits and approvals are secured, and is expected to take approximately 18 months. QMC wishes to have the new Generator Building completed and the generators installed by the end of 2008.

1.6 Preliminary Development Cost

The cost of planning, design, construction, and equipment is estimated to be approximately $35 million. The source of funding for the construction work and equipment will be primarily from QMC, and the State of Hawaii has committed to $2 million in funding. Efforts to secure Federal and additional State funding are ongoing as this project is a significant disaster preparedness effort.

2 DESCRIPTION OF THE AFFECTED ENVIRONMENT, PROJECT IMPACTS, AND MITIGATION MEASURES

2.1 Background - The Queen's Medical Center

QMC, founded in 1859 by Queen Emma and King Kamehameha IV, is the largest private hospital in Hawaii and is a subsidiary of the Queen's Health Systems. Over the last 148 years, the original small hospital has grown into the world class medical center it is today. Through six generations, QMC has become a major provider of health care to the people of our State and a part of the cultural fabric of Hawaii. QMC is a certified private non-profit health care organization/medical center facility that offers the full comprehensive range of hospital, medical, clinical, and health care services required of a major urban center as warranted by Honolulu's population size and magnitude. These services include general, acute, critical, and intensive care; and skilled nursing, medical, surgical, obstetric, orthopedic, neurological, trauma, cardiovascular, cancer, behavioral medicine, emergency, dental, and diagnostic/treatment services.

QMC is an acute care facility licensed to operate with 505 acute care beds and 28 sub-acute care beds. There are 3,000 employees and over 1,200 physicians on staff. QMC is the leading medical referral center in the Pacific and provides the most comprehensive range of health care services in the State. QMC offers services and programs for primary medical care and preventive medicine. Major centers of leading medical excellence include The Queen's Heart Center, The Queen's Cancer Institute (QCI), and The Queen's Neuroscience Institute (NSI). Furthermore, QMC also provides a full wide range of ancillary and support services, including educational, administrative, and research and development programs.

2.2 Regional and Project Setting

QMC's existing campus is 15.85 acres consisting of the following parcels: TMK 2-1-18:048, 2-1-35:001, 003 - 008 and 010, and 2-1-37:002, as depicted in Figure 3. The complex of 21 buildings and 3 parking structures were built between the early 1900s and 2000. The total floor area of these facilities is approximately 2,175,000 square feet, with the parking garages alone comprising approximately 725,000 square feet.

The QMC facility has 23 surgery suites, including 17 on the third floor of the Queen Emma Tower, 3 on the ground floor of the Pauahi Building, and 3 on the third floor of the Nalani Building. In addition to these major buildings, the QMC complex also contains the Hawaii Medical Library and two Physician Office Buildings referred to as POB I and POB II. The existing campus site plan is shown in Figure 2.

The Emergency Room has 31 treatment rooms housed in a 25,000 square foot area. The medical facility has an extensive diagnostic imaging department which includes linear accelerators, CAT scanners, MRIs, heart catheter labs, angiography units, ultrasound, nuclear medicine, C-arm, angiography, radiography (including high-dose radiography), mammography, cystology, hemodialysis, labor and delivery, rehabilitation, a PET scanner, a gamma knife, a lithotripter unit, and a cyclotron unit. The proposed Electrical System Upgrade Project improvements will help prepare QMC for an emergency disaster situation through the use of emergency generator power. The emergency generator power will allow critical and life safety devices and machines, as well as the basic operations of the building such as lighting and air conditioning, to continue at a normal level of service.

2.3 Existing and Surrounding Uses

QMC and its subsidiaries are located in the Civic Center of the City and County of Honolulu and the State of Hawaii (Figure 1). The surrounding area includes the offices of the legislative and executive branches of both the State and Municipal governments of Hawaii and Honolulu, respectively. The Honolulu Central Business District adjoins the Civic Center at its western edge.

West of QMC is Punchbowl Street. Further west of Punchbowl Street are the DOH, State Department of Education, State Capitol, State Library, Iolani Palace, and the Governor's Mansion. North and east of QMC are Vineyard Boulevard, Lusitana Street, the H-1 Freeway, and apartment areas. East of QMC is Lauhala Street and the Board of Water Supply. The Honolulu Medical Group offices and clinic also abut QMC to the east. South of QMC is the City and County of Honolulu Municipal Building and its parking structure, Honolulu Hale and Annex, and the Department of Land and Natural Resources (DLNR).

Potential Impacts and Mitigative Measures

No negative impacts to adjacent or surrounding land uses are anticipated. No mitigation measures are proposed.

2.4 Topography and Soil Type

QMC is located in an urban area. There is a moderate down slope in the southerly direction from the northern portion (Miller Street Triangle) and eastern most portions of the (POB 2 Parking Garage) sloping to the middle of the QMC campus (the great lawn area on Punchbowl Street). The Beretania Street great lawn area is fairly level. There are no natural lands forms on the campus.

According to the United States Department of Agriculture, Soil Conservation Service's *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, the QMC campus is classified as Tantalus silty clay loam (TCC). The only exception is the western half of the Miller Street Parking Garage parcel, which is classified as Makiki clay loam (MkA).

The proposed Generator Building would be constructed in the area of the Tantalus silty clay loam which consists of well-drained soils on the uplands of the island of Oahu. Tantalus silty clay loam is characterized by slow runoff and slight erosion hazard.

Potential Impacts and Mitigative Measures

As the proposed building is to be built above grade and supported by micropiles, ground disturbance will be limited and will take place in an area already developed as an exit driveway for the POB 1 Parking Garage. No long term negative impacts to topography or soil conditions are anticipated. No mitigation measures are proposed.

2.5 Climate

The climate of Oahu is relatively mild. It is characterized by consistent tradewinds, relatively constant temperatures, moderate humidity, and infrequent severe storms. Northeasterly tradewinds prevail throughout the year with an average wind velocity of about 10-15 miles per hour. The mean temperature at the Honolulu International Airport ranges from 70 degrees Fahrenheit in the winter months to 85 degrees and above in the summer months.

Potential Impacts and Mitigative Measures

The proposed building is generally aligned in a northeasterly direction. Although the new Generator Building may partially block trade-wind flow through the existing corridor between the POB 1 parking garage and the existing Central Utility Plant Building, the ventilation of the proposed Generator Building will be enhanced because the new building is generally aligned in a direction to allow prevailing trade winds to flow into the proposed Generator Building. This alignment will not result in a significant adverse impact, but rather, will enhance ventilation of the Generator Building. The proposed project will have no other impacts on climate conditions. No mitigation measures are proposed.

2.6 Flood Hazard

According to the Flood Insurance Rate Map of the Federal Emergency Management Area (FEMA), panel 365 of 395, Map Number 15003C0365 E, dated November 20, 2000, the QMC campus is in Zone X, an area determined to be outside of the 500-year flood plain. Additionally, the proposed Generator Building is designed such that the emergency generators are located above-grade (Level 04) so that the generators would not be subject to potential at-grade or below-grade flooding conditions.

Potential Impacts and Mitigative Measures

The proposed project will not impact existing drainage or flood hazard conditions. No mitigation measures are proposed.

2.7 Flora and Fauna

The new Generator Building will be constructed in an area that is already developed. The site is an existing asphalt exit driveway for the POB 1 Parking Garage (Figure 7). The method of construction will disturb a very limited area of land because the new Generator Building will be constructed atop ten 3-foot-square concrete columns. No existing landscaping or animal habitat areas will be disturbed.

Potential Impacts and Mitigative Measures

The proposed project will not impact existing flora or fauna. No mitigation measures are proposed.

2.8 Noise Quality

Acoustical consultant, Mr. Y. Ebisu, conducted an acoustical study with treatment recommendations for the proposed QMC project (see Appendix A). The study, summarized below, provides acoustical design goals and initial acoustical treatment recommendations for the generator rooms in the proposed new Generator Building.

The closest "noise-sensitive" uses to the proposed Generator Building and generator rooms within the building are multifamily dwelling units on the *mauka* (north) side of Vineyard Boulevard, which is on the opposite side of Vineyard Boulevard from the proposed new building. In the vicinity of the proposed Generator Building, Vineyard Boulevard has six lanes of traffic (plus dedicated turning lanes) moving in the east-west direction. Traffic is going towards and coming off of the H-1 Freeway.

2.8.1 State Department of Health Noise Regulations

Current DOH noise limits along all property boundaries or at receptor locations for commercial or multifamily zoning districts are 60 dBA (decibels) for daytime periods from 7:00 am to 10:00 pm, and 50 dBA for nighttime periods from 10:00 pm to 7:00 am. The DOH regulations require use of the best available noise control technology for emergency generators when it is not feasible to meet DOH noise limits. However, the limits are typically not enforced during emergencies.

2.8.2 Basis of Acoustical Design

The State DOH noise limits of 60 dBA and 50 dBA were used to define the acoustical design goals for the proposed Generator Building. The State DOH nighttime noise limit of 50 dBA along or within the project's property boundary lines is the most stringent requirement to be met. Based on the sound level predictions of the planned generator installation, approximately 37 dBA of sound attenuation will be required to meet the State DOH nighttime limit of 50 dBA at the closest noise-sensitive residential unit.

It should be possible to meet the DOH daytime limit of 60 dBA at the closest noise-sensitive residential unit (2-story business with upstairs residential unit) at the intersection of Miller Street, Lusitana Street, and Vineyard Boulevard. The noise level of 60 dBA at the closest noise-

sensitive residential unit was adopted as the acoustical design goal for this facility to comply with the DOH limits during daytime generator testing operations.

In order to verify that adverse noise impacts would not occur during daytime operation of the emergency generators, background ambient noise measurements were obtained at the closest noise-sensitive residential unit on June 6, 2007, from 8:49 am to 9:19 am. The results of the measurements are shown in the Appendix A report, Figure 1. The results indicated that existing daytime background noise levels at the closest receptor location are at least 2.5 dBA higher than the DOH daytime noise limit of 60 dBA. Adverse noise impacts from the new generator facility should not occur at the closest noise-sensitive receptor locations if the design goal of 60 dBA is achieved and if the generators are tested during the daytime period.

Measurements of background noise levels at the closest noise-sensitive residential unit during the early morning of June 10, 2007, are shown in the Appendix A report, Figure 2, and indicate that existing background noise levels currently exceed the State DOH nighttime limit of 50 dBA.

2.8.3 Initial Acoustical Recommendations

The following are initial acoustical recommendations for treatment of the generator rooms to be located on Levels 03 and 04 of the proposed new building. Further details and materials information are contained in the full report found in Appendix A.

1. Walls and Ceiling: The basic design assumption is that the exterior walls of each Generator Room will be formed from a minimum 12-inch thick dense concrete. Except for treated ventilation openings, all cracks and voids in the walls should be sealed. The roof on the top floor of the Generator Room is assumed to be formed from minimum 8-inch concrete topping.

2. Interior Finish Treatment of Generator Rooms: The underside of the ceiling and bare wall surfaces of each Generator Room should be treated with a 4-inch total thickness of semi-rigid fiberglass treatment. Alternately, perforated metal protective panels may be used as the outer finish layer with a 4-inch thick inner layer of un-faced Owens Corning Type 703 fiberglass used between the bare wall and the perforated metal panels.

3. Radiator Discharge Air Opening: The discharge air opening of each Generator Room should be treated with duct silencers. The duct silencers should be oriented horizontally with a lined

transition duct located between the silencers and the remote radiator. The transition duct between the remote radiator and discharge duct silencers should be internally lined.

The silencers may be fabricated from galvanized or stainless steel and should use fiberglass as the baffle insulation material. Stainless steel construction is recommended for the discharge silencers. The silencers should be tilted to drain outward and with their internal baffles oriented vertically. A bird screen or grill should be added at the exterior end of the discharge air duct. Standard louvers may also be used at the exterior end of the silencers, but the opening may need to be oversized due to the lower effective free area of the louvers.

4. Exterior Door: The exterior doors of each Generator Room should have a fully grouted steel frame and adjustable neoprene compression-type seals along the head, jamb, astragal, and door bottom.

5. Intake Air Opening: It is suggested that the intake air be ducted into the Generator Rooms from the *Ewa* walls through duct silencers. The duct silencers should be tilted downward to drain outward and the perforated splitter elements in each silencer module should be oriented vertically. Stainless steel construction is recommended for the intake silencer. A rain gutter or eyebrow should be used along the roof overhang above the intake silencer bank. A bird screen or grill should be added at the exterior end of the inlet air silencers. Standard louvers may also be used at the exterior end of the silencers, but the opening may need to be oversized due to the lower effective free area of the louvers.

6. Engine Exhaust Muffler: Two residential grade mufflers, connected in series with a minimum 18-inch pipe size, are recommended for each Generator Room. Split collars (which do not make direct contact with the exhaust pipe) should be used on the interior side of the roof by the exhaust pipe and a one-quarter inch gap with insulation spacers should be provided between the exhaust pipe and the collar. The purpose of the collars is to minimize the size of the gap between the exhaust pipe and the structure.

7. Engine Generator Mounts: Vibration isolators should be used to support the generators. Neoprene grommets and washers should be used as required at all isolator hold-down points. The vibration isolators should be located on height-saving brackets, and should include seismic restraints. The stiffness of the floors under the generators should limit the static deflection of the floor slab to 0.2 inches.

2.8.4 Potential Construction-Related Noise

Typical construction noise sources will be a mobile hydraulic crane, concrete truck, concrete pump truck with a boom, and hand power tools. The contractor anticipates the typical concrete pours will be approximately 30 cubic yards in size.

Potential Impacts and Mitigative Measures

Short-term construction noise will occur while the proposed project is built. Construction noise will comply with the State DOH rules for "Community Noise Control" (Chapter 11-46, Hawaii Administrative Rules). The DOH rules limit construction to the hours between 6:30 am and 6:00 pm on weekdays, except holidays, and 8:30 am to 6:00 pm on Saturdays.

No significant long term impacts are anticipated. The generators would be operational only under certain conditions such as monthly testing (as required by JCAHO and NFPA codes) at times when HECO lacks sufficient generation capacity to meet demand for electricity or if there is a complete loss of service from HECO.

2.9 Air Quality

Environmental consultant Mr. J.W. Morrow conducted an air quality study for the proposed QMC project (see Appendix B). The study summarized below examined potential short- and long-term air quality impacts associated with the construction and operation of the proposed project. Mitigation measures were suggested to reduce impacts where possible and appropriate.

2.9.1 Air Quality Standards

A summary of the State of Hawaii and national ambient air quality standards (AAQS) is presented in Table 2-1. Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards. Hawaii's AAQS for nitrogen dioxide (NO_2) and carbon monoxide (CO) are more stringent than the national standards, while the AAQS for the other parameters are comparable. The air quality consultant relied on these standards to assess potential impacts and their significance.

2.9.2 Existing Air Quality

The State DOH maintains a network of air monitoring stations around the state to gather data on the following regulated pollutants:

- Particulate matter (PM) < or = 10 microns (PM_{10})
- Sulfur Dioxide (SO_2)
- Nitrogen dioxide (NO_2)
- Carbon Monoxide (CO)
- Ozone (O_3)

In the case of PM_{10}, measurements are made on a 24-hour basis to correspond with the averaging period specified in state and federal standards. Depending on the sampling equipment and site, samples are collected either continuously or once every six days in accordance with U.S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide, sulfur dioxide and ozone, however, are measured on a continuous basis due to their short-term (1- and 3- and 8-hour) standards. NO_2 is also measured with continuous instruments and averaged over a full year to correspond to its annual standards. Lead (Pb) sampling was discontinued in October 1997 with EPA approval. This was largely due to the elimination of lead in gasoline and the resulting reduction of ambient lead levels in Hawaii to essentially zero.

2.9.3 Department of Health Monitoring

The nearest DOH air monitoring station is located across Punchbowl Street from QMC. A summary of the most recent published air quality data from that site and from the Sand Island air monitoring station are presented in Table 1 in the full report in Appendix B. These data are representative of the existing good air quality in the project area.

2.9.4 Modeling Methodology and Results

The air impact analysis was performed for the diesel engines using EPA's guideline recommended Industrial Source Complex model (ISC3), five years of meteorological data from the Honolulu International Airport preprocessed with EPA's PCRAMMET program, and U.S. Geological Survey (USGS) digital elevation model (DEM) data for the Honolulu quadrangle. Using the DEM, a grid with 1,156 receptors spaced at 30 meter intervals was established around the proposed building. The output concentrations from the digital elevation modeling were combined with background pollutant concentrations taken from the DOH's 2005 monitoring data. The results, presented in Table 2 in the full report in Appendix B, indicate compliance with

state and federal ambient air quality standards. Therefore no further mitigation is required beyond that already resulting from the proposed limits on fuel sulfur content, annual fuel use, and the "best available technology" (BACT) requirement.

Potential Impacts and Mitigative Measures

Potential Short-Term On-site Impacts

The principal source of short-term air quality impact will be construction-related activity. Construction vehicle traffic on the existing streets may at times cause a temporary reduction in average travel speeds with a simultaneous increase in vehicle emissions due to the "stop and go" traffic conditions. Although the site of the new generator building is relatively small, site preparation will generate some particulate matter (PM) emissions, as will construction of the new building.

Potential Short-Term Off-site Impacts

There will be off-site impacts due to the operation of concrete batch plants needed for construction of the new building. Such plants routinely emit particulate matter and other gaseous pollutants. However, it is too early to identify the specific facilities that will be providing this material and thus the discussion of air quality impacts is generic. The batch plants producing this concrete must be permitted by the DOH's Clean Air Branch pursuant to state regulations. In order to obtain these permits, the batch plants must demonstrate their ability to continuously comply with both emission and ambient air quality standards.

Potential Long-Term Impacts – Source Activity

The engine that powers each of the 4 generators is a 2006 Caterpillar Model 3516B rated at 3,286 horsepower. On an annual basis, no more than 1 million gallons of distillate fuel will be fired and its sulfur content will not exceed 0.5 percent by weight. These limits will be included in the required air permit.

Potential Long-Term Impacts – Emissions

Emission factors (pounds per hour) for NOx, CO, PM, and total hydrocarbons (THC) were taken from the manufacturer's specification sheets for the diesel engine. These engines are certified at the Tier 1 emission level required by EPA's new source performance standards for diesel engines. THC were assumed to be equivalent to the current term "volatile organic compounds"

(VOC). From an air pollution standpoint, this is conservative because THC would include methane which is not considered a photochemical oxidant precursor nor a component of VOC. Emission factors for SO_2, Pb, and other air toxics were taken from EPA's compilation of emission factors. Using these emission factors, hourly and annual emissions were computed and are presented in Appendix B Report, Table 5.

Emissions conclusions: The emissions, presented in Table 5, trigger certain permitting and emission control requirements. The NO_x emissions exceed 100 tons per year and thus require QMC to obtain a "Covered Source" air permit pursuant to state air pollution control rules. These rules are the EPA-approved version of the operating permit rules mandated by Title V of the U.S. Clean Air Act. Hawaii's air program, however, is fully integrated in that the air permit issued is both an "authority to construct" and a "permit to operate". The NO_x emissions also exceed the 40 tons per year threshold for BACT. The proposed engines meet the BACT requirement by being designed and certified to meet EPA's Tier 1 emission limits which are considered the best available control technology for model year 2006 diesel engines.

Conclusions and Mitigation

The construction contractor is responsible for complying with the State DOH Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control," including fugitive dust and the prohibition of visible dust emissions at property boundaries. Adequate dust control measure during the construction period will need to be employed. Also, frequent watering of unpaved and disturbed areas at the project site will help control the generation of dust. Off-site activities, such as concrete batch plants, appear to be minor and emissions at these plants will be strictly regulated by the DOH. The visibility of emissions are also regulated under Chapter 11-60.1, State DOH Hawaii Administrative Rules. The Queen's Medical Center is in the process of applying for a Covered Source Permit, which addresses the requirement of a maximum of 20% (twenty percent) opacity for emissions. No significant long-term impacts to air quality from the proposed project are anticipated.

2.10 Historic, Archaeological and Cultural Resources

2.10.1 History of The Queen's Medical Center

The Queen's Hospital, now called The Queen's Medical Center, was founded in 1859 by Queen Emma and King Kamehameha IV. In King Kamehameha IV's initial speech to the Legislature in 1854, the King voiced his desire to create a hospital for the people of Hawaii. At that time, the continued existence of the Hawaiian race was seriously threatened by the influx of disease brought to the island by foreign visitors. Queen Emma enthusiastically supported the dream of a hospital and the two campaigned tirelessly to make it a reality. They personally went door-to-door soliciting the necessary funding. The royal couple exceeded their goal in just over a month, raising $13,530. In turn, the Legislature appropriated $6,000.

When QMC was first built, there was little development in the area from Punchbowl to Honolulu Harbor. Honolulu in the 1850's was mostly dry, dusty, barren land with minimal development. Early photographs show the modest beginnings of QMC surrounded by raw undeveloped land. Over the next 142 years the small hospital grew into the world class medical center it is today and Honolulu grew around it. Through six generations, QMC has become a major provider of health care to the people of the State and a part of the cultural fabric of Hawaii.

2.10.2 Historic Structures

The proposed project will not affect any structures on the State or National Register of Historic Places. The only official historic site at QMC is the Mabel Smyth Memorial Building (Site No. 80-14-9765) (see Figure 2), which was built in 1941 and designed by the noted architect C. W. Dickey. It is listed on the State and National Register of Historic Sites. The Harkness Nurse's Building, built in 1932 and also designed by Dickey, is not on the State or National Register of Historic Sites, but it is recognized by the Department of Planning and Permitting as contributing to the character of the district (see Figure 2).

2.10.3 Archaeological Resources

In October 2005, a "Monitoring Plan in Support of The Queen's Medical Center Redevelopment Project" was prepared in relation to QMC's Re-Zoning Application. The scope of work included historical research to construct a history of land use and to determine if archaeological sites had been recorded on or near the QMC property.

The Archeological Monitoring Provisions state that the State Historic Preservation Division (SHPD) has requested that a qualified archaeologist should monitor all building demolition and removal at QMC and conduct on-call or on-site monitoring of any ground disturbance that requires more than 12 inches of excavation for driveways, surface parking lots, sidewalks, buildings, and landscaping improvements.

The Provisions go on to state that if significant findings are encountered during subsurface work, preparation of a mitigation plan may be indicated to be reviewed and approved by the SHPD/ DLNR. Additionally, if burials are encountered during archeological monitoring, the Burials Program of SHPD/DLNR must be notified to determine appropriate treatment.

The Monitoring Provisions specified possible finds and procedures for response to particular finds and events associated with construction activities and provisions for implementation of archaeological monitoring. In terms of construction within the QMC campus, the Monitoring Provisions "Anticipated Finds" states that,

> "There is a probability that cultural deposits (pre-contact or historic) may be encountered. Additionally, there is a remote possibility that human burials (pre-contact or historic) may be inadvertently encountered within the project area. Based on background research, mixed nineteenth and twentieth century artifacts are the most likely finds."

On January 11, 2006, SHPD approved the "Monitoring Plan in Support of The Queen's Medical Center Redevelopment Project." A copy of the letter is in Appendix C. The Archaeological Monitoring Plan provisions state that, "The archaeologist(s) will monitor all structure demolition and removal and any major (that require more than 12 inches of excavation) ground disturbance activities." Therefore, an archaeologist(s) will monitor the new Generator Building site during ground disturbance activities, such as the excavation work for the Generator Building foundation and micropile work. The "Inventory Survey Plan in Support of The Queen's Medical Center Redevelopment Project" was approved by the SHPD office on March 2, 2006. A copy of the letter is in Appendix C.

Potential Impacts and Mitigative Measures

The new Generator Building site has been previously developed and disturbed as an exit ramp for the POB 1 Parking Garage. A minimal area of land will be disturbed to create the foundation for the new Generator Building. In accordance with the Archaeological Monitoring Provisions, an archaeologist(s) will monitor all removal and ground disturbance activities that require more than 12 inches of excavation. In accordance with the Archaeological Monitoring Provisions, in the event cultural deposits or human remains are encountered, the monitoring archeologist has the authority to halt construction in the immediate area where deposits or remains are encountered in order to carry out the provisions of the Archaeological Monitoring Plan. The QMC and its contractor are responsible for following the Archaeological Monitoring Provisions of the approved October 2005 Monitoring Plan.

2.11 Visual Impacts

The visual characteristics of the QMC campus are that of a developed urban area with a high volume of vehicles traveling nearby along Punchbowl Street and Vineyard Boulevard. There are built-up office, commercial, governmental, and residential buildings in the vicinity. The new Generator Building will be approximately 81 feet 7 inches in height (Figure 8) and will be situated immediately adjacent to the POB 1 Parking Garage, which is approximately 86 feet in height. The Generator Building will appear as a relatively indistinguishable component of a moderately high density urban hospital campus.

The upper levels of the new Generator Building will be visible to motorists traveling east along Vineyard Boulevard and somewhat visible along Miller Street. The lower levels of the Generator Building will be sandwiched between the POB 1 Parking Garage and the Utility Plant Building and, therefore, will only be visible from the interior of the QMC campus' Pauahi Service Court.

From the project site, there are prominent views of the high-rise office buildings in downtown Honolulu, Vineyard Boulevard, and portions of Punchbowl Crater. Views from the project site towards the State Capitol are generally blocked by the existing Pauahi Tower on the QMC campus (see Figure 9). Also, views from the project site towards Punchbowl Crater are partially blocked by the POB 1 Parking Garage's circular-shaped interior ramp. The new Generator Building will be visible from the 5th Floor Public Lanai of the State Capitol. Figure 16 is a photo

taken from the 5th Floor Public Lanai looking at the POB1 Parking Garage. Figure 17 is a model of the proposed new Generator Building adjacent to the existing POB1 Parking Garage**.**

The proposed new Generator Building's height is less than the maximum allowable height of 100 feet for the Hawaii Capitol Special District's Queen's Medical Center Precinct, within which the new building will be located.

The color and texture of the concrete materials that will be used in the construction of the new Generator Building will be muted and will blend in and be compatible with the existing adjacent POB 1 Parking Garage. A parapet wall will be constructed around the perimeter of the Generator Building's roof to screen views of rooftop equipment.

Potential Impacts and Mitigation Measures

The new Generator Building is within the allowable height limit. The materials used in the construction of the building will blend in with the adjacent POB 1 Parking Garage. A parapet wall will be constructed around the roof. No further mitigation measures are proposed. Further review of the building and potential impacts on view planes will take place during the Minor Special District Permit process.

2.12 Circulation and Traffic

Access to the Generator Building will be off of Miller Street via QMC's service road into an area called the Pauahi Service Court, which provides access to the QMC loading dock area (see Figure 2). The Generator Building will be constructed such that the single-lane exit driveway located on the *Ewa/makai* side of the POB 1 parking structure will no longer be in use (see right hand photo in Figure 7). Figure 12 illustrates the new exit ramp on Level 02 of the POB 1 parking structure to replace the existing exit ramp where the Generator Building will be constructed. Figure 13 illustrates how the existing entry driveway located at the Diamond Head side of the POB 1 Parking Garage has been modified to include an exit lane. These modifications are needed because the existing exit driveway located on the *Ewa/makai* side of the parking structure will be closed permanently once construction of the new Generator Building begins.

As a result of these modifications explained above, a total of five (5) parking stalls at the POB 1 Parking Garage will be permanently lost, as labeled in Figures 12 and 13. That will leave a total

of 2,701 parking and loading stalls provided on campus, which results in 698 more parking stalls than the required 1,985.

Potential Impacts and Mitigation Measures

As a result of these modifications, five (5) parking stalls at the POB 1 Parking Garage will be permanently lost. Per the approved 2004 PRU permit, the QMC has 2,552 parking stalls, which is 567 more stalls than the 1,985 parking stalls required. Therefore, the permanent loss of five (5) parking stalls will not significantly impact the overall parking situation.

2.13 Social and Economic Characteristics

The proposed project will not affect the uses of the existing QMC campus structures. There are two multi-family dwellings on campus (Clark and Manamana Apartments) which are used as off-island patient family housing. Although no definitive timetable has been set, both of these are proposed to be demolished in accordance with QMC's approved *2004 Plan Review Use Permit (2004/PRU-2)*. No new dwelling units are proposed to be developed.

The proposed project will not change the resident population, visitor population, or social character of the neighborhood. There will be no impacts on housing supply, schools, and parks, and it will not result in population changes in the immediate area.

Potential Impacts and Mitigative Measures

No impacts are anticipated. No mitigation measures are proposed.

2.14 Public Facilities and Services

No additional staff will be needed to operate the equipment in the new Generator Building. The proposed building will generate limited to no demand for water, wastewater collection, solid waste removal, parks and playgrounds, schools, and police and fire protection. Impacts on utilities will be primarily related to electricity, which would consist of lighting and cooling the facility.

Existing Potable Water System: Potable water for QMC is supplied by both a private well located in the Utility Plant Building and the City and County of Honolulu Board of Water Supply (BWS) potable water system. A connection to the BWS water main line located in Miller Street provides back-up to the on-site well. In general, the facilities on the perimeter of the campus are

connected to the BWS system, while the facilities on the interior of the property are served by the on-site well. The proposed Generator Building will be supplied by the private well.

Fire Protection System: An automatic fire sprinkler system will be installed in the new Generator Building. Water for the fire sprinkler system will be supplied by the private well. The City system is and will continue to be used as back-up.

Wastewater System: Wastewater generated by QMC is discharged to the City sewers located in Punchbowl Street, Lusitana Street, and Lauhala Street. There are three sewer connections in Punchbowl Street, one in Lusitana Street, and three in Lauhala Street. The new Generator Building will not have restrooms.

Drainage: The existing drainage system for QMC is divided into two major drainage service areas. The first major drainage service area connects to an 18-inch line that discharges into the City's 27-inch drain in Punchbowl Street. The second major drainage serviced area connects to the City's 18-inch drain in Beretania Street. The new Generator Building is located in the first major drainage service area which consists basically of the east, or *mauka*, portion of the campus, including the area around the POB 1 Parking Garage.

Electrical and Telephone Services: The existing electrical power capacity at the main HECO service feeder entrance is adequate to serve the existing campus loads. According to records, the maximum demand was 5,960 kW between July and August 2003, which represents approximately 80 percent of the service feeder capacity.

As described previously, the existing service feeder capacity will be upgraded. This will help to support QMC's planned developments for the campus. Discussions have been held with HECO and they have indicated that they will be able to support the increased capacity required for the expansion. Plans have been initiated by HECO to upgrade the service entrance in 2008.

Solid Waste Disposal: Solid waste generated by QMC is collected by a private refuse contractor. The proposed new Generator Building will not affect municipal waste operations. QMC has a Bio-Hazardous and Solid Waste Management Plan in place.

Parks, Playgrounds, and Schools: The proposed Generator Building will not have any affect on parks, playgrounds, or schools in the area.

Police and Fire Protection:

The City and County of Honolulu's Police Department's Alapai Headquarters is located approximately 1,800 feet from the driveway entrance to QMC, at the intersection of Alapai Street and Beretaina Street. The Central Fire Station (Station 1) is located at 104 Beretania Street, approximately 2,800 feet away from QMC.

Potential Impacts and Mitigative Measures

The proposed Generator Building and related electrical system upgrades will not have any significant impacts on public utilities, services, or facilities. No mitigation measures are proposed.

3 RELATIONSHIP TO LAND USE, POLICIES AND CONTROLS

This section discusses State and City and County of Honolulu land use controls, plans, and policies relating to the proposed project.

3.1 State Land Use District

The Hawaii State Land Use Law of Chapter 205, HRS, classifies all land in the State into four land use districts: Urban, Agricultural, Conservation, and Rural. The proposed Generator Building site is in the State Urban Land Use District. The proposed project is consistent with uses designated for the Urban district**.**

3.2 Chapter 6E, HRS, State Historic Preservation Law

The new Generator Building and the associated electrical upgrade project will not affect any structures on the State or National Register of Historic Places nor any structures considered by the City Department of Planning and Permitting that contribute to the character of the district.

QMC has submitted archaeological reports to the SHPD in association with QMC's Planned Review Use Permit in 2004, and a more recent zone change request with the City's Department of Planning and Permitting. Specifically, an "Archaeological Monitoring Plan in Support of The Queen's Medical Center Redevelopment Project" was submitted to the SHPD on October 7, 2005. In turn, the SHPD, in a letter dated January 11, 2006, approved the Archaeological Monitoring Plan. Also, an "Archaeological Inventory Survey Plan in Support of The Queen's Medical Center Redevelopment Project" was submitted to the SHPD on October 7, 2005, and re-submitted in February 2006.

As stated previously, in accordance with the Archaeological Monitoring Provisions, an archaeologist(s) will monitor all removal and ground disturbance activities that require more than 12 inches of excavation, including work at the proposed Generator Building site.

3.3 City and County of Honolulu

3.3.1 The General Plan

The City and County of Honolulu directs land use and growth through a three-tier system of objectives, policies, planning principles, guidelines, and regulations. The General Plan forms the

first tier of this system. The General Plan, first adopted by resolution in 1977, is a short document that provides broad statements of objectives and policies to guide the future of the City and County of Honolulu. The basic objectives and policies set forth in 1977 remain intact, although the General Plan has been amended many times.

The City's General Plan contains comprehensive objectives and policies that outline the City's long-range development goals. QMC's proposed Generator Building and electrical system upgrade project are consistent with the following objectives and policies of the City's General Plan:

Chapter VI Energy:

Objective B: "To conserve energy through the more efficient management of its use."

Policy 2: "Provide incentives and, where appropriate, mandatory controls to achieve energy-efficient siting and design of new developments."

Chapter VIII Public Safety:

Objective B: "To protect the people of Oahu and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions."

Chapter IX Health and Education:

Objective A: "To protect the health of the people of Oahu."

Policy 1: "Encourage the provision of health-care facilities that are accessible to both employment and residential centers."

Discussion: The proposed Generator Building and electrical system upgrade project is consistent with the objectives and policies stated above. QMC intends to participate in a HECO incentive program whereby QMC can utilize the generators in the event of rolling blackouts, therefore helping to conserve energy. Although most of the policies associated with Objective B are directed at City agencies, the Generator Building project will aid the residents of Oahu in the event of an emergency or other natural disaster by providing a normal level of service at QMC. Finally, QMC is located adjacent to the Central Business District, which is the largest employment center on Oahu and in close proximity to several major residential centers. Again, the electrical system upgrade project will provide for QMC to prepare for emergency situations or natural disasters that could impact the City's major employment center and create the need for continued medical care in such an event.

3.3.2 Primary Urban Center Development Plan

The second tier of the system is the development plans – now many are called Sustainable Communities Plans. These are adopted and revised by ordinance and are required to implement the objectives and policies set forth in the General Plan. In June 2004, the Primary Urban Center Development Plan was adopted by the City Council as Ordinance 04-14.

The Land Use Map of the Primary Urban Center Development Plan identifies QMC as a major health care facility and is designated for institutional use, specifically as a Hospital/Medical Center. The proposed electrical system upgrade project is consistent with the Land Use Map designation.

The Public Infrastructure Map of the Primary Urban Center Development Plan indicates a roadway improvement planned on Lusitana Street. This will not affect the proposed project or the proposed new Generator Building.

This section discusses how the proposed Generator Building supports the relevant key elements of the vision, planning principles and guidelines contained in the Primary Urban Center Development Plan.

Section 4.3 "Electrical Power," a subsection of Section 4, "Infrastructure and Public Facilities," of the Primary Urban Center Development Plan primarily addresses HECO and the components of its operations such as power plants and transmission and distribution systems. There are no

specific policies or guidelines that apply directly to the proposed Generator Building project. QMC's proactive measures to have an alternative power source in the event of emergency or disaster situations do not conflict with the intent of this section.

3.3.3 Land Use Ordinance - Zoning

The third tier of the system consists of implementing the ordinances, including the Land Use Ordinance (LUO) (Honolulu's zoning code) and the City's Capital Improvements Program. These ordinances, mandated by the City Charter, constitute the primary means of implementing the City's plans. The zoning ordinances are required to be consistent with and carry out the purposes of the General Plan, the Development Plans, and each other.

The QMC campus is zoned B-2 Community Business District (Figure 10). The proposed Generator Building would be located on TMK: 2-1-35:003, which is zoned B-2 Community Business. Utility-oriented facilities are a permitted use in the B-2 Community Business District. The proposed Generator Building will meet the B-2 zoning district development standards and the Hawaii Capitol Special District development standards.

Previous and On-Going Approvals with the City Department of Planning and Permitting

On October 13, 2004, the City Council approved a new Plan Review Use (PRU) Permit, Resolution No. 04-244, CD1, FD1 for the QMC Facility Five-Year Master Plan for new facilities development and expansion, relocation, and renovation, etc. The improvements contained in the Master Plan will enable QMC to sustain and fulfill the health and medical needs of Hawaii into the 21st Century. The PRU (2004/PRU-2) was approved in 2004.

Subsequently, an Application for a Minor Modification to the 2004 PRU was submitted in March 2006. The Minor Modification contains three components, one of which is the Generator Building and service feeder upgrade project. The two other components deal with adjusting the timing of some developments. The new Generator Building project requires approval of a Minor Special District Permit.

Following this environmental assessment process and under the jurisdiction of the City and County of Honolulu's Department of Planning and Permitting, the proposed new Generator Building will be reviewed during the PRU Modification process in terms of the building's consistency with applicable zoning development standards. The proposed building will also be

reviewed in terms of its consistency with The Hawaii Capitol Special District Development Standards.

The footprint of the proposed new Generator Building is 2,266 SF and is included in the "Building Area" total below. Note that the numbers below do not include the Miller Street Triangle or the POB2 lot. The August 2007 Open Space Plan is shown in Figure 18. The open space calculation for the Queen's Medical Center Campus is:

QMC Campus Lot Area	638,086.05	SF
Building Area	321,589.00	SF
Parking/Loading	59,511.00	SF
Open Space	256,986.05	SF
256,986.05 SF / 638,086.05 SF	40.27% Open Space	

4 ALTERNATIVES TO THE PROPOSED ACTION

4.1 No Action Alternative

The No Action Alternative would mean that QMC would not install the four emergency generators. Use of the existing generators and maintaining the status quo is not a viable alternative because the new generators are critical to ensuring a normal level of continued electricity for hospital operations in times of such emergencies, including natural disasters, which may cause a loss of electrical power at the hospital. The proposed project is also needed to upgrade the existing service feeder capacity. Peak usage at the medical center currently exceeds eighty percent (80%) of the feeder capacity, necessitating the need to expand QMC's service entrance capacity.

4.2 Alternatives Considered

Alternative Construction Material: Other alternatives that were considered include the use of steel rather than concrete in construction, but it was determined to be more prone to damage in the event of a hurricane.

Alternative Location for the Proposed Generator Building: A number of alternative locations were considered within the exiting QMC Campus. However, either the land area was inadequate or the location was not close enough to the existing Utility Plant Building.

4.3 The Preferred Alternative

The proposed Generator Building is required to house four new generators which are needed to ensure a normal level of continued electricity for hospital operations in times of emergencies, including natural disasters, which may cause a loss of electrical power at the hospital. The proposed project will also upgrade the existing service feeder capacity. Peak usage at the medical center currently exceeds eighty percent (80%) of the feeder capacity, necessitating the need to expand QMC's service entrance capacity.

5 PRELIMINARY DETERMINATION

This Draft Environmental Assessment demonstrates that the proposed action is not anticipated to have a significant adverse effect on the environment and that an Environmental Impact Statement would not be warranted. A FONSI is therefore anticipated for this project.

5.1 Findings and Reasons Supporting the Preliminary Determination

The following findings and reasons demonstrate that the proposed action will not have significant adverse impacts on the environment and, consequently, support the above preliminary determination.

Potential impacts have been evaluated and are addressed in terms of how the proposed project relates to the thirteen criteria of Section 11-200-12 of the DOH's Administrative Rules. In general, the proposed project will not:

1. Involve an irrevocable commitment to loss or destruction of any natural or cultural resource;

The proposed electrical system upgrade project and new Generator Building will occur on a site that has already been disturbed, developed, and is surrounded by extensive development. The project location does not interfere with any access to traditional gathering sites or important cultural resources.

QMC submitted an "Archaeological Monitoring Plan in Support of The Queen's Medical Center Redevelopment Project" on October 7, 2005. The SHPD, in a letter dated January 11, 2006, approved the Archaeological Monitoring Plan.

QMC also submitted an "Archaeological Inventory Survey Plan in Support of The Queen's Medical Center Redevelopment Project" on October 7, 2005. The SHPD, in a letter dated January 12, 2006, requested changes to the Archaeological Inventory Survey Plan. As part of QMC's Rezoning Application, changes were being made and the revised Inventory Survey Plan was re-submitted to the SHPD in February 2006.

2. Curtail the range of beneficial uses of the environment;

The proposed project is an allowable use per the City and County's zoning ordinance. The proposed Generator Building and electrical system upgrades will not curtail the range of beneficial uses of the environment. The new Generator Building site has been previously developed for a number of years as part of the QMC campus.

3. Conflict with the state'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;

The proposed project does not conflict with long-term environmental policies or goals or guidelines of the State of Hawaii. The project's potential environmental impacts are primarily short-term temporary impacts associated with construction of the new Generator Building. Those impacts can be mitigated through adherence to standard construction mitigation, following State and County Rules and Regulations for construction practices. As previously discussed in Section 2.9 of this document, QMC has applied for a Covered Source Permit (air emissions) from the State DOH. The proposed Generator Building will comply with the state and federal air quality regulations.

4. Substantially affect the economic welfare, social welfare, and cultural practices of the community or State;

The proposed project is expected to have a beneficial effect on the economy in general. There will be short-term construction jobs, as well as employment associated with the operation of the proposed Generator Building and the related electrical system. Also, the project is expected to benefit the social welfare of the community by way of sustaining a normal level of health care service at QMC during an emergency or natural disaster.

5. Substantially affect public health;

The proposed action is expected to benefit public health by way of sustaining a normal level of health care service at QMC during an emergency or natural disaster. There are no public health concerns relating to the construction or operation of the proposed Generator Building.

6. Involve substantial secondary impacts, such as population changes or effects on public facilities;

There are no anticipated secondary impacts to population or public facilities. The proposed action does not change the existing land use nor generate increased resident population. The proposed project would benefit the community at large by way of sustaining a normal level of health care service at QMC during an emergency or natural disaster.

7. Involve a substantial degradation of environmental quality;

Construction activities are anticipated to result in short-term impacts to noise, air quality, water quality, and traffic in the immediate vicinity of the project site. Mitigation measures will be implemented during construction in order to minimize impacts. No long-term degradation of environmental quality is anticipated. QMC has and will apply for the required permits for the construction and operation of the proposed Generator Building.

8. Is individually limited but cumulatively has considerable effects upon the environment or involves a commitment for larger actions;

No cumulative effects are anticipated and the proposed project does not involve a commitment for a larger action. As a mature medical campus, QMC is an integral component of urban Honolulu. The proposed improvements are operational in nature. The proposed construction is a consequence of the existing facilities, not a precursor to facility expansion.

9. Substantially affect a rare, threatened, or endangered species, or its habitat;

The project site has been previously disturbed and developed as an exit driveway for the POB 1 Parking Garage. The existing site is paved with asphalt concrete and there is no natural habitat.

10. Detrimentally affect air or water quality or ambient noise levels;

Construction activities associated with the proposed Generator Building are anticipated to result in short-term impacts to noise, air quality, water quality, and traffic in the immediate vicinity of the project site. Mitigation measures will be implemented during

construction in order to minimize impacts in accordance with applicable federal, state, and city laws, statutes, ordinance, and rules and regulations.

The operation of the new Generator Building will not have significant long-term impacts on air or water quality or ambient noise levels in the vicinity. As described in Sections 2.8 Noise Quality and 2.9 Air Quality, the new Generator Building will have a number of sound attenuation features to be installed in the building and in the generator rooms. Additionally, QMC has applied for the required Covered Source Permit relating to air emissions. The operation of the Generator Building will comply with state and federal noise and air quality regulations.

11. Affect 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 QMC campus is in Zone X, areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas with less than 1 square mile; and areas protected by levees from 100-year flood. Additionally, the proposed Generator Building is designed such that the emergency generators are located above-grade and would not be subject to at-grade or below-grade flooding conditions.

12. Substantially affect scenic vistas and view planes identified in county or state plans or studies; or

The Generator Building will be a narrow 21-foot wide structure situated adjacent to the POB 1 Parking Structure. The Generator Building will be less than the maximum allowable 100 feet in height for the Queen's Medical Center Precinct of the Hawaii Capitol Special District. A screen on the roof will shield views of roof-top equipment. The colors and materials of the structure will generally be neutral and similar to the adjacent POB 1 Parking Garage.

13. Require substantial energy consumption.

Construction and occupation of the proposed Generator Building will not require a substantial increase in sustained energy consumption. Operation of the emergency generators will be fueled by diesel fuel stored on-site within the QMC property.

6 PERMITS AND APPROVALS

The following is a list of permits, approvals, and reviews which may be required prior to construction of the proposed project:

State of Hawaii

Department of Health, Covered Source Permit

City and County of Honolulu

Department of Planning and Permitting

- Modification to Plan Review Use Permit 2004/PRU
- Minor Special District Permit
- Building Permit

7 CONSULTATION

7.1 Parties Consulted During the Pre-Environmental Assessment Consultation Period

The following agencies were contacted during the preparation of the Draft EA.

State of Hawaii

- Department of Health, Clean Air Branch
- Department of Health, Office of Environmental Quality Control

City and County of Honolulu

- Department of Planning and Permitting

7.2 Parties Consulted on the Draft Environmental Assessment

The following received a copy of the Draft Environmental Assessment.

State of Hawaii

- Department of Health
- Department of Land and Natural Resources, Historic Preservation Division
- Department of Transportation
- Office of Planning
- State Library

City and County of Honolulu

- Board of Water Supply
- Department of Planning and Permitting
  - Building Division
  - Civil Engineering Branch
  - Planning Division
  - Traffic Review Branch
  - Wastewater Branch
- Department of Transportation Services
- Environmental Services
- Fire Department
- Police Department

Other

- Downtown Neighborhood Board No. 13

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
TELEPHONE: (808) 768-8000 • FAX: (808) 527-6743
INTERNET: www.honolulu.gov • DEPT. WEB SITE: www.honoluludpp.org

MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2007/ELOG-1838
2007/ED-12(pd)

July 24, 2007

Mr. Lee Sichter
Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Sichter:

Subject: Chapter 343, Hawaii Revised Statutes (HRS)
Draft Environmental Assessment, Electrical System Upgrade
Project Name: Queen's Medical Center
File No.: 2007/ED-12
Location: 1329 Lusitana Street, 1410 Miller Street, 510 South Beretania Street, and 1236 Lauhala Street – Hawaii Capital District
Tax Map Keys: 2-1-35: 1, 3-8, 10; 2-1-18: 48; and, 2-1-37: 2

We have reviewed the above Draft Environmental Assessment (DEA) submitted July 2 and July 20, 2007, for an electrical system upgrade including a new generator building, four (4) new diesel-powered emergency generators (a total of 9.468 megawatts), relocation of two (2) underground electrical service feeders, and an increase in feeder capacity.

We are providing the following initial comments, which should be addressed in the Final Environmental Assessment (FEA):

1. Is there a relationship between the new Generator Building and the proposed 30,000-square-foot addition to the General Services Building which was approved under Resolution No. 04-244, CD1, FD1? The addition was proposed for Phase I (2005 - 2007). Please provide a written status regarding this work.

2. Along the north side of the existing utility plant building (Figure 4, partial site plan) there is a notation "Waterproof below grade walls." The plan also indicates that demolition work is proposed. Is this part of the electrical upgrade? If so, please describe the nature and scope of the work.

3. Will the project require underground fuel storage? If so, provide a narrative description and plans.

4. Page 11 of the DEA (Section 22.5) discusses building alignment and states that "this alignment will not result in a significant adverse impact, but rather, will enhance ventilation of the building." Please explain this conclusion.

5. The DEA indicates that, on January 11, 2006, the State Historic Preservation Division (SHPD) approved the "Monitoring Plan in Support of the Queen's Medical Center Redevelopment Project." Does this plan specifically include the proposed new building? Please provide documentation from SHPD in this regard.

6. What is represented by the cross-hatched area on Figure 4, Generator Building Site Plan? This plan should be fully dimensioned.

7. To ensure compliance with the Land Use Ordinance (LUO), please provide open space calculations and show setbacks on the plans.

8. As depicted in Figure 6, are the stairs within the setback? Are stairs interior or exterior?

9. The DEA must disclose that the proposal requires approval of a Minor Special District Permit. It appears that the building may be visible from the 5th floor lanais at the State Capital, which is identified as a prominent view within the Hawaii Capital District. Please address this issue.

10. On Figure 8, please ensure that the roof color is not white or reflective. There is a notation that the cooling tower will be relocated; where will this occur? Please provide a narrative description and plans.

11. Describe emissions from the "exhaust stacks," and what impact such emissions will have on the prominent view.

12. Provide information on the color and finish of the "aluminum screen."

13. What is the overall floor area of the proposed generator building?

Please note that we anticipate providing you with additional comments, which will be transmitted separately at a later date.

Should you have any questions, please contact Pamela Davis of our staff at 768-8017.

Very truly yours,

Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:cs

cc: Queen's Medical Center

Doc552693

September 21, 2007
2007.33.0400 / 07P-377

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

Dear Mr. Eng:

Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Thank you for participating in the Chapter 343 (HRS) public and agency review process. We are writing in response to the comments your office provided on July 24, 2007 for the document above. Our responses are presented in the order of your comments.

1. There is no relationship between the new Generator Building and the proposed 30,000-square-foot addition to the General Services Building. According to the Queen's Medical Center, it is our understanding that the expansion of the General Services Building has been deferred until 2009.

2. The notation "waterproof below grade walls" is a maintenance item and is not part of the proposed project or its scope. The waterproof notation will not appear in Figure 4 in the Final EA because it is not related to the proposed Generator Building project.

   The demolition work notation in Figure 4 in the Draft EA indicates a dotted line around three (3) existing generators that were to have been removed. The Queen's Medical Center has decided to keep the existing generators, which will remain in place, to increase the level of reliability of the emergency power supply system. The text on page 3 Section 1.1.1 of the Draft EA states that the existing generators will remain. This demolition notation will not appear in Figure 4 in the Final EA.

3. The project does not require new or additional underground fuel storage, or any changes to the existing underground fuel storage, which is located in the driveway, Ewa of the existing Trash Compactor. QMC has existing permitted underground fuel storage. There are three (3) existing underground fuel storage tanks: one 15,000-gallon and two 20,000-gallon (each) for a total fuel

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

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T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

storage capacity of 55,000 gallons. (55,000 gallons of onsite fuel will allow QMC to operate for approximately 7 days in the event of a natural disaster.) The two 20,000-gallon tanks were recently installed in 2007 per building permit BP 595748, replacing two steel underground storage tanks, one 10,000-gallon and one 9,000-gallon, that were installed in 1985. The 15,000-gallon FRP underground storage tank, originally installed in 1985, remains in service. Although there are no further improvements planned at the time of this writing, the possibility of expanding existing fuel storage at some point in the future should not be precluded.

4. The ventilation of the proposed Generator Building will be enhanced because it is generally aligned in a direction to allow prevailing trade-winds to flow into the proposed Generator Building.

5. The statements in the Draft EA are consistent with prior archeological reports submitted to and approved by the State Historic Preservation Division. Specifically, the October 2005 "Monitoring Plan in Support of The Queen's Medical Center Redevelopment Project" which was approved by the State Historic Preservation Division (SHPD) on January 11, 2006. The Monitoring Plan and the related approval letter from SHPD were submitted to the Department of Planning and Permitting in relationship to the Rezoning Application for the Queen's Medical Center.

   Page " i " of the approved October 2005 Monitoring Plan defines the "Location" as including TMK 2-1-035: 003 and that the "Project Acreage" is 15.85 acres. The proposed Generator Building is located within TMK 2-1-035:003 and is located within the 15.85-acre campus.

   The last sentence in the first paragraph at the top of Page 6 of the approved October 2005 Monitoring Plan states, "This archeological monitoring plan will address these areas as well as any other areas in which subsurface disturbance into undisturbed deposits exceeds 12 inches (0.3 meters)." While the Monitoring Plan addresses projects that were enumerated in that document, the Monitoring Plan also includes clearly and explicitly "any other areas" where subsurface disturbance exceeds 12 inches.

   The first paragraph on Page 52 of the approved Monitoring Plan also states that, "As noted in the previous section, the State Historic Preservation Division has requested that a qualified archaeologist should monitor all building demolition and removal at The Queen's Medical Center and conduct on-call or on-site monitoring of any ground disturbance that requires more

than 12 inches of excavation for driveways, surface parking lots, sidewalks, buildings, and landscaping improvements."

Therefore, the statements in Section 2.10 of the Draft Environmental Assessment are consistent with the SHPD approved Monitoring Plan for The Queen's Medical Center campus. Text will be added to the Final EA to further state that The Queen's Medical Center and its contractor are responsible for following the Archaeological Monitoring Provisions of the approved October 2005 Monitoring Plan.

6. The cross-hatched area on Figure 4 represents the footprint of the proposed new Generator Building. A scaled Site Plan drawing with the new Generator Building dimensioned is included in the Final EA.

7. The footprint of the proposed new Generator Building is 2,266 SF and is included in the "Building Area" total below. (These numbers do not include the Miller Street Triangle Lot or the POB2 Lot.) A copy of the August 2007 "Open Space Plan" is attached to this letter. The plans in the Final EA show setbacks. The Open Space calculation for the Queen's Medical Center Campus is:

QMC Campus Lot Area	638,086.05 SF
Building Area	321,589.00 SF
Parking/Loading	59,511.00 SF
Open Space	256,986.05 SF

256,986.05 SF / 638,086.05 SF 40.27% Open Space

8. As depicted in Figure 6 of the Draft EA, the mauka stairs are on the exterior of the new Generator Building and are not enclosed. The mauka exterior stairs are 29 feet 3 inches away from the closest property line. The exterior stairs are not within any yard setback.

9. Chapter 6 of the Final EA will state that a Minor Special District Permit is required.

The Final EA will address views from the State Capitol building. The new Generator Building will be partially visible from the State Capitol's 5th floor public lanai which faces mauka. Figures containing a photo and a model of the new building have been added to the Final EA.

10. The proposed Generator Building's exterior and roof finishes will comply with the provisions of the Hawaii Capital Special Design District. The proposed Generator Building's concrete exterior will be painted to blend with surrounding structures. The grillwork around portions of the generator building will be horizontally oriented and painted a similar green to match the existing roof color of the Miller Street Parking Garage, Emergency Room, and Front Lobby Porte-Cochere. The Generator Building's height is less than the 100-foot height limit.

    The roof will not be white and it will not be reflective. Figure 8 in the Final EA will indicate that the roof color is not white and is not reflective. The roof color is intended to be an approved green that will comply with the Hawaii Capital Special District guidelines. It is intended to be a similar shade of green that was used on the Bishop rooftop for the Addition/Alteration of Cath. Lab/New Mechanical Room project, BP 615013.

    As depicted in Figure 8 of the Draft EA, the dotted outline of the existing cooling tower is impacted by a portion of the new Generator Building. This is due to the large air intake silencers that are required to ensure adequate noise mitigation measures for the generators. The silencers, which are approximately seven feet in length, impose the need for additional building width, which is achieved by cantilevering the new Generator Building over the existing Utility Plant Building. The existing cooling tower #3 and the existing boiler diesel fuel tank #2 are both impacted by the required cantilever. Therefore, it is necessary to relocate cooling tower CT-3 and the boiler Diesel Fuel Tank 2 elsewhere on the Utility Plant Building roof. A discussion and plans of the Utility Plant rooftop work are included in the Final EA.

11. A description of the emissions can be found in Sections 6.2 page 14 and 7.2.1 page 18 of the "Air Quality Impact Report" located in Appendix B of the Draft EA. The report will also be included in the Final EA. According to Mr. J.W. Morrow who prepared the report, the emissions are regulated to a maximum of 20% (twenty percent) opacity under Chapter 11-60.1, Hawaii Administrative Rules. The Queen's Medical Center is in the process of applying for a Covered Source Permit, which also addresses the requirement of a maximum of 20% (twenty percent) opacity for emissions.

    The emergency generators would be expected to be in operation under the following circumstances:

a. During mandatory Joint Commission testing which is required every month.

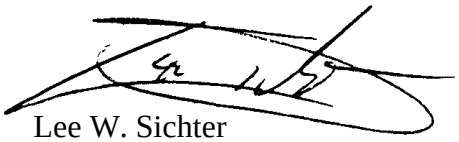
b. When there is a power outage or in times when there is an anticipated shortfall of electricity that may cause a loss of electrical power at the hospital.

12. The color of the aluminum screen will be a matte green to match the roof color used on the Miller Street Parking Garage, Emergency Room, and Front Lobby Porte-Cochere. The aluminum screen will have a matte finish.

13. The overall floor area of the proposed four-story Generator Building is 7,663 square feet, including the enclosed makai stairway and not including the open exterior mauka stairway.

Sincerely yours,

BELT COLLINS HAWAII LTD.



Lee W. Sichter
Principal Planner

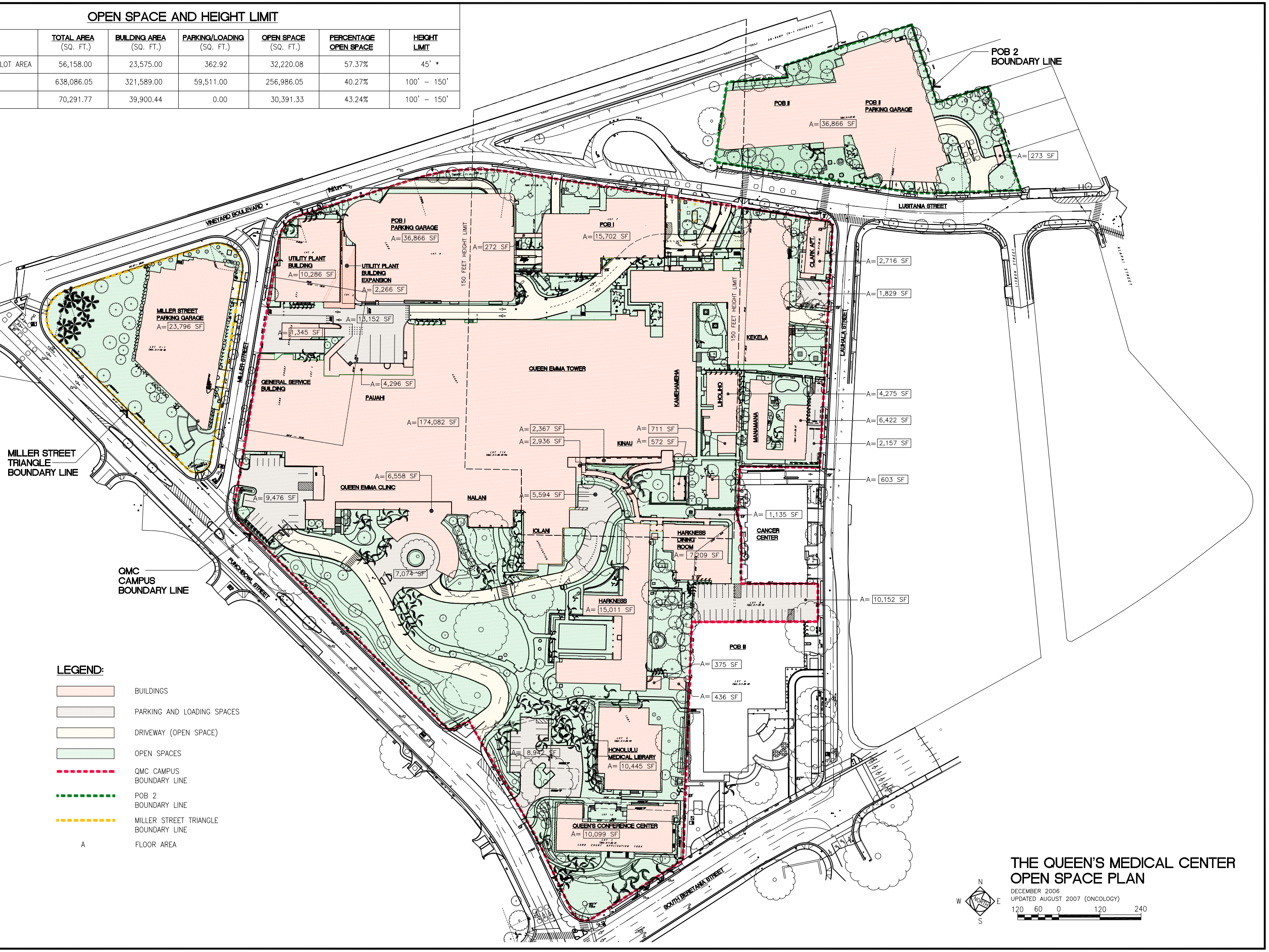
LWS:MJO:lf

Attachment: August 2007 "Open Space Plan"

OPEN SPACE AND HEIGHT LIMIT

	TOTAL AREA (SQ. FT.)	BUILDING AREA (SQ. FT.)	PARKING/LOADING (SQ. FT.)	OPEN SPACE (SQ. FT.)	PERCENTAGE OPEN SPACE	HEIGHT LIMIT
MILLER STREET TRIANGLE LOT AREA	56,158.00	23,575.00	362.92	32,220.08	57.37%	45' *
QMC CAMPUS LOT AREA	638,086.05	321,589.00	59,511.00	256,986.05	40.27%	100' – 150'
POB 2 LOT AREA	70,291.77	39,900.44	0.00	30,391.33	43.24%	100' – 150'

* PROPOSED HEIGHT



LEGEND:

- BUILDINGS
- PARKING AND LOADING SPACES
- DRIVEWAY (OPEN SPACE)
- OPEN SPACES
- QMC CAMPUS BOUNDARY LINE
- POB 2 BOUNDARY LINE
- MILLER STREET TRIANGLE BOUNDARY LINE
- A — FLOOR AREA

THE QUEEN'S MEDICAL CENTER
OPEN SPACE PLAN

DECEMBER 2006
UPDATED AUGUST 2007 (ONCOLOGY)

2007/ED-12 - 2185

BOARD OF WATER SUPPLY

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

August 2, 2007

RECEIVED
'07 AUG -7 A8:51
DEPT OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

TO: HENRY ENG, FAICP, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

ATTN: PAMELA DAVIS

FROM: KEITH S. SHIDA, PRINCIPAL EXECUTIVE
CUSTOMER CARE DIVISION

SUBJECT: YOUR LETTER DATED JULY 24, 2007 REGARDING THE PLAN REVIEW USE (PRU) PERMIT CHAPTER 343, HAWAII REVISED STATUES DRAFT ENVIRONMENTAL ASSESSMENT (DEA) FOR ELECTRICAL SYSTEM UPGRADES FOR QUEEN'S MEDICAL CENTER, 2007/ED-12 (PD), TMK: 2-1-35:1,3-8,10; 2-1-18:48; 2-1-37:2

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

We understand that the additional water, required by the improvements in this assessment, will be served by the Queen's Medical Center's private well. Therefore, we have no comments or objections for the proposed project.

If you have any questions, please contact Robert Chun at 748-5440.

September 21, 2007
2007.33.0400 / 07P-380

Mr. Keith S. Shida, Principal Executive
Customer Care Division
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96813

Dear Mr. Shida:

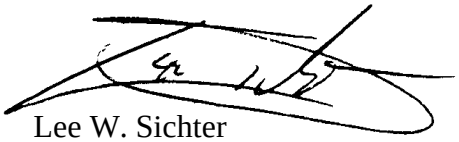
Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Thank you for your August 2, 2007 letter which acknowledges that the Queen's Medical Center's private well will serve the proposed subject project.

Thank you for participating in the Chapter 343 (HRS) public and agency review process.

Sincerely yours,

BELT COLLINS HAWAII LTD.



Lee W. Sichter
Principal Planner

LWS:MJO:lf

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 ▪ Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

2007/ELOG-2498

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

MUFI HANNEMANN
MAYOR

BOISSE P. CORREA
CHIEF

~~GLEN R. KAJIYAMA~~
PAUL D. PUTZULU
DEPUTY CHIEFS

OUR REFERENCE BS-DK

August 9, 2007

RECEIVED
'07 AUG 10 A11:33
DEPT OF PLANNING AND PERMITTING
CITY & COUNTY OF HONOLULU

TO: HENRY ENG, FAICP, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: BOISSE P. CORREA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: PLAN REVIEW USE PERMIT
DRAFT ENVIRONMENTAL ASSESSMENT
THE QUEEN'S MEDICAL CENTER - ELECTRICAL SYSTEMS UPGRADE PROJECT
TAX MAP KEYS: 2-1-35: 1, 3-8, 10; 2-1-18: 48; AND 2-1-37: 2

Thank you for the opportunity to review and comment on the subject project.

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 Randall Macadangdang of District 1 at 529-3386 or Mr. Brandon Stone of the Executive Office at 529-3644.

Post-it® Fax Note 7671	Date 9-10-07	# of pages ▶ 9
To LEE SICHTER	From PAM DAVIS	
Co./Dept. BELT COLLINS	Co. DPP	
Phone #	Phone # 523-4807	
Fax # 538-7819	Fax # 527-6743	

BOISSE P. CORREA
Chief of Police

By

JOHN P. KERR
Assistant Chief of Police
Support Services Bureau

Serving and Protecting With Aloha

September 21, 2007
2007.33.0400 / 07P-378

Mr. Boise P. Correa
Chief of Police
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, HI 96813

Dear Chief Correa:

Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Thank you for your August 9, 2007 letter which states that the project should have no significant impact on the facilities or operations of the Honolulu Police Department.

Thank you for participating in the Chapter 343 (HRS) public and agency review process.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Lee W. Sichter
Principal Planner

LWS:MJO:lf

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

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T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

2007/ELOG-2499

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ALVIN K. TOMITA
DEPUTY FIRE CHIEF

August 20, 2007

TO: HENRY ENG, FAICP, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: KENNETH G. SILVA, FIRE CHIEF

SUBJECT: PLAN REVIEW USE (PRU) PERMIT 2007/ED-12
QUEEN'S MEDICAL CENTER
1329 LUSITANA STREET, 1410 MILLER STREET,
510 SOUTH BERETANIA STREET, AND 1236 LAUHALA STREET
TAX MAP KEYS: 2-1-035: 001, 003-008, AND 010; 2-1-018: 048; AND
2-1-037: 002

In response to your letter of July 24, 2007, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and determined that the proposed project will not adversely impact services provided by the HFD.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 723-7151.

KENNETH G. SILVA
Fire Chief

KGS/SK:bh

September 21, 2007
2007.33.0400 / 07P-379

Mr. Kenneth G. Silva, Fire Chief
Fire Department
City and County of Honolulu
636 South Street
Honolulu, HI 96813

Dear Chief Silva:

Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Thank you for your August 20, 2007 letter which states that the project will not adversely impact services provided by the Honolulu Fire Department.

Thank you for participating in the Chapter 343 (HRS) public and agency review process.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Lee W. Sichter
Principal Planner

LWS:MJO:lf

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 ▪ Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

2007/ED-12(pd)-2497

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EPO-07-160

September 4, 2007

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

Mr. Eng:

SUBJECT: 2007/ED-12(pd)
Draft Environmental Assessment and Plan Review Use (PRU) Permit for Queen's Medical Center
Honolulu, Oahu, Hawaii
TMK: (1) 2-1-035: 001, 003-008 and 010
(1) 2-1-018: 048
(1) 2-1-037: 002

Thank you for allowing us to review and comment on the subject application. The document was routed to the various branches of the Department of Health (DOH) Environmental Health Administration. We have the following Clean Air Branch, Radiation & Indoor Air Quality Branch, and General comments.

Clean Air Branch

A Project that May Require an Air Pollution Control Permit:

The project must comply with all applicable Air Pollution Control Permit conditions and requirements.

Control of Fugitive Dust:

Fugitive dust emissions occur during all phases of construction and operations. Activities close to existing residences, businesses, public areas or thoroughfares can cause dust problems. For cases involving mixed land use, we strongly recommend that buffer zones be established, wherever possible, in order to alleviate potential nuisance problems. We recommend that the contractors operate under a dust control management plan. The plan does not require the

Department of Health approval, however it will help with identifying and minimizing the dust problems from the proposed project.

Examples of measures that can be included in the dust control plan are:

a) Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;
b) Providing an adequate water resource at the site prior to start-up of construction activities;
c) Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;
d) Minimizing dust from shoulders and access roads;
e) Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
f) Controlling dust from debris being hauled away from the project site.

All activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust. If you have any questions, please contact the Clean Air Branch at 586-4200.

Noise, Radiation & Indoor Air Quality Branch

Project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, Community Noise Control. Should there be any questions, please contact Russell S. Takata, Environmental Health Program Manager, Noise, Radiation and Indoor Air Quality Branch, at 586-4701.

General

We strongly recommend that you review all of the Standard Comments on our website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

If there are any questions about these comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

c: EPO
CWB
NRIAQB

September 21, 2007
2007.33.0400 / 07P-382

Mr. Kelvin H. Sunada, Manager
Environmental Planning Office
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, HI 96801-3378

Dear Mr. Sunada:

Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Thank you for your letter of September 4, 2007, commenting on the above document. The following responses are presented in the same order as the comments in your letter.

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Clean Air Branch

Air Pollution Control Permit: On page 18 of the Draft Environmental Assessment regarding Section 2.9 Air Quality, the "Conclusions and Mitigation" section states that the construction contractor will be responsible for complying with the State Department of Health Administrative Rules, Title 11, Chapter 60-11.1 regarding "Air Pollution Control," including fugitive dust, the prohibition of visible dust emission at property boundaries, and that adequate dust control measures during the construction period will need to be employed.

Control of Fugitive Dust: Please see discussion under "Air Pollution Control Permit" above. The examples of dust control measures enumerated in your letter have been noted.

Noise, Radiation & Indoor Air Quality Branch

Community Noise Control: On page 15 of the Draft Environmental Assessment regarding Section 2.8 Noise Quality, the "Potential Impacts and Mitigative Measures" section states that construction noise will comply with the State Department of Health's rules in Chapter 11-46, Community Noise Control.

Belt Collins Hawaii Ltd.
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T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

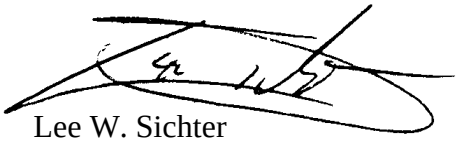
General

Standard Comments: Belt Collins attempted multiple times and on different days to access all of the standard comments on the Department of Health's website. However, the website address in your letter - www.state.hi.us/health/environmental/env-planning/landuse/landuse.html is not working and the screen displays "Site Error."

Thank you for participating in the Chapter 343 (HRS) public and agency review process.

Sincerely yours,

BELT COLLINS HAWAII LTD.



Lee W. Sichter
Principal Planner

LWS:MJO:lf

Date: 7-23-07

REQUEST for COMMENTS

File No.: 2007/ED-12

Department of Planning and Permitting
Land Use Permits Division

To:

- [X] Planning Division
  - [X] Community Actions Plans
  - [ ] Dev.Plans/Zone Changes
  - [ ] Planning Research
  - [ ] Policy Planning
- [ ] Land Use Permits Division
  - [ ] Urban Design
- [X] Building Division
  - [X] Zoning Plans Review (KEITH T.)
- [X] Site Development Division
  - [X] Civil Engineering
  - [ ] Subdivision
  - [X] Traffic Review
  - [X] Wastewater
- [ ] Customer Service Office
  - [ ] Code Compliance

PLANNER: PAM DAVIS
PROJECT NAME: D.E.A. FOR QUEEN'S ELECT. SYSTEM UPGRADE
STREET ADDRESS: (VARIOUS)
TAX MAP KEY(S): 2-1-35:1, 3-B, 10; 2-1-18:48; AND, 2-1-37:2
AGENT: BELT COLLINS (LEE SICHTER)
Attached for your review and comment is an application for:

Cluster: [ ] Agricultural [ ] Country [ ] Housing	[ ] **Park Dedication**	**Special Management Area Use Permit:** [ ] Minor [ ] Major
	D.E.A. for [X] **Plan Review Use**	[ ] **Variance from LUO Sec.(s):**
Conditional Use Permit: [ ] Minor [ ] Major	**Planned Development:** [ ] Housing [ ] Commercial (WSD Only) [ ] Resort (WSD Only)	[ ] **Waiver from LUO Sec.(s):**
[ ] **Existing Use:** (Indicate Type of Use)	[ ] **Shoreline Setback Variance**	[ ] **Zoning Adjustment, LUO Sec.(s):**
[ ] **Minor Shoreline Structures Permit**	**Special District Permit:** [ ] Minor [ ] Major	[ ] **201G Project**
[ ] **Modify Approved Permit:** (Indicate Reference File No.)	(Indicate District) [ ] Downtown Height >350 Feet	

Additional Notes: PLEASE VERIFY LUO DATA PRESENTED IN EA, SUCH AS DEVEL. FLR. AREA, PARKING, ETC., TO ENSURE IT MATCHES ZPRB INFORMATION.

Due to statutory time constraints, we require your reply by: SEPT. 7, 2007

If you have any questions, or require clarification, please contact the planner listed above. ***Mahalo.***

Return to Land Use Permits Division

Date: 9/5/07

To:			Initial	Date
UDB ___	[X]	No comments	SA	9/5
LUAB X	[ ]	See attached response	___	___
ZRPB ___				

Attachment(s)

reqcmnts.fam(5/01/01)

Date: 7-23-07

REQUEST for COMMENTS

File No.: 2007/ED-12

Department of Planning and Permitting
Land Use Permits Division

To:

- [X] Planning Division
  - [X] Community Actions Plans
  - [ ] Dev.Plans/Zone Changes
  - [ ] Planning Research
  - [ ] Policy Planning
- [ ] Land Use Permits Division
  - [ ] Urban Design
- [X] Building Division
  - [X] Zoning Plans Review (KEITH T.)
- [X] Site Development Division
  - [X] Civil Engineering
  - [ ] Subdivision
  - [X] Traffic Review
  - [X] Wastewater
- [ ] Customer Service Office
  - [ ] Code Compliance

PLANNER: PAM DAVIS
PROJECT NAME: D.E.A. FOR QUEEN'S ELECT. SYSTEM UPGRADE
STREET ADDRESS: (VARIOUS)
TAX MAP KEY(S): 2-1-35:1, 3-B, 10; 2-1-18:48; AND, 2-1-37:2
AGENT: BELT COLLINS (LEE SICHTER)
Attached for your review and comment is an application for:

Cluster: [ ] Agricultural [ ] Country [ ] Housing	[ ] **Park Dedication**	**Special Management Area Use Permit:** [ ] Minor [ ] Major
	D.E.A. for [X] **Plan Review Use**	[ ] **Variance from LUO Sec.(s):**
Conditional Use Permit: [ ] Minor [ ] Major	**Planned Development:** [ ] Housing [ ] Commercial (WSD Only) [ ] Resort (WSD Only)	[ ] **Waiver from LUO Sec.(s):**
[ ] **Existing Use:** (Indicate Type of Use)	[ ] **Shoreline Setback Variance**	[ ] **Zoning Adjustment, LUO Sec.(s):**
[ ] **Minor Shoreline Structures Permit**	**Special District Permit:** [ ] Minor [ ] Major	[ ] **201G Project**
[ ] **Modify Approved Permit:** (Indicate Reference File No.)	(Indicate District) [ ] Downtown Height >350 Feet	

Additional Notes: PLEASE VERIFY LUO DATA PRESENTED IN EA, SUCH AS DEVEL. FLR. AREA, PARKING, ETC., TO ENSURE IT MATCHES ZPRB INFORMATION.

Due to statutory time constraints, we require your reply by: SEPT. 7, 2007

If you have any questions, or require clarification, please contact the planner listed above. ***Mahalo.***

Return to Land Use Permits Division

Date: 9/5/07

To:			Initial	Date
UDB ___	[X]	No comments	SA	9/5
LUAB X	[ ]	See attached response	___	___
ZRPB ___				

Attachment(s)

reqcmnts.fam(5/01/01)

September 21, 2007
2007.33.0400 / 07P-383

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

Dear Mr. Eng:

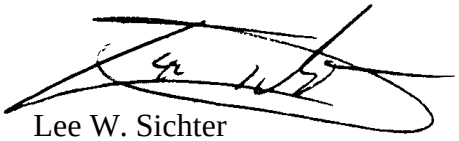
Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Ms. Pamela Davis of your office transmitted to Belt Collins copies of Department of Planning and Permitting "Request for Comments" forms. We are writing to acknowledge that regarding the subject project the Wastewater Branch and the Civil Engineering Branch responded as "no comments" to Ms. Davis on September 5, 2007 and September 7, 2007 respectively on these forms.

Thank you for participating in the Chapter 343 (HRS) public and agency review process.

Sincerely yours,

BELT COLLINS HAWAII LTD.



Lee W. Sichter
Principal Planner

LWS:MJO:lf

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 ▪ Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

2007/452056-2496

DOWNTOWN NEIGHBORHOOD BOARD NO. 13
c/o NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET ROOM 400 • HONOLULU, HAWAII, 96813
PHONE (808) 527-5749 • FAX (808) 527-5760 • INTERNET: http://www.honolulu.gov

September 7, 2007

Mr. Henry Ing, FAICP
Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th floor
Honolulu, HI 96813

RE: Plan Review Use Permit, Draft Environmental Assessment (DEA)
Queen's Medical Center Electrical System Upgrade

Dear Mr. Ing:

The Downtown Neighborhood Board at its meeting on September 6th, 2007, considered the DEA for construction of a new electrical generator building and addition of four new generators for Queen's Medical Center.

The board unanimously approved this project in the form described in the DEA proposal. We value the service that Queen's Medical Center brings to Honolulu and especially to our neighborhood. They have been good neighbors in general and we have favored the improvements they have made to their campus. Addition of a greater emergency generator capability will enhance their ability to provide important emergency medical services to our community.

We recognize that that these new generators will bring some noise to the neighborhood but understand that there are no immediate residential neighbors and that day-to-day traffic noise in that area is about equivalent to the noise of the generators.

Accordingly, the Downtown Neighborhood Board supports the Planned Review Use Permit application for this new development.

Sincerely,

Tom Smyth, CEcD
Chair

September 21, 2007
2007.33.0400 / 07P-381

Mr. Tom Smyth, Chair
Downtown Neighborhood Board No. 13
c/o Neighborhood Commission
530 South King Street, Room 400
Honolulu, HI 96813

Dear Mr. Smyth and Members of Downtown Neighborhood Board No. 13:

Draft Environmental Assessment
The Queen's Medical Center – Electrical Systems Upgrade Project
1301 Punchbowl Street, Honolulu, Hawaii

Thank you for your September 7, 2007 letter which states that the Board unanimously approved this project in the form described in the Draft Environmental Assessment. The Queen's Medical Center appreciates your continued support and recognition of this vital project.

Thank you for participating in the Chapter 343 (HRS) public and agency review process.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Lee W. Sichter
Principal Planner

LWS:MJO:lf

Honolulu
Guam
Hong Kong
Philippines
Seattle
Singapore
Thailand

Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200 ▪ Honolulu, Hawaii 96819-4554 USA
T/808 521 5361 ▪ F/808 538 7819 ▪ honolulu@beltcollins.com ▪ www.beltcollins.com

8 REFERENCES

AES Design Group, Inc. Design drawings for the proposed Generator Building.

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City and County of Honolulu, Department of Planning and Permitting April 2003. *Land Use Ordinance.*

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Cultural Surveys Hawaii, Inc. October 2005. *Monitoring Plan in Support of The Queen's Medical Center Redevelopment Project.*

Hawaii State Legislature. *Hawaii Revised Statutes, Chapter 343, Environmental Impact Statements*. http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0343/HRS_0343-.HTM accessed March 2007.

Hawaii State Legislature. *Hawaii Revised Statutes, Chapter 344, State Environmental Policy.* http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0344/HRS_0344-.HTM accessed March 2007.

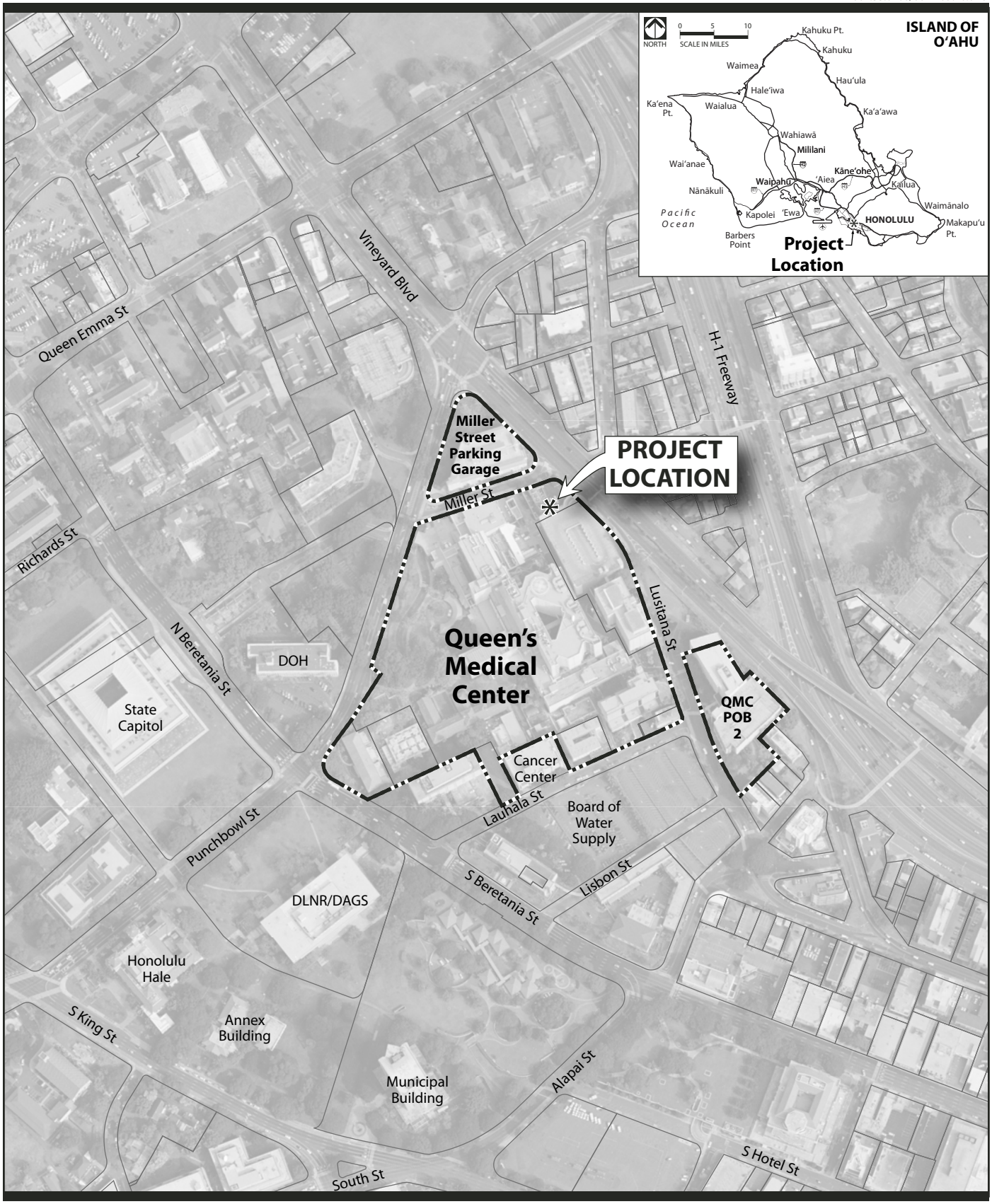
Kusao & Kurahashi, Inc. June and July 2006. *Request for a Land Use Ordinance Amendment to the Hawaii Capitol Special District, Height and Open Space Precincts.*

Kusao & Kurahashi, Inc. June 2006. *Rezoning Application Report – Queen's Medical Center.*

Kusao & Kurahashi, Inc. March 28, 2006. *Application for a Minor Modification to Plan Review Use Permit.*

Kusao & Kurahashi, Inc. March 2004. *Queen's Medical Center – Plan Review Use Permit Application.*

Figures



BeltCollins

NORTH

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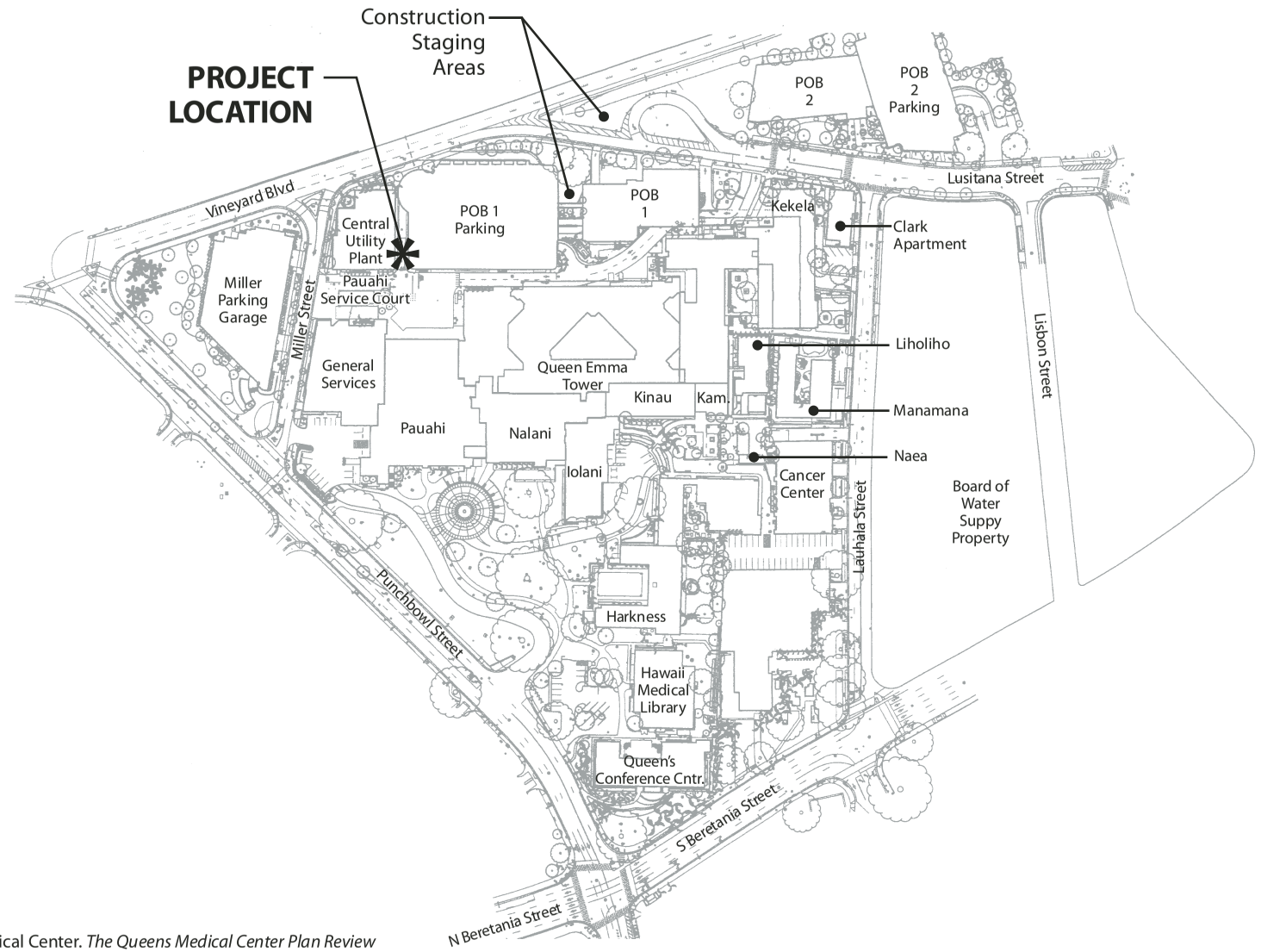
SCALE IN FEET

Figure 1
PROJECT LOCATION MAP

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



Source: Queen's Medical Center. *The Queens Medical Center Plan Review Use 5-Year Master Plan.* March 8, 2004.

BeltCollins

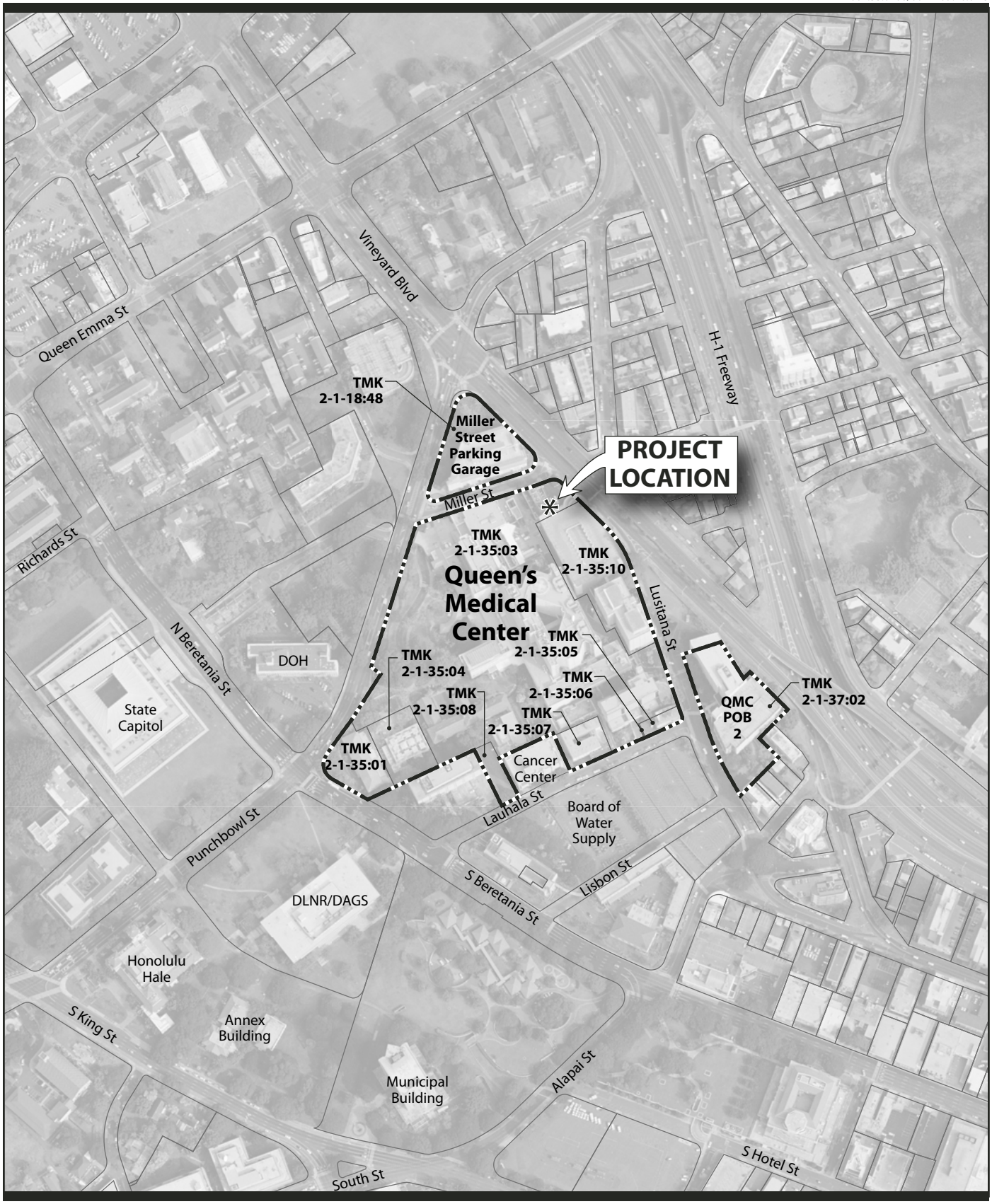
0 50 100 150 200 250

SCALE IN FEET

Figure 2

QUEEN'S MEDICAL CENTER—EXISTING CAMPUS SITE PLAN

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



BeltCollins

NORTH

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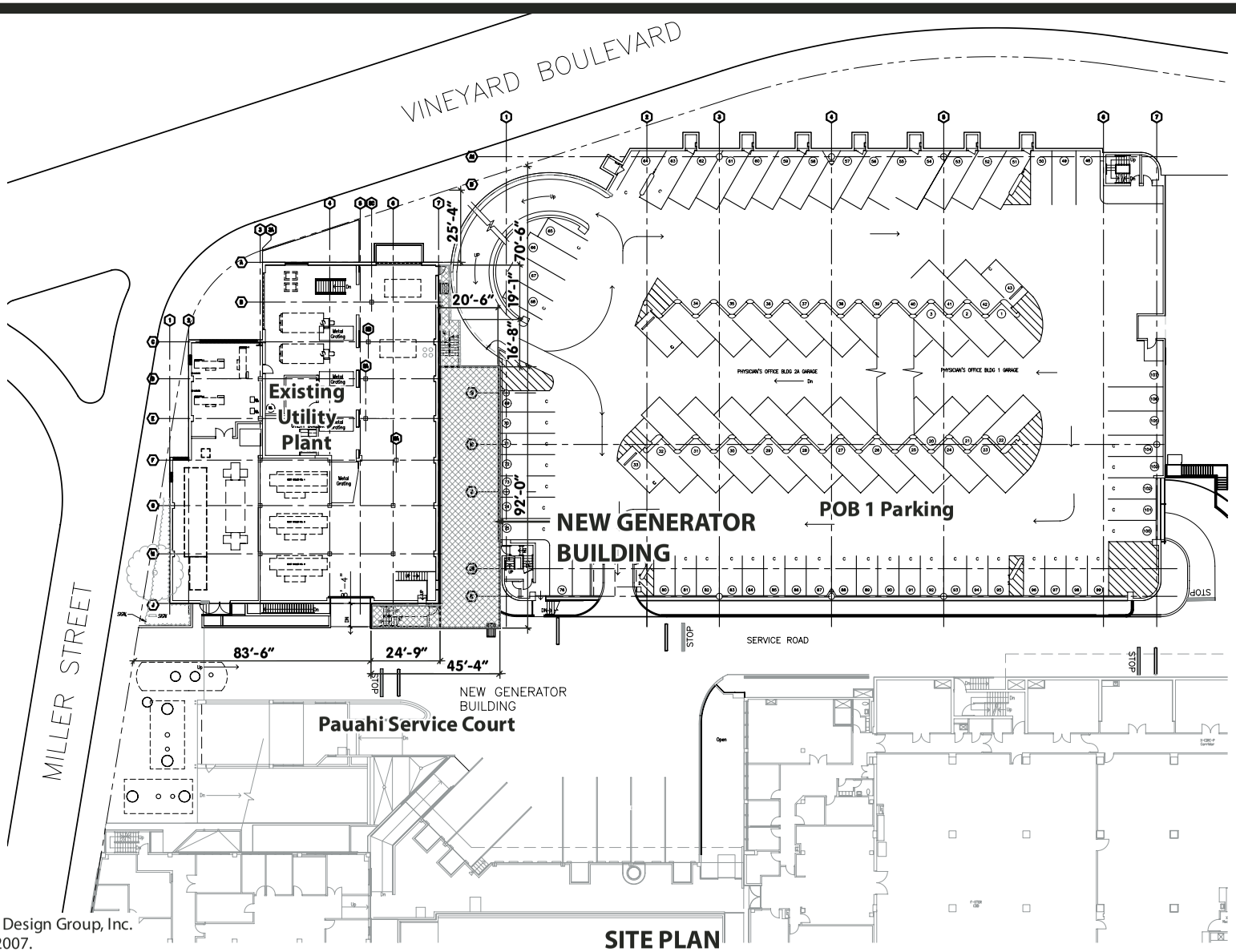
SCALE IN FEET

Figure 3
TAX MAP KEY

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



Source: The AES Design Group, Inc.
September 20, 2007.

Belt Collins

NORTH

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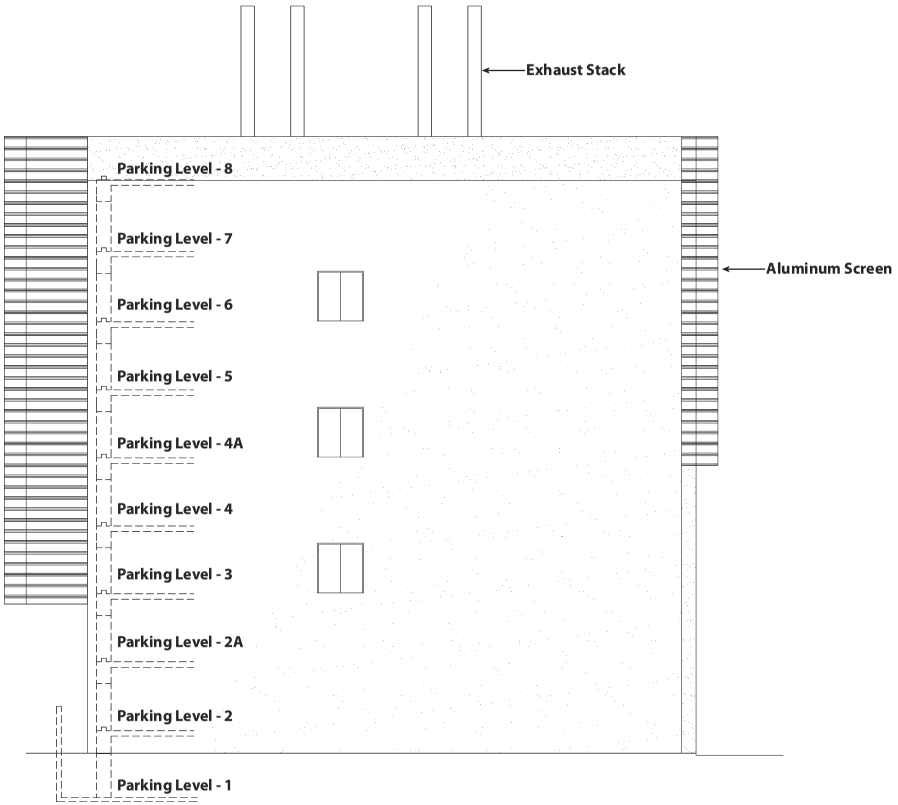
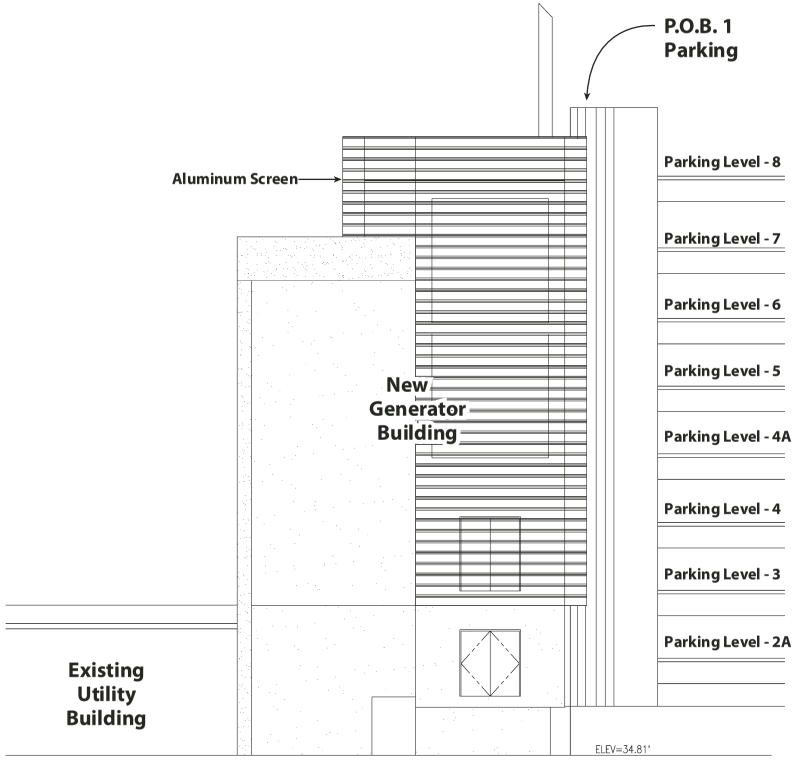
SCALE IN FEET

Figure 4
GENERATOR BUILDING SITE PLAN

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



SOUTH ELEVATION



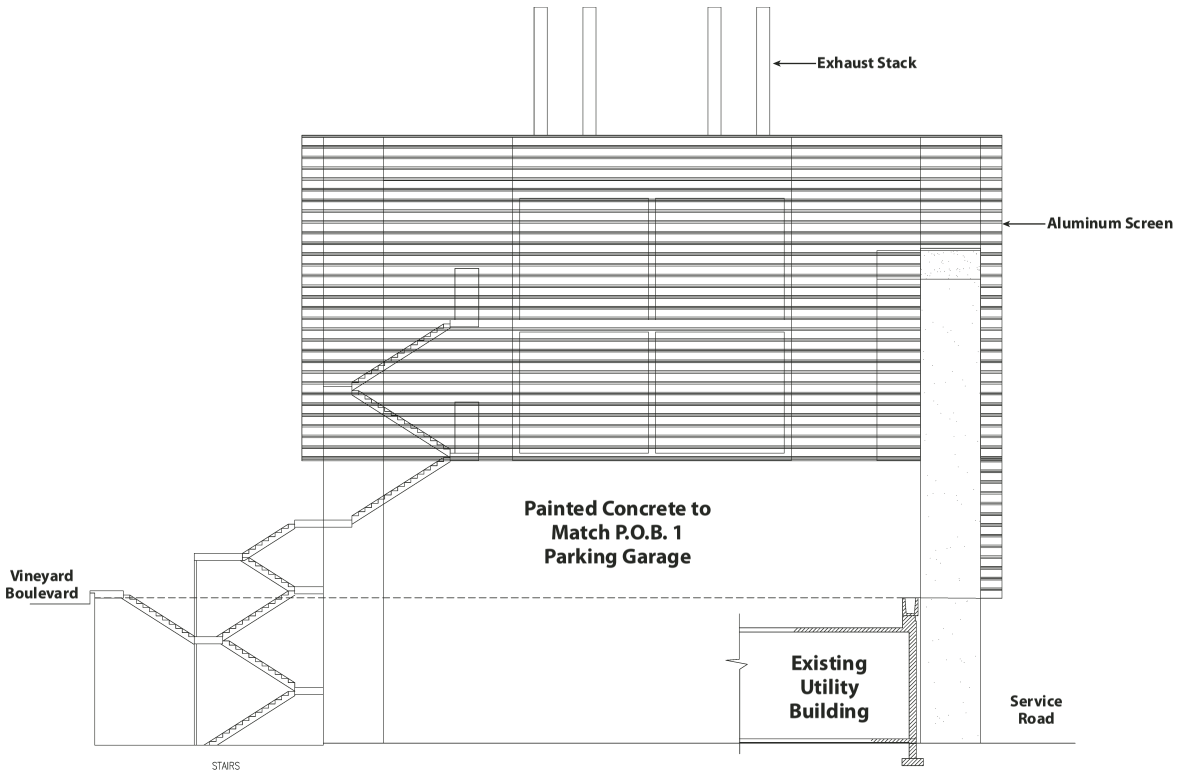
WEST ELEVATION

Not to Scale

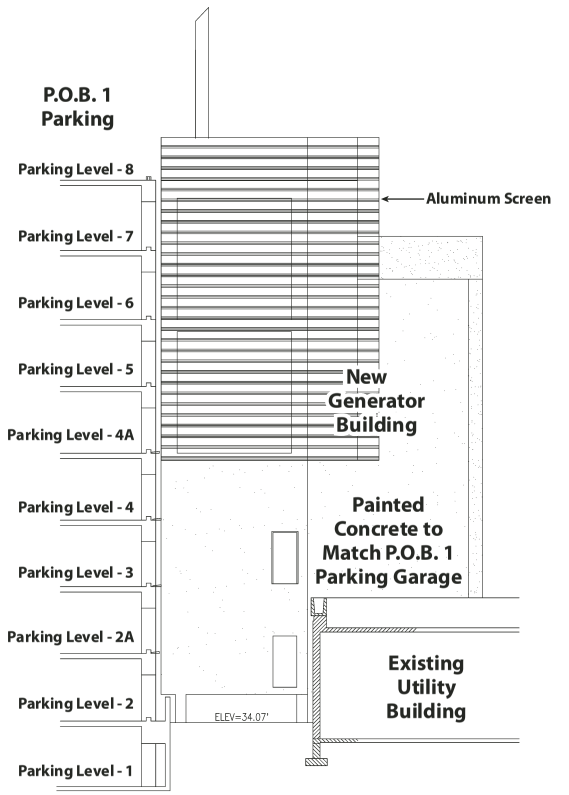
Source: The AES Design Group, Inc.
June 21, 2007.

Figure 5
GENERATOR BUILDING ELEVATIONS

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



NORTH ELEVATION



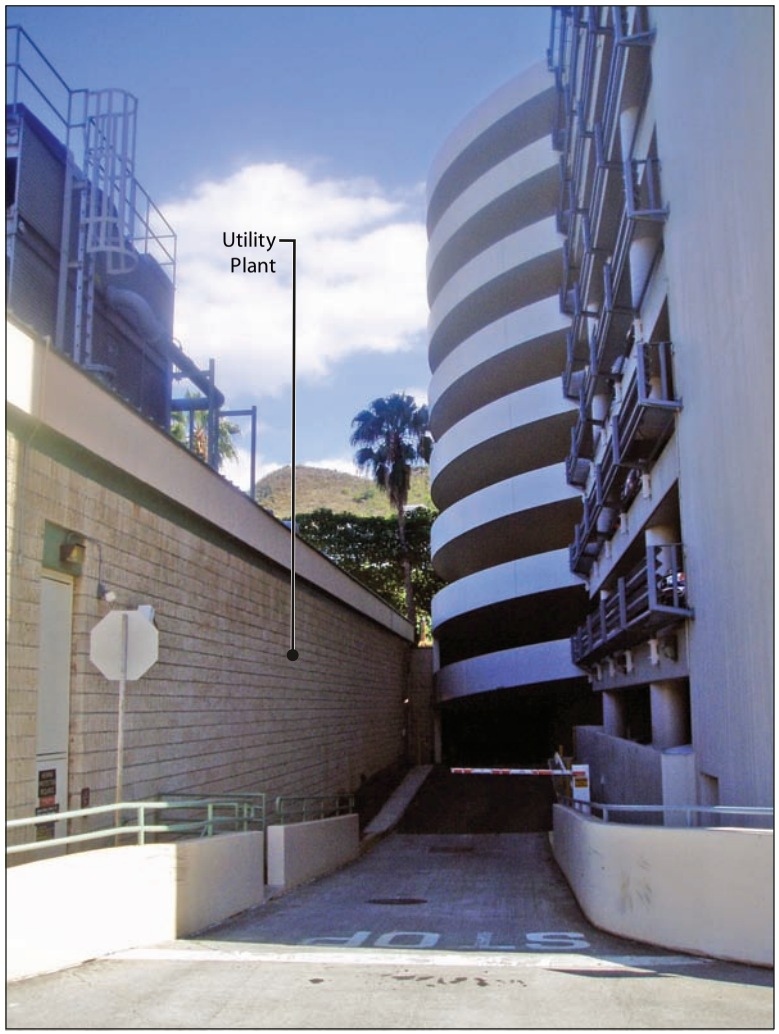
EAST ELEVATION

Not to Scale

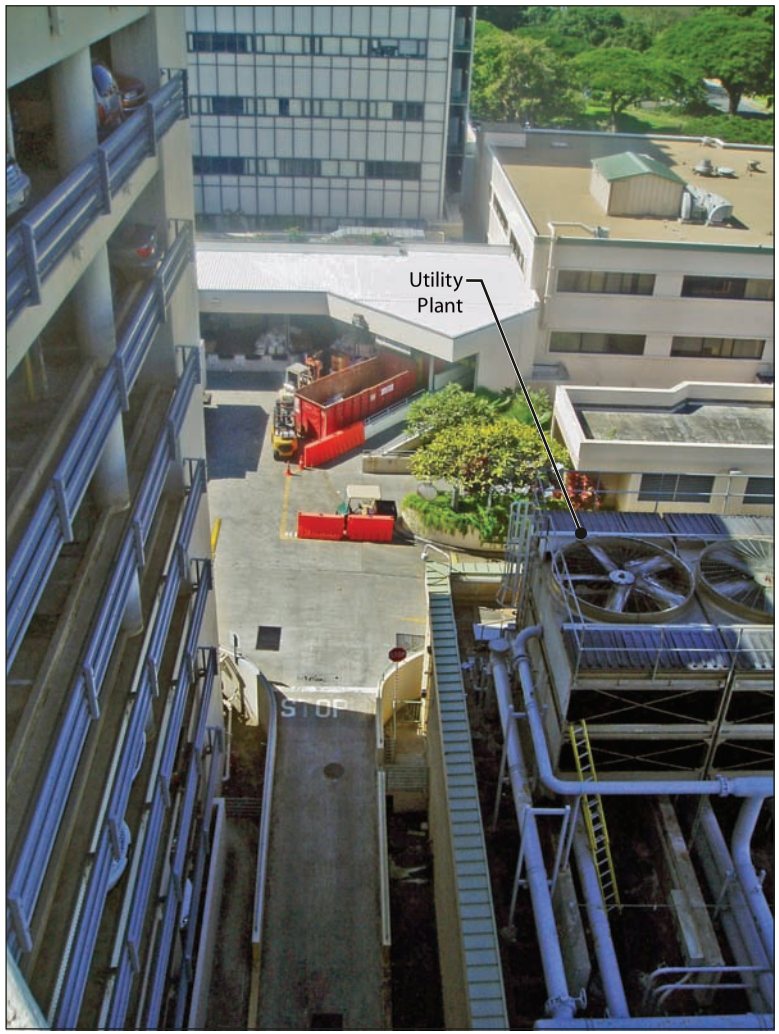
Source: The AES Design Group, Inc.
June 21, 2007.

Figure 6
GENERATOR BUILDING ELEVATIONS

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



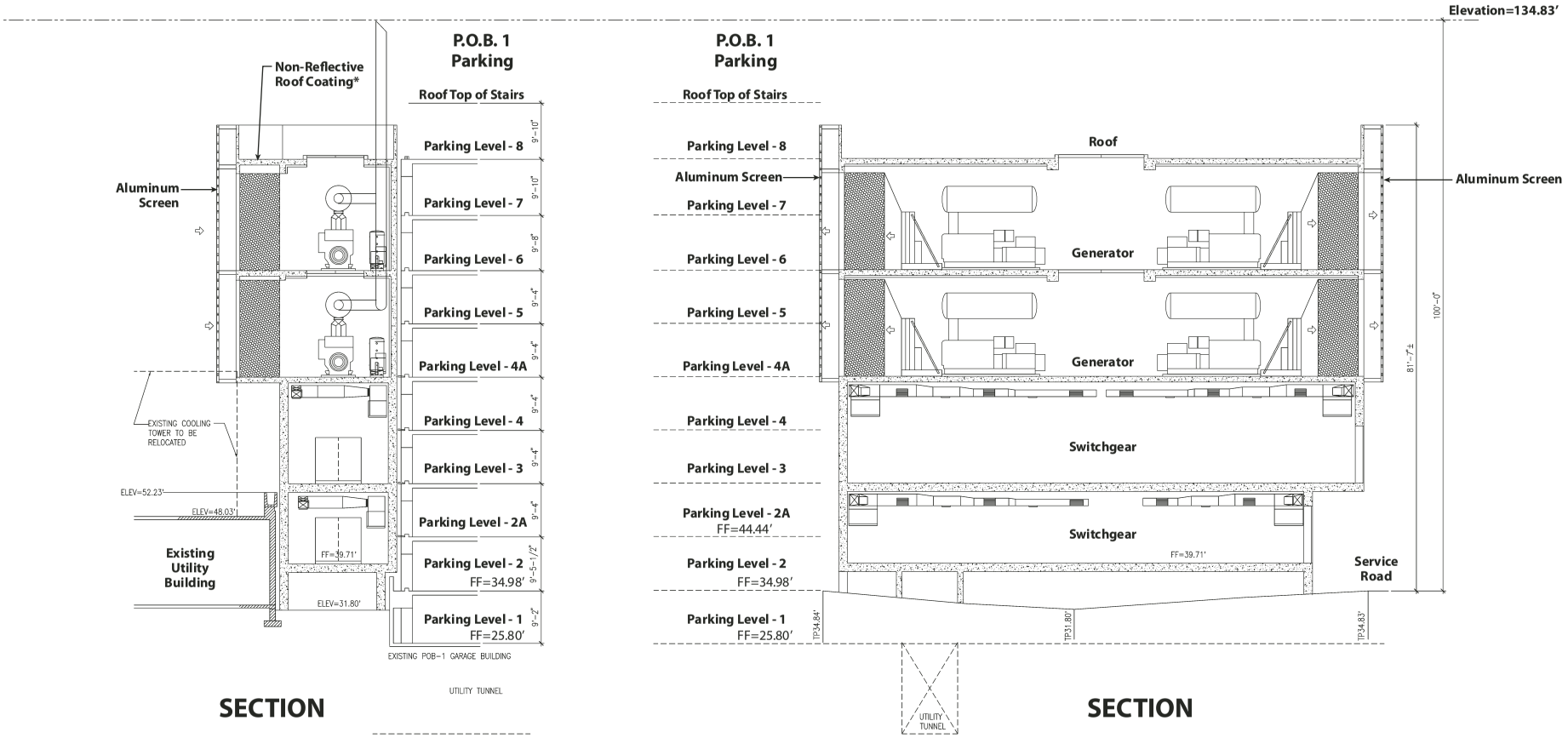
POB 1 Parking Garage ewa/makai exit.



View of exit from POB 1 Parking Garage.

Figure 7
EXISTING POB 1 PARKING GARAGE EWA/MAKAI EXIT DRIVEWAY

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



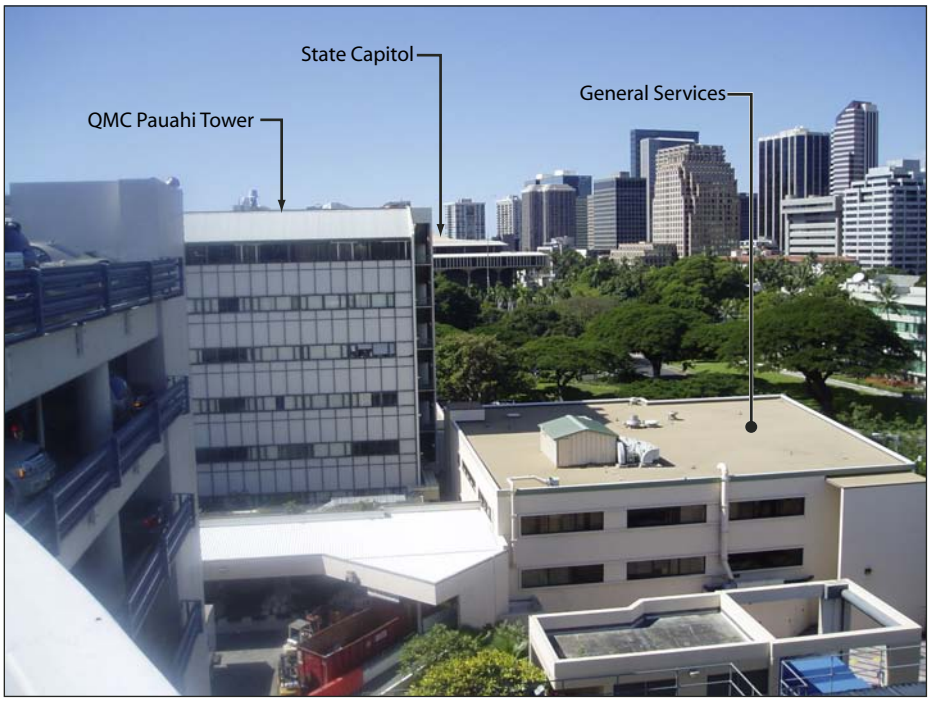
*Roof color will comply with Hawaii Capitol Special District guidelines.

Not to Scale

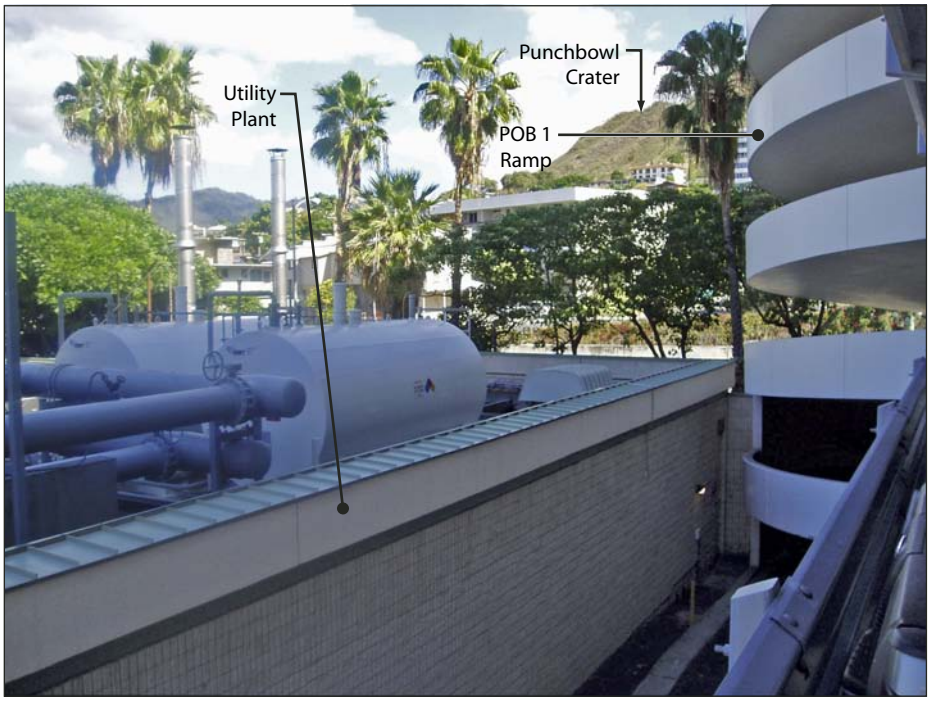
Source: The AES Design Group, Inc.
June 21, 2007.

Figure 8
GENERATOR BUILDING SECTION

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



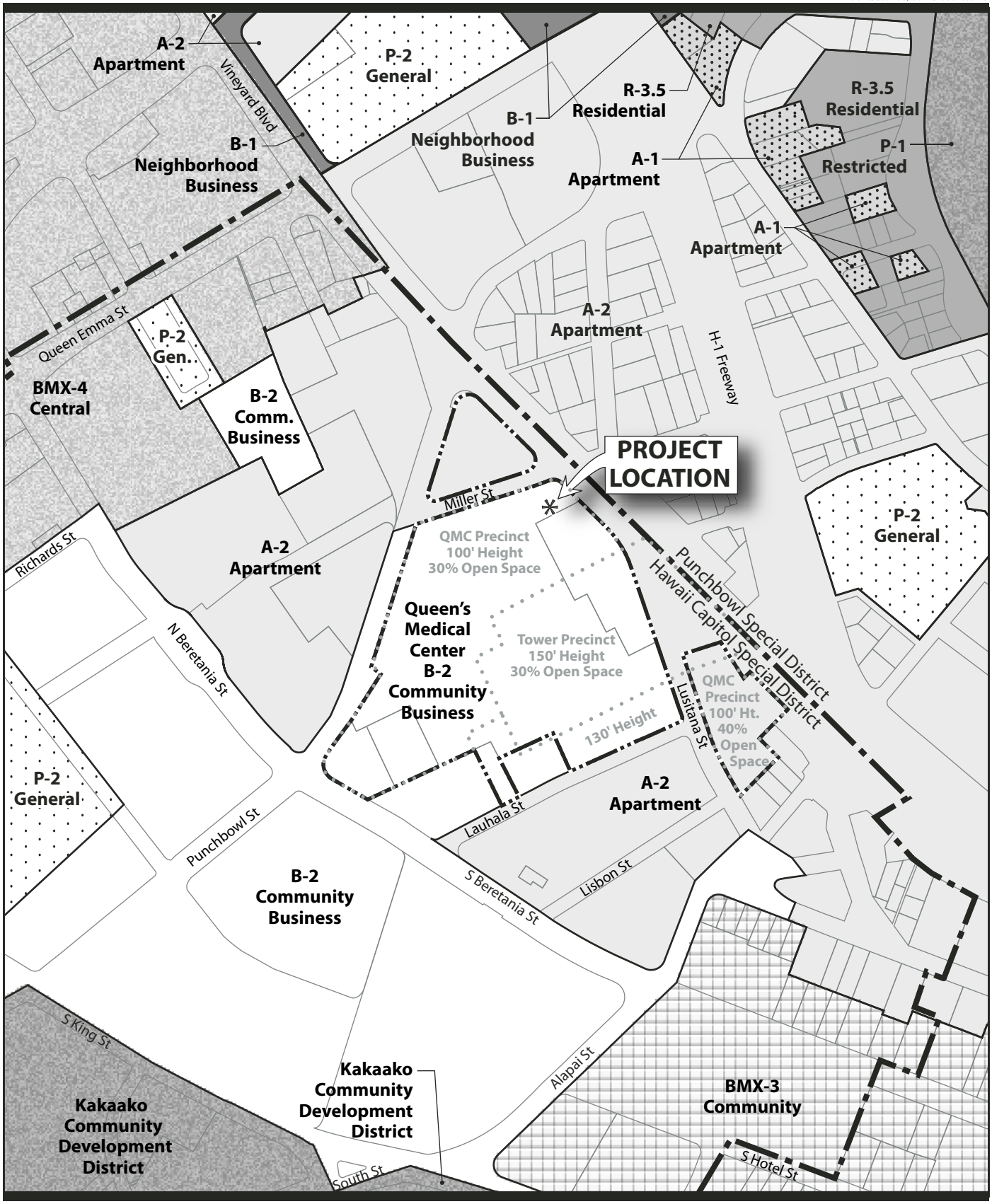
Looking towards State Capitol.



Looking towards Punchbowl Crater.

Figure 9
VIEWS FROM PROJECT SITE

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



NORTH

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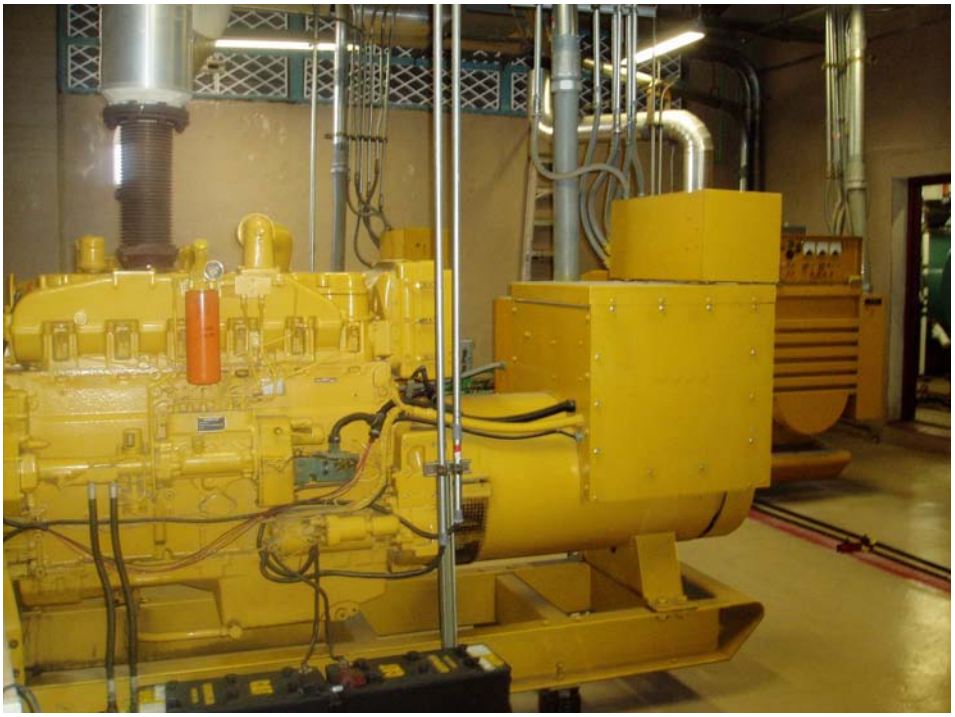
Figure 10
ZONING DESIGNATIONS

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007

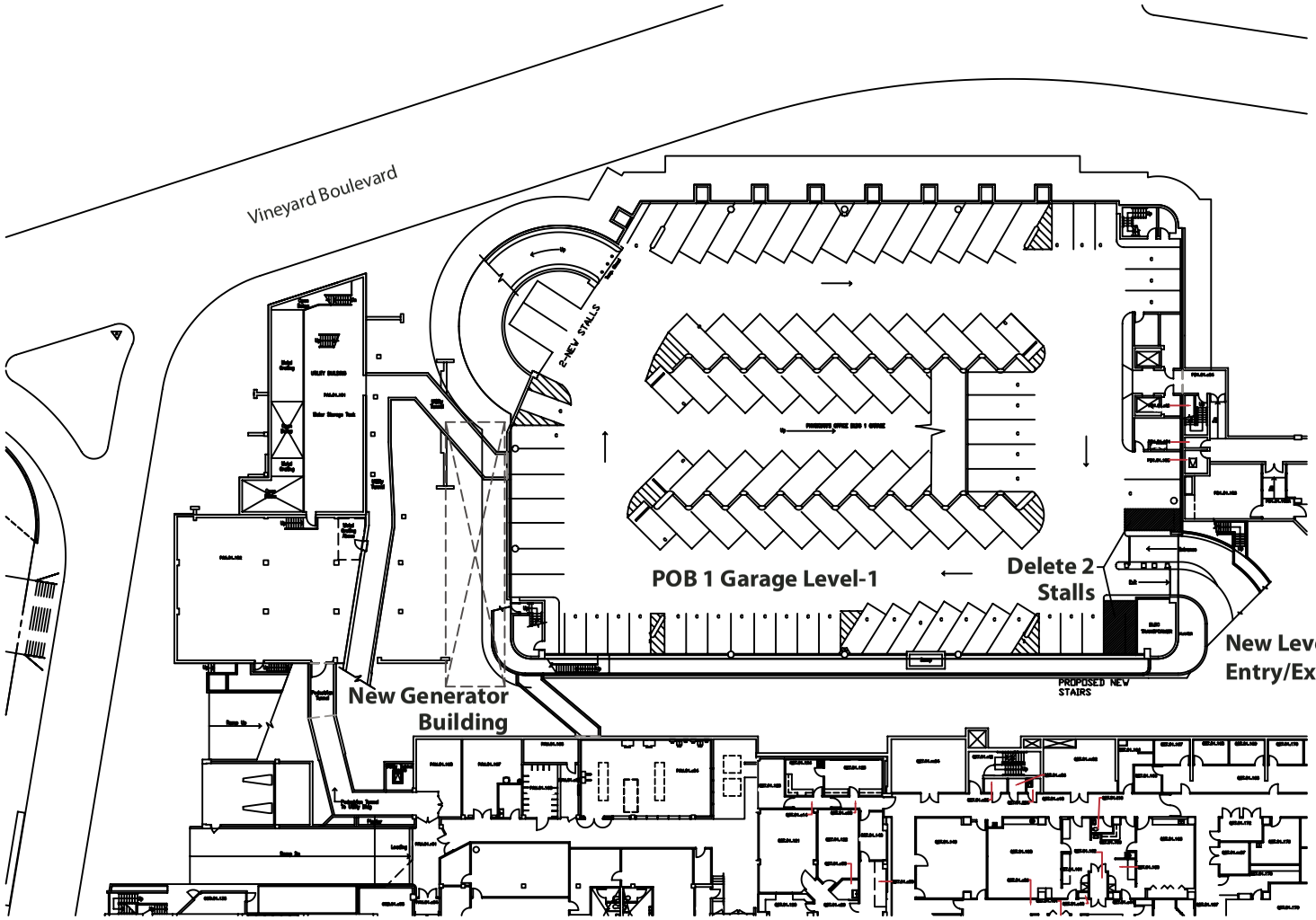
Puahi Service Court Generator Room.



Utility Plant Building Generator Room.

Figure 11
EXISTING GENERATORS

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



Source: The AES Design Group, Inc.

Belt Collins

NORTH

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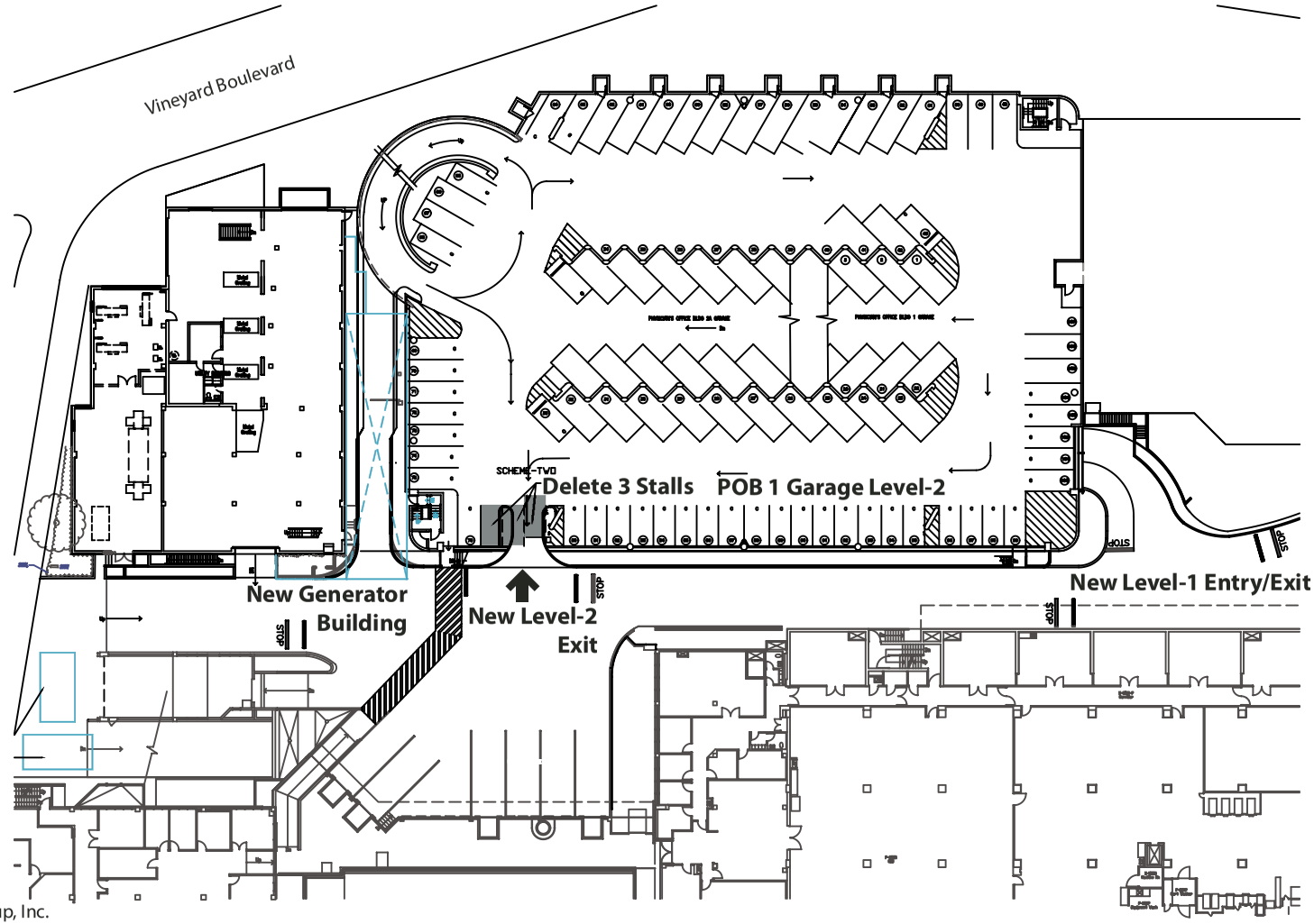
SCALE IN FEET

Figure 12
POB 1 GARAGE LEVEL 01 PARKING STALLS TO BE REMOVED

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



Source: The AES Design Group, Inc.
July 11, 2006.

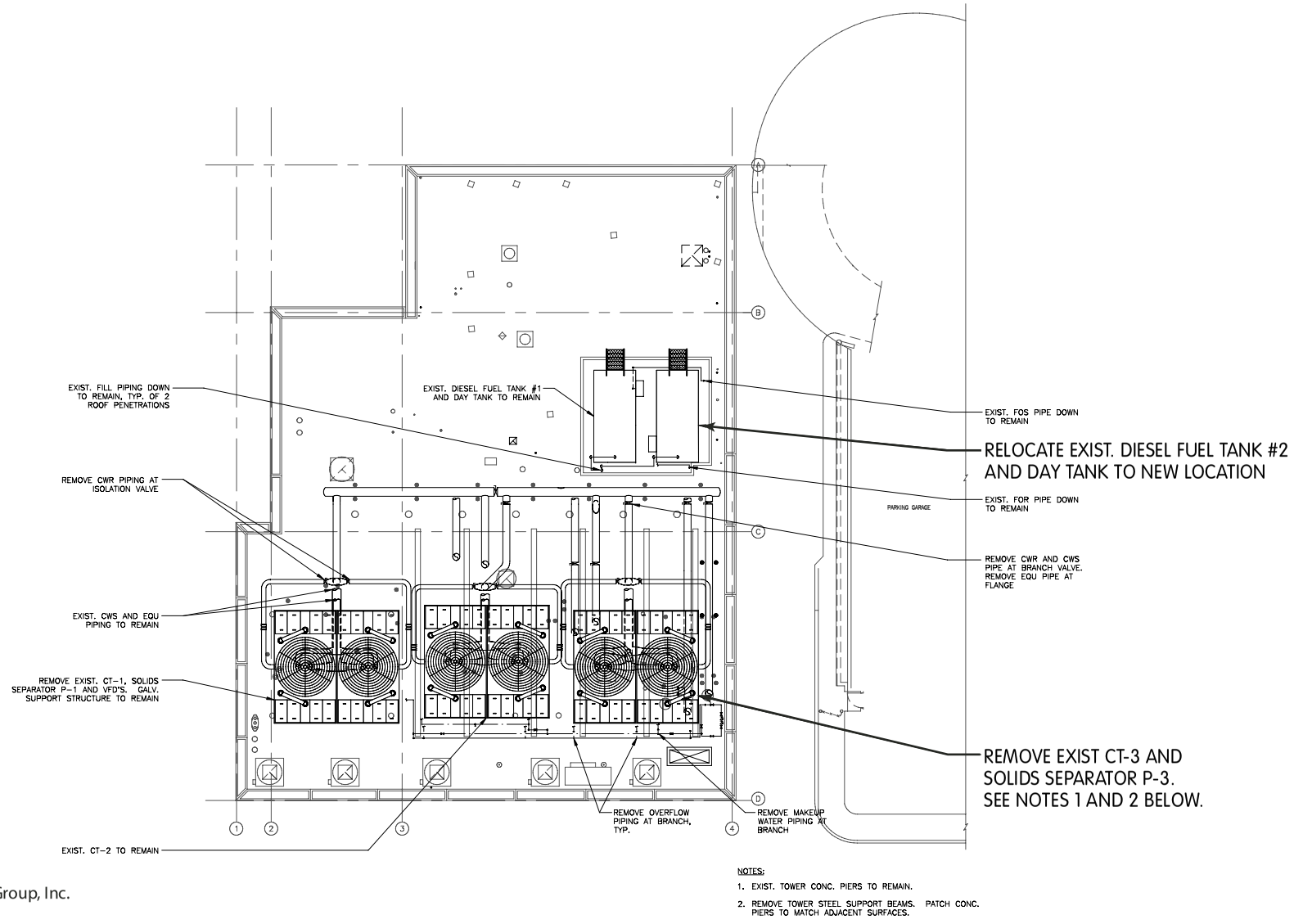
Belt Collins

NORTH

0 15 30 60
SCALE IN FEET

Figure 13
POB 1 GARAGE LEVEL 02 PARKING STALLS TO BE REMOVED

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



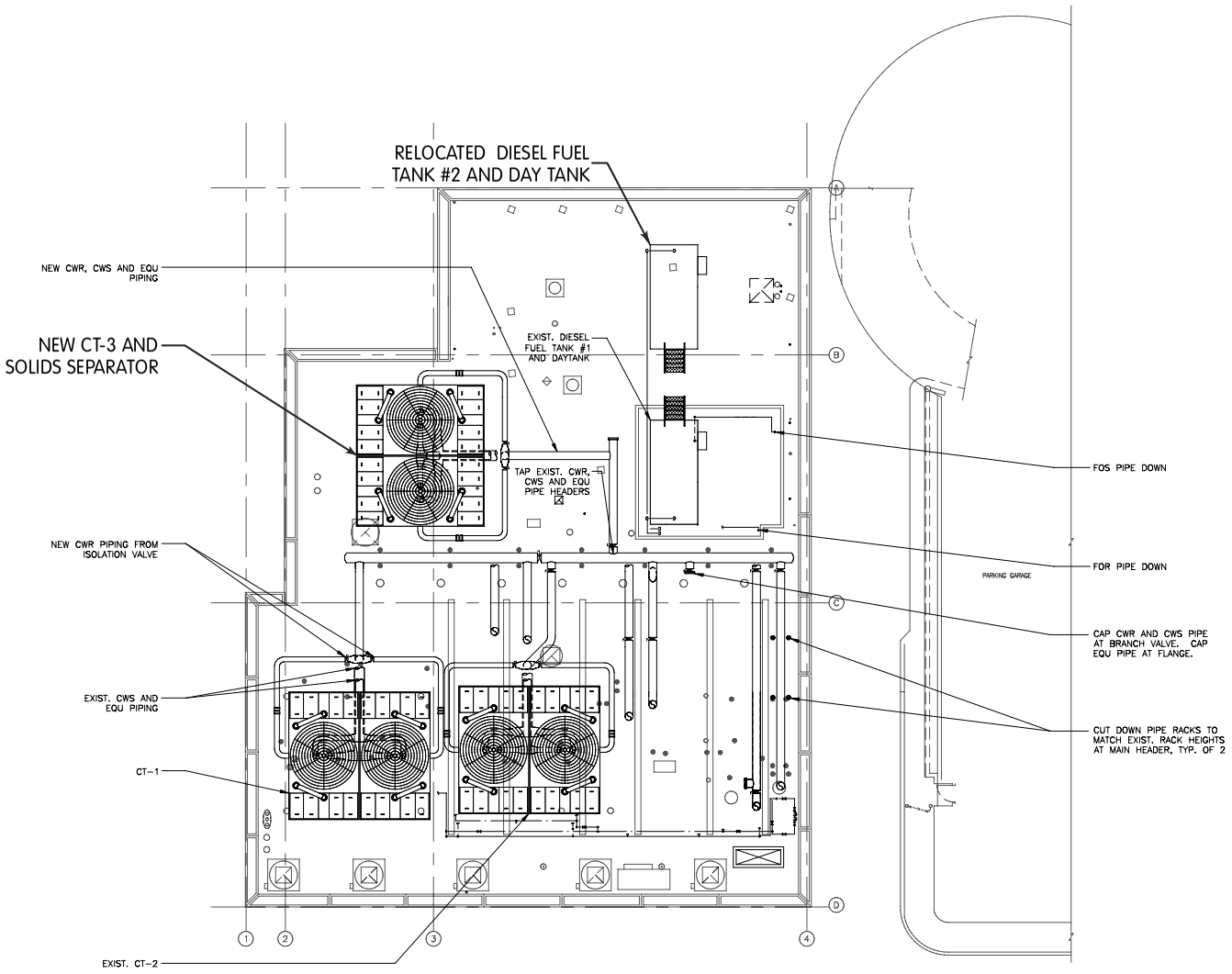
Source: The AES Design Group, Inc.
September 20, 2007.

Belt Collins

0 15 30
SCALE IN FEET

Figure 14
UTILITY BUILDING ROOF—EXISTING CONDITIONS

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007



Source: The AES Design Group, Inc.
September 20, 2007.

Belt Collins

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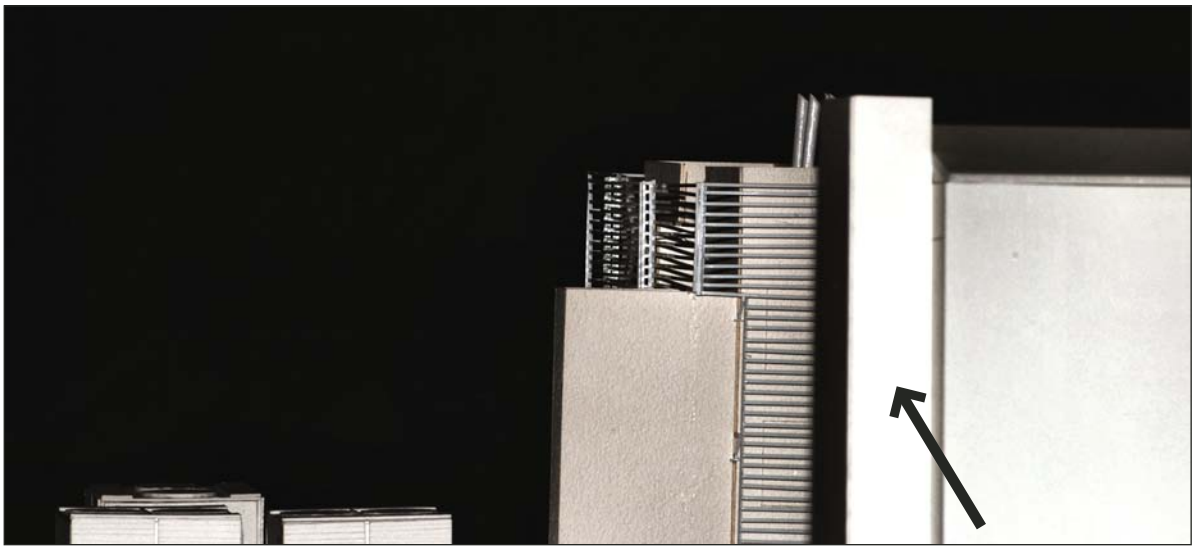
SCALE IN FEET

Figure 15
UTILITY BUILDING ROOF—PROPOSED CONDITIONS

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007

View of Punchbowl from the 5th Floor of the State Capitol Building.



View of architectural model from same approximate vantage point.

Note: The arrow indicates the existing elevator shaft abutting the parking garage. As evidenced in the view of the model, the proposed generator building will not exceed the elevator shaft in height and therefore will not encroach into views of Punchbowl from the Capitol.

Figure 16
MAUKA VIEW FROM 5TH FLOOR OF STATE CAPITOL BUILDING

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007

Figure 17
OPEN SPACE PLAN

Final Environmental Assessment
Queen's Medical Center Electrical Upgrade Project
Prepared for Queen's Medical Center
Prepared by Belt Collins Hawaii—September 2007

Appendix A

Y. Ebisu & Associates
Acoustical and Electronic Engineers

1126 12th Ave., Room 305
Honolulu, Hawaii 96816
Ph. (808) 735-1634 – Fax (808) 732-0409
e-mail: ebisuyassoc@aol.com

YEA Job #45.017
June 12, 2007

The AES Design Group, Inc.
98-1005 Moanalua Road, Suite 213
Pearlridge Center Uptown
Aiea, Hawaii 96701

Attention: Mr. Dexter S. Yee, P.E.

Subject: Acoustical Treatment Recommendations for Emergency Generator Rooms with Four, 2250 kw, Tier 1 Generators with Remote Radiators; Queen's Medical Center Electrical System Upgrade

Dear Mr. Yee:

The following letter report provides our acoustical design goals, and initial acoustical recommendations for the Generator Rooms at the subject facility.

1. ACOUSTICAL DESIGN GOALS

1.1 State Department of Health (DOH) Noise Regulations

The Queen's Hospital project site is currently zoned B-2 (Community Business District), with multifamily dwelling units mauka (north) of Vineyard Boulevard being the closest noise sensitive uses to the Generator Rooms. Current DOH noise limits for commercial or multifamily zoning along all property boundaries or at receptor locations are 60 dBA and 50 dBA for the daytime and nighttime periods, respectively, where the daytime period is from 7:00 am to 10:00 pm and the nighttime period is from 10:00 pm to 7:00 am. When it is not feasible to meet the DOH noise limits, the DOH regulations require use of best available noise control technology for emergency generators, and are typically not enforced during emergencies.

1.2 Basis of Acoustical Design

The State DOH noise limits of 60 dBA and 50 dBA were used to define the acoustical design goals for this project. The State DOH nighttime noise limit of 50 dBA along or within the project's property boundary lines is the most stringent requirement to be met. Based on the sound level predictions of the planned generator installation, approximately 37 dB of sound attenuation will be required to meet the State DOH nighttime limit of 50 dBA at the closest noise sensitive living unit. It should be possible to meet the DOH daytime limit of 60 dBA at the closest noise sensitive living unit (2-story business with upstairs living unit) at the intersection of Miller Street, Lusitana

Street, and Vineyard Boulevard. The noise level of 60 dBA at the closest noise sensitive living unit was adopted as the acoustical design goal for this facility to comply with the DOH limits during daytime generator testing operations.

In order to verify that adverse noise impacts would not occur during daytime operation of the emergency generators, background ambient noise measurements were obtained at the closest noise sensitive living unit on June 6, 2007 from 8:49 am to 9:19 am. The results of the measurements are shown in Figure 1 and indicated that existing daytime background noise levels at the closest receptor location are at least 2.5 dBA higher than the DOH daytime noise limit of 60 dBA, so that adverse noise impacts from the new generator facility should not occur at the closest noise sensitive receptor locations if the design goal of 60 dBA is achieved and if the generators are tested during the daytime period.

Measurements of background noise levels at the closest noise sensitive living unit during the early morning of June 10, 2007 are shown in Figure 2, and indicated that existing background noise levels currently exceed the State DOH nighttime limit of 50 dBA.

2. ACOUSTICAL ASSUMPTIONS:

1. Caterpillar 2,250 KW, Tier 1, 3516B Generator with Remote Radiator: Free-field generator casing noise level of maximum 98 dBA at 23 FT distance.

2. Remote Radiator Fan Airflow: 75,221 CFM.

3. Remote Radiator Noise Level: 91 dBA at 23 FT distance.

4. Maximum Static Pressure Drop of Intake Plus Exhaust Air Duct Silencers: less than 0.25 (inches of water).

5. Minimum Size of Intake and Discharge Air Openings: 115 SF (intake) and 106 SF (discharge).

6. Exhaust Pipe Noise Level with Critical Grade (30 dBA) Muffler: 74 dBA at 23 FT distance.

3. INITIAL ACOUSTICAL RECOMMENDATIONS:

1. Walls and Ceiling: I assumed that the exterior walls of each Generator Room will be formed from minimum 12" thick dense concrete. Except for treated ventilation openings, all cracks and voids in the walls should be sealed. The roof of the top floor

Generator Room was assumed to be formed from minimum 8" concrete topping.

2. Interior Finish Treatment of Generator Room: The underside of the ceiling and bare wall surfaces (from the ceiling down to the 1 FT height line) of each Generator Room should be treated with 4" total thickness of semirigid fiberglass treatment. The recommended composition of the fiberglass treatment is a 3-1/2" thick inner layer of unfaced, semirigid panels of Owens Corning Type 703 insulation (see ENCLOSURE 1) plus a 5/8" thick outer layer of white Armstrong #2906, film-faced, fiberglass ceiling panel (see ENCLOSURE 2). The insulation may be held in place with fasteners and/or a galvanized metal lath attached to Z-furring channels spaced 24" O.C. (see ENCLOSURES 3A and 3B). Alternately, perforated metal, protective panels (see ENCLOSURE 4) may be used as the outer finish layer, with a 4" thick inner layer of unfaced Owens Corning Type 703 used between the bare wall and the perforated metal panels.

3. Radiator Discharge Air Opening: The use of a Young VB56F-50-252-50H-254 remote radiator (see ENCLOSURE 5) was assumed for this scheme. Radiator air flow of 75,221 cfm, with 106.1 deg F maximum inlet temperature, and with 46 hp motor were assumed. Radiator dimensions are 110.5"h x 101.1"w x 90.4" d. The remote radiators should be mounted on Mason Type ND (see ENCLOSURE 6) vibration isolators. The discharge air opening of each Generator Room should be treated with inline, 7 FT long, IAC 7Ms duct silencers (see ENCLOSURE 7), with a minimum total face area of 106 SF. The duct silencers should be oriented horizontally with a lined transition duct located between the silencers and the remote radiator. The transition duct between the remote radiator and discharge duct silencers should be internally lined with 4" thick semirigid duct liner. An inner layer of unfaced, 3" thick Owens Corning Type 703 insulation plus an outer face layer of 1" thick Owens Corning Duct Liner Board (see ENCLOSURE 8) may be used to construct the 4" thick duct liner. The black coated face of the Duct Liner Board should be exposed within the transition duct.

The silencers may be fabricated from galvanized or stainless steel, and should use fiberglass as the baffle insulation material. Stainless steel construction is recommended for the discharge silencers. The silencers should be tilted to drain outward and with their internal baffles oriented vertically. A bird screen or grill should be added at the exterior end of the discharge air duct. Standard louvers may also be used at the exterior end of the silencers, but the opening may need to be oversized due to the lower effective free area of the louvers.

4. Exterior Door: The exterior doors of each Generator Room should be rated at a minimum STC 50 as an assembly, which includes a fully grouted steel frame, and adjustable, neoprene, compression-type seals along the head, jamb, astragal, and door bottom.

5. Intake Air Opening: It is suggested that the intake air be ducted into the Generator Rooms from the Ewa walls through 7 FT long, IAC 7Ms duct silencers (see ENCLOSURE 7), with minimum total face area of 115 SF. The duct silencers should be tilted downward to drain outward, and the perforated splitter elements in each silencer module should be oriented vertically. Stainless steel construction is recommended for the intake silencer. A rain gutter or eyebrow should be used along the roof overhang above the intake silencer bank. A bird screen or grill should be added at the exterior end of the inlet air silencers. Standard louvers may also be used at the exterior end of the silencers, but the opening may need to be oversized due to the lower effective free area of the louvers.

6. Engine Exhaust Muffler: Two Residential Grade mufflers, connected in series, with minimum 18" pipe size are recommended for each Generator Room. The suggested mufflers are Nelson #41299 (see ENCLOSURE 9) and Nelson #43229 (see ENCLOSURE 9). I am assuming that the exhaust pipe will be thermally insulated with high temperature jacket, and will be resiliently supported. Split collars (which do not make direct contact with the exhaust pipe) should be used on the interior side of the roof penetration by the exhaust pipe, and 1/4" gap (with insulation spacers) should be provided between the exhaust pipe and the collar. The purpose of the collars is to minimize the size of the gap between the exhaust pipe and the structure.

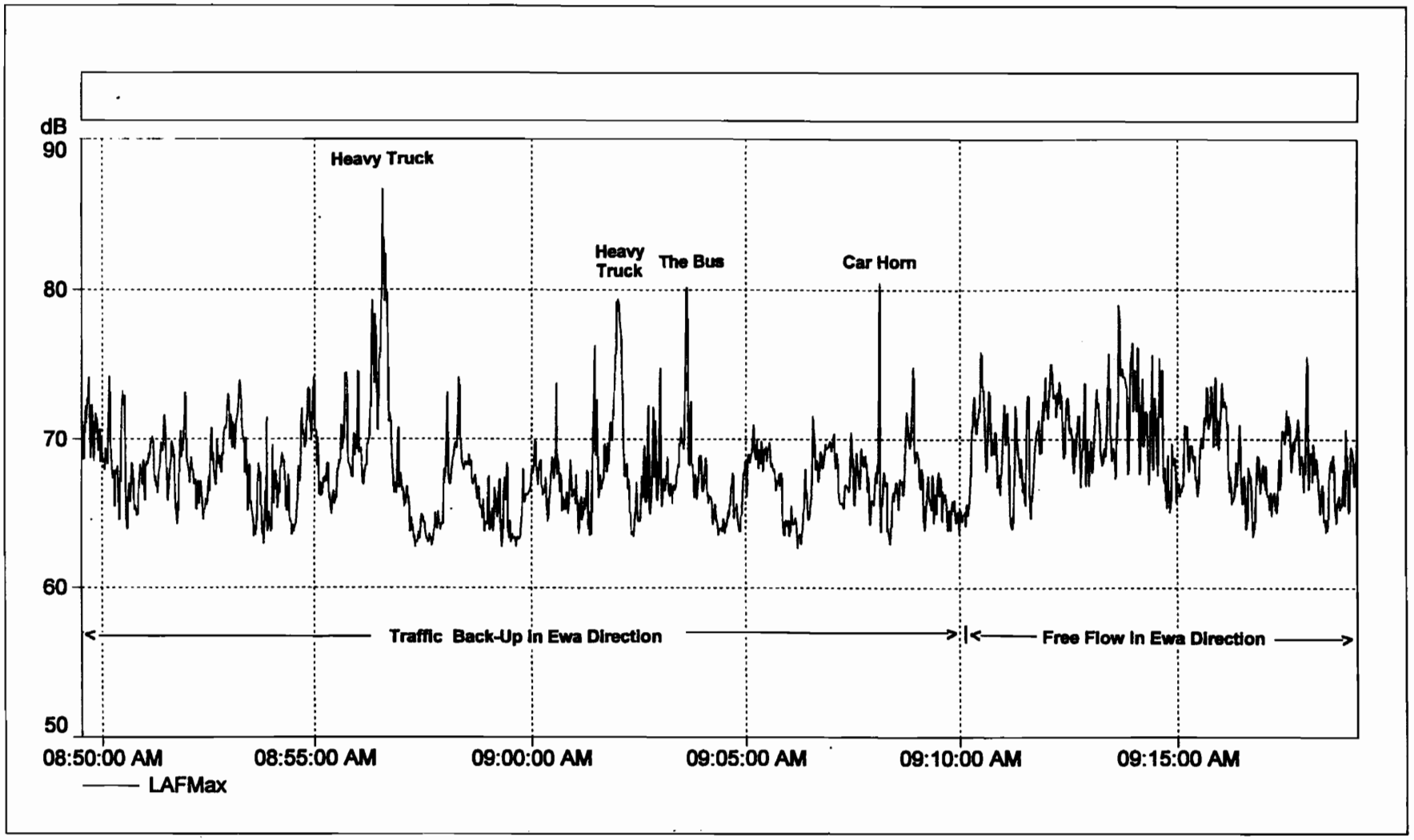
7. Engine Generator Mounts: Spring-plus-neoprene-in-series vibration isolators with minimum 2" static deflection should be used to support the generator. Neoprene grommets and washers should be used as required at all isolator hold-down points (see ENCLOSURE 10). The vibration isolators should be located on outriggers (or height saving brackets), and should include seismic restraints. The stiffness of the floors under the generators should limit the static deflection of the floor slab to 0.2 inches.

If you have any questions regarding these recommendations, do not hesitate to call. You should pass these recommendations on to the other consultants and the potential remote radiator supplier for their review and evaluation.

Sincerely,

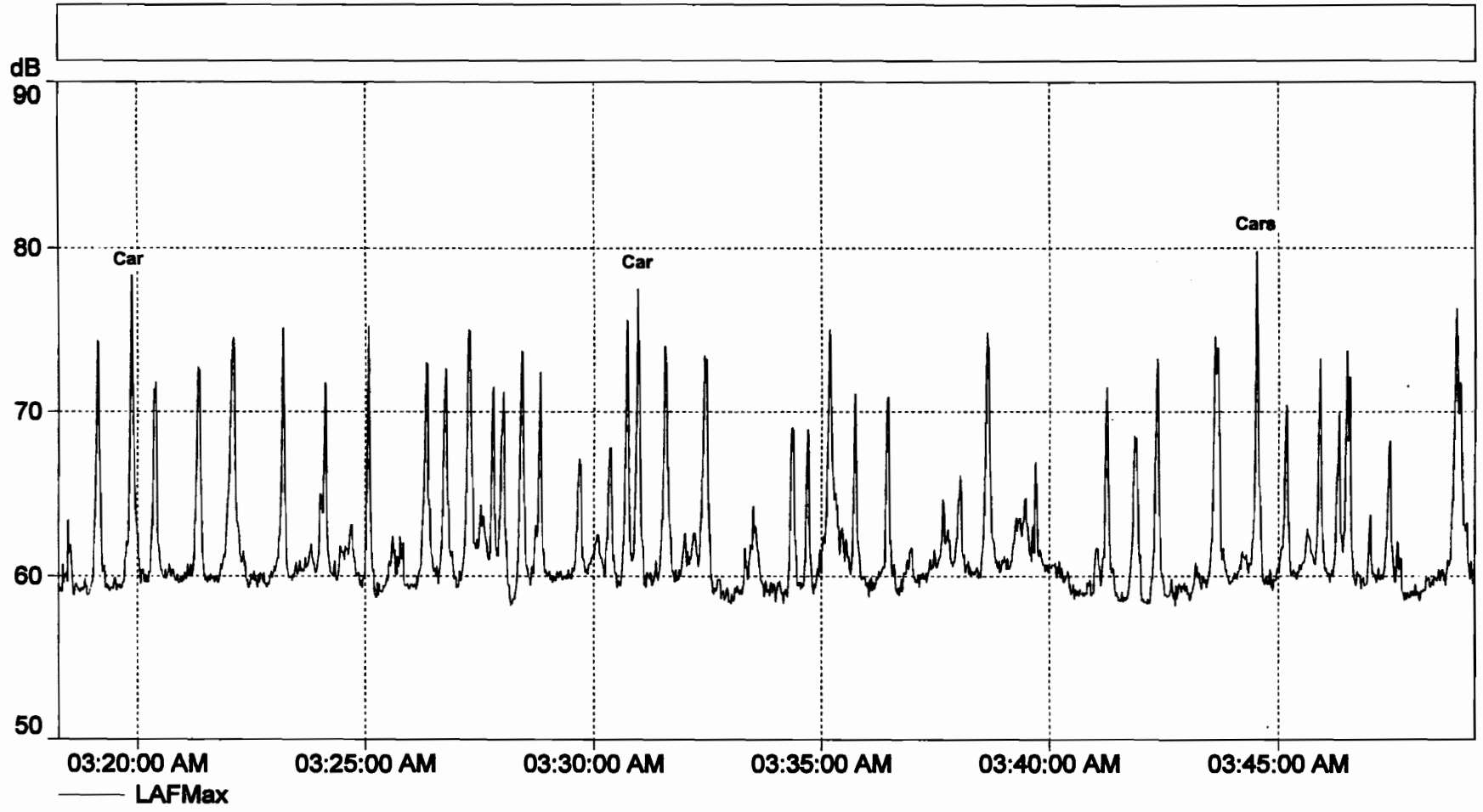
Yoichi Ebisu, P.E.

encl.



BACKGROUND NOISE MEASUREMENTS AT INTERSECTION OF LUSITANA AND MILLER STREETS

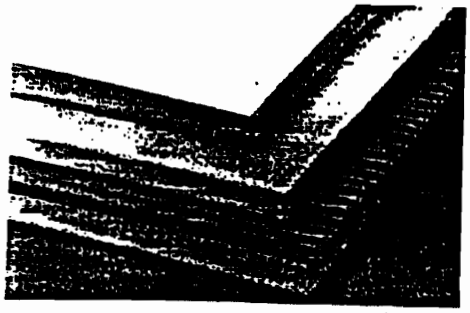
FIGURE 1



NIGHTTIME BACKGROUND NOISE MEASUREMENTS AT INTERSECTION OF LUSITANA AND MILLER STREETS

FIGURE 2

Industrial Insulation 700 Series Plain and Faced



Uses

Owens-Corning 700 Series Fiberglas® plain and faced industrial insulations are a highly versatile group designed to insulate ductwork, equipment, vessels, and tanks, both thermally and acoustically, where operating temperatures do not exceed 450F.

Type 701 is a lightweight, resilient insulation, in board form, used on vessels having irregular surfaces and where the exterior finish is supported by welded studs, pins, or other mechanical attachments.
Type 703 is a semi-rigid board recommended for use on equipment, vessels, and air-conditioning ductwork.
Type 705 is a rigid board with very high strength characteristics for use on chillers, hot and cold equipment, heating and air-conditioning ductwork, and where greater abuse resistance and good appearance is required.

Description

Owens-Corning Fiberglas 700 series industrial insulations are made of inorganic glass fibers preformed into semi-rigid to rigid rectangular boards of varying densities. Each type has specific thermal, acoustical, and physical characteristics which make it suitable for the uses described. Types 703 and 705 are available with factory-applied FRK-25 foil-reinforced kraft facing or ASJ-25 All-Service Jacket facing. Both facings are vapor barriers, and provide a neat and finished appearance.

These products are not designed for use inside ducts or equipment where the insulation is exposed directly to a moving air stream. Contact your local Owens-Corning Fiberglas Mechanical Division salesman for product recommendations.

® Registered trademark, Owens-Corning Fiberglas Corp.

Features and Related Benefits

Exceptional thermal efficiency	Fiberglas 700 series insulation boards save energy and reduce heat transfer, lowering operating costs, in –60F to +450F service.
Available in three densities	A selection of products is offered to meet specific performance and economic requirements.
Structural integrity	700 series insulations resist damage, maintain structural integrity and efficiency. Thickness stays uniform.
Excellent acoustical properties	This versatile group of Fiberglas boards efficiently reduces sound transmission.
Factory-applied facings	Attractive, finished appearance can be attained. Heavier density boards cut neatly, with neat, square corners.
UL listed	Fiberglas 700 series insulation (faced and unfaced) has a UL flame spread rating of less than 25*; this usually permits immediate building code approval, and lower insurance rates.

*This UL rating is used solely to measure and describe the properties of the products in response to heat and flame under controlled laboratory conditions. This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions. Values are reported to the nearest 5 rating.

Flat Surface
Time Rate of Heat Loss
per Unit Area
80 F Ambient Temperature
0.0 Wind Velocity, MPH
0.90 Surface Emittance

ASTM recommended practice for determination of heat loss or gain, and surface temperatures of insulated pipe and equipment systems by the use of a computer program ASTM designation C680.

TYPE 701 *FIBERGLAS* INSULATION

Insulation Thickness (Inches)	Operating Temperature, degrees F													
	150		200		250		300		350		400		450	
	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.
1.5	11	88	20	93	31	100	42	106	56	113	70	121	81	129
2.0	8	86	15	91	23	95	32	101	43	106	54	112	66	119
2.5	7	85	12	89	19	93	26	97	34	102	44	107	54	112
3.0	5	84	10	87	16	91	22	95	29	99	37	103	45	108
4.0	4	83	8	86	12	88	17	91	22	94	28	98	34	102
5.0	3	82	6	84	10	87	13	89	17	92	22	95	27	98
6.0	3	82	5	84	8	86	11	88	15	90	18	92	23	95
7.0	2	82	4	83	7	85	9	87	12	89	16	91	20	93
7.5*	2	81	4	83	7	85	9	86	12	88	15	90	18	92

TYPE 703 *FIBERGLAS* INSULATION

Insulation Thickness (Inches)	Operating Temperature, degrees F													
	150		200		250		300		350		400		450	
	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.
1.0	14	90	26	97	40	105	55	113	72	121	90	130	111	140
1.5	10	87	18	92	28	98	38	104	49	110	62	117	76	129
2.0	7	85	14	90	21	94	29	99	38	104	48	109	58	115
2.5	6	84	11	88	17	91	23	95	30	100	38	104	47	109
3.0	5	84	9	87	14	90	20	93	26	97	32	100	40	105
3.5	4	83	8	86	12	88	17	91	22	95	28	98	34	102
4.0*	4	83	7	85	11	87	15	90	19	93	24	96	30	99

TYPE 705 *FIBERGLAS* INSULATION

Insulation Thickness (Inches)			Operating Temperature, degrees F											
	150		200		250		300		350		400		450	
	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.
1.0	14	90	27	97	40	105	55	113	71	121	89	130	109	139
1.5	10	87	18	92	28	98	38	104	49	110	62	116	75	123
2.0	7	85	14	90	21	94	29	99	38	103	47	109	58	114
2.5	6	84	11	88	17	91	23	95	30	99	38	104	47	108
3.0*	5	84	9	87	14	90	20	93	25	97	32	100	39	104

*Maximum allowable thickness (single or double layer) at maximum operating temperature (450F).

Mounting:

F405: Insulation placed against 24-gauge sheet metal over a 16-inch air space. This mounting configuration is typical of a sheet metal enclosure with insulation on one side.

Sound Absorption Coefficients:

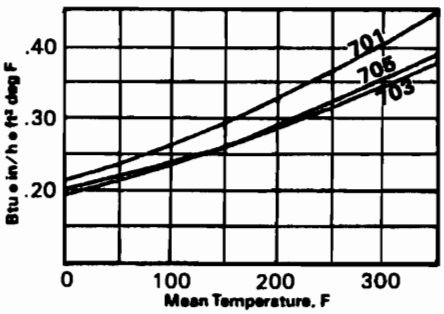
	Unfaced Insulation Type						Faced Insulation Type					
	701		703		705		701	703 FRK or ASJ		705 FRK or ASJ	
Frequency Hz	One-Inch Thickness	Two-Inch Thickness	One-Inch Thickness	Two-Inch Thickness	One-Inch Thickness	Two-Inch Thickness	One-Inch Thickness	Two-Inch Thickness	One-Inch Thickness	Two-Inch Thickness	One-Inch Thickness	Two-Inch Thickness
125	.38	.44	.33	.38	.32	.39		.31	.38	.25	.38
250	.34	.66	.28	.63	.30	.59		.45	.51	.48	.36
500	.68	1.07	.62	1.10	.66	1.06		.62	.83	.28	.39
1000	.82	1.06	.88	1.07	.90	1.08	Not Available	.65	.73	.57	.37
2000	.87	.99	.96	1.05	.95	1.05	Faced	.51	.53	.39	.56
4000	.96	1.06	1.04	1.05	1.01	1.13		.28	.37	.30	.38
NRC	.68	.95	.69	.96	.70	.95		.56	.65	.43	.42

For further Noise Control information, contact your local Owens-Corning Fiberglas representative.

Size and Density:

	701	703	705
Density (pcf)	1.50	3.00	6.00
Thickness (½" (increments)	1½"-4"	1"-2"	1"-2"
Compressive strength (psf at 10% deform.) (psf at 25% deform.)	20	90	350
Standard size (inches)		24"x48"	
Thermal conductivity at 75F mean temp.	0.25	0.23	0.23

Thermal Conductivity:



Vapor transmission rates:

ASJ-25 - .02 perms
FRK-25 - .02 perms

Beach puncture resistance:

ASJ-25 - 50 units
FRK-25 - 25 units

Surface burning characteristics:

(UL 723)*,
unfaced or faced

flame spread*	25
smoke developed	50

*This UL rating is used solely to measure and describe the properties of the products in response to heat and flame under controlled laboratory conditions. This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions. Velues are reported to the nearest 5 rating.

Facings:

Types 703 and 705 are available with the following factory-applied vapor barrier facings, with UL labels if specified:
FRK—Foil reinforced kraft
ASJ—Embossed white kraft foil laminate

Thickness to Prevent Condensation

Calculated per ASTM C680 (modified), flat, vertical surface.

90% Relative Humidity

Operating Temp., F	Thickness, Inches 90F Ambient				Thickness, Inches 80F Ambient			
	Type 703		Type 705		Type 703		Type 705	
-10	5½	12½	5	13	5	11½	5	12
0	5	11½	5	12	4½	10½	4½	10½
10	4½	10½	4	10½	4	9	4	9½
20	4	9	4	9½	3½	8	3½	8
40	3	6½	3	6½	2½	5½	2½	5½
60	2	4	2	4	1	2½	1½	2½
80	1	1	1	1½				
Emittance	0.9	0.2	0.9	0.2	0.9	0.2	0.9	0.2

80% Relative Humidity

Operating Temp., F	Thickness, Inches 90F Ambient				Thickness, Inches 80F Ambient			
	Type 703		Type 705		Type 703		Type 705	
-10	2	4½	2½	5	2	4½	2	4½
0	2	4½	2	4½	2	4	2	4
10	2	4	2	4	1½	3½	1½	3½
20	1½	3½	1½	3½	1½	3	1½	3
40	1	2½	1	2½	1	2	1	2
60	1	1½	1	1½	1	1	1	1
80	1	1	1	1				
Emittance	0.9	0.2	0.9	0.2	0.9	0.2	0.9	0.2

Specification Compliance

These products conform to the property requirements of government specifications:

	701	703	705
HH-I-558B Amendment 3 Form A, Class 1		•	•
HH-I-558B Amendment 3 Form A, Class 2		•	•
HH-I-558B Amendment 3 Form B, Class 6	•	•	
HH-I-558B Amendment 3 Form B, Class 7	•	•	

Products 703 and 705 comply with the property requirements of:

ASTM C612 "Standard Specification for Mineral Fiber Block and Board Thermal Insulation," Class I and II.

MIL-I-24244 A

NRC Guide 1.36

NFPA 90A

Flat Surface
Time Rate of Heat Loss
per Unit Area
80 F Ambient Temperature
0.0 Wind Velocity, MPH
0.20 Surface Emittance

ASTM recommended practice for determination of heat loss or gain, and surface temperatures of insulated pipe and equipment systems by the use of a computer program ASTM designation C680.

TYPE 701 *FIBERGLAS* INSULATION WITH BRIGHT METAL JACKET

Insulation Thickness (Inches)	Operating Temperature, degrees F													
	150		200		250		300		350		400		450	
	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.
1.5	10	94	18	104	28	114	39	124	52	135	65	147	81	160
2.0	8	91	14	99	22	107	30	116	40	125	51	135	63	145
2.5	6	90	12	96	18	103	25	110	33	118	41	126	51	135
3.0	5	88	10	94	15	100	21	106	28	113	35	120	43	128
4.0	4	87	7	91	11	96	16	101	21	108	27	112	33	118
5.0	3	85	6	89	9	93	13	98	17	102	22	107	27	112
6.0	2	85	5	88	8	91	11	95	14	99	18	103	22	108
7.0	2	84	4	87	7	90	9	93	12	97	15	101	19	105
7.5*	2	84	4	87	6	90	9	93	11	96	14	99	18	103

TYPE 703 *FIBERGLAS* INSULATION WITH BRIGHT METAL JACKET

Insulation Thickness (Inches)	Operating Temperature, degrees F													
	150		200		250		300		350		400		450	
	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.
1.0	13	97	24	109	36	121	50	134	65	147	82	161	111	140
1.5	9	93	17	102	25	111	35	120	46	130	58	141	76	129
2.0	7	90	13	98	20	105	27	113	36	121	45	129	58	115
2.5	5	89	10	95	16	101	22	108	29	115	37	122	47	109
3.0	5	88	9	93	13	98	19	104	24	110	31	116	40	105
3.5	4	87	8	91	12	96	16	101	21	107	27	112	34	102
4.0*	3	86	7	90	10	95	14	99	19	104	23	109	33	99

TYPE 705 *FIBERGLAS* INSULATION WITH BRIGHT METAL JACKET

Insulation Thickness (Inches)	Operating Temperature, degrees F													
	150		200		250		300		350		400		450	
	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.	Heat Loss	Surf. Temp.
1.0	13	97	24	109	36	121	50	134	65	146	81	160	100	171
1.5	9	93	17	102	25	111	35	120	46	130	58	140	71	151
2.0	7	91	13	98	20	105	27	113	35	121	45	129	55	138
2.5	6	89	11	95	16	101	22	108	29	114	36	121	44	129
3.0*	5	88	9	93	13	98	19	104	24	110	31	116	38	123

*Maximum allowable thickness (single or double layer) at maximum operating temperature (450F).

Application Recommendations

Type 701—lightweight unfaced flexible insulation in board form for use on vessels having irregular surfaces, where the compressive strength is not a performance criterion.

Types 703 and 705—board insulations normally impaled on welded pins on flat surfaces. They are cut in segments and banded in place on irregular surfaces. Unfaced boards are normally finished with reinforced insulating cement or weatherproof mastic. For outdoor application: Types 703 and 705, faced.

ASJ-25 or FRK-25 Faced insulation boards shall be applied using mechanical fasteners such as weld pins or stick clips. Fasteners shall be located not less than 3" from each edge or corner of the board. Pin spacing along the duct should be no greater than 12" on centers. Additional pins or clips may be required to hold the insulation tightly against the surface where cross breaking is used for stiffening. Weld pin lengths must be selected to insure tight fit but avoid "oil canning" effect.

Apply vapor seal ASJ or FRK pressure-sensitive patches. Rub hard with the nylon sealing tool to insure a tight bond and a vapor seal.

All insulation edges and butt joints are to be sealed with pressure-sensitive joint sealing tape to match the jacket. Rub hard with nylon sealing tool. Use 3" wide tapes on flat surfaces, or where edges are shiplapped and stapled. Five-inch wide tape can be used in lieu of shiplapping.

Precautions:
- Keep all contact adhesive surfaces clean.
- Use nylon sealing tool to prevent wrinkles and fishmouths.
- Ductwork or radius may require pre-scoring to allow the board to conform to the surface.
- When painting the facings for indoor applications, use only water base/latex products.

Limitations:
- Pressure-sensitive sealing tapes or patches should only be applied when the ambient temperature is between +35F and +110F.
- Maximum insulation surface temperatures in use are limited to –10F to +150F.
- Outdoor applications require additional weatherproofing. The product we have tested with our FRK facing and recommend with this type of application is: Cadoprene 725, manufactured by Epolux Mfg. Corp.

Caution

It is possible that heat may be generated from the resinous binder of insulations if ignited by external sources such as welding slag, cutting torches, etc. Care should be taken to avoid direct contact with the insulation by fire or ignition sources.

Insulation may cause temporary irritation. Wear long-sleeved, loose fitting clothing, gloves and eye protection, when handling and applying material. Wash with soap and warm water after handling. Wash work clothes separately in rinse washer. A disposable mask designed for nuisance type dusts is advisable where high dust levels are encountered.

When the insulation is brought up to operating temperature for the first time, some acrid smoke or fumes may be given off. This normally will stop in 24 hrs. Adequate natural ventilation should be used and for enclosed areas, mechanical ventilation is required. If the material must be installed on hot surfaces (above 200 F), a full-face respirator approved for protection against organic vapors shall be used.

OWENS-CORNING FIBERGLAS CORP.
Mechanical Division
Fiberglas Tower, Toledo, Ohio 43659

Pub. 1-IN-6360-N Litho in U.S.A. November, 1983

Vinyl-faced fiberglass - **RANDOM FISSURED, SHASTA, STONEBROOKE** fine texture

Relative Installed Cost

$	$$	$$$	$$$$

Armstrong

Key Selection Attributes

- High acoustical performance (perforated options)
- Durable — Easy-clean vinyl surface
  Scrubbable
  Impact-resistant
  Soil-resistant
- Humidity-resistant **HumiGuard Plus** performance to inhibit panel sag
- 10-year limited warranty; 15-year with **HumiGuard Plus** products and Armstrong hot dipped galvanized grid

Typical Applications

- Discount stores and grocery stores
- Low-rise and single-story buildings
- Classrooms and locker rooms
- Can be installed before building is enclosed

Recycled Content:
31% (RANDOM FISSURED)
28%

Color
White (WH)

Visual Selection / Performance Selection

GRID FACE	EDGE PROFILE	ITEM NUMBER	DIMENSIONS	UL Classified ACOUSTICS NRC	ACOUSTICS CAC	FIRE RESIST	SAG RESIST	LIGHT REFLECT	DURABILITY
RANDOM FISSURED Perforated									
15/16"	Square Lay-in	2908 2908M	24 x 24 x 5/8" 600 x 600 x 15mm	0.70	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
		2910 2910M	24 x 48 x 5/8" 600 x 1200 x 15mm	0.70	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
RANDOM FISSURED Nonperforated									
15/16"	Square Lay-in	2909 2909M	24 x 24 x 5/8" 600 x 600 x 15mm	0.55	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
		2911 2911M	24 x 48 x 5/8" 600 x 1200 x 15mm	0.55	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
SHASTA Perforated									
15/16"	Square Lay-in	2904 2904M	24 x 24 x 5/8" 600 x 600 x 15mm	0.70	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
		2906 2906M	24 x 48 x 5/8" 600 x 1200 x 15mm	0.70	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
SHASTA Nonperforated									
15/16"	Square Lay-in	2905 2905M	24 x 24 x 5/8" 600 x 600 x 15mm	0.50	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
		2907 2907M	24 x 48 x 5/8" 600 x 1200 x 15mm	0.50	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist
STONEBROOKE Nonperforated									
15/16"	Square Lay-in	2927 2927M	24 x 48 x 1" 600 x 1200 x 25mm	0.65	–	Class A		0.73	Scrubbable Impact-Resist Soil-Resist

High Acoustical Performance

Sag Resistance
4 drops / HumiGuard Max
2 drops / HumiGuard Plus

Physical Data

Material
Fiberglass

Surface Finish
Scrubbable vinyl film facing (UV protected)

Flame Spread/Fire Resistance
Class A: Flame Spread 25 or under (UL Labeled) per ASTM E 1264

ASTM E 1264 Classification
2904, 2906, 2908, 2910 – Type XII, Form 1, Pattern E C
2905, 2907, 2909, 2911, 2927 – Type XII, Form 1, Pattern E

Insulation Value
2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911
R Factor - 2.8 (BTU units)
R Factor - 0.46 (Watts units)
2927
R Factor - 4.0 (BTU units)
R Factor - 0.70 (Watts units)

Backloading Recommendation
Backloading is not recommended

Weight; Square Feet/Carton
2904, 2905, 2906, 2907, 2908, 2909, 2910, and
2911 - 0.20 lbs/SF; 128 SF/CTN
2927 - 0.20 lbs/SF; 80 SF/CTN

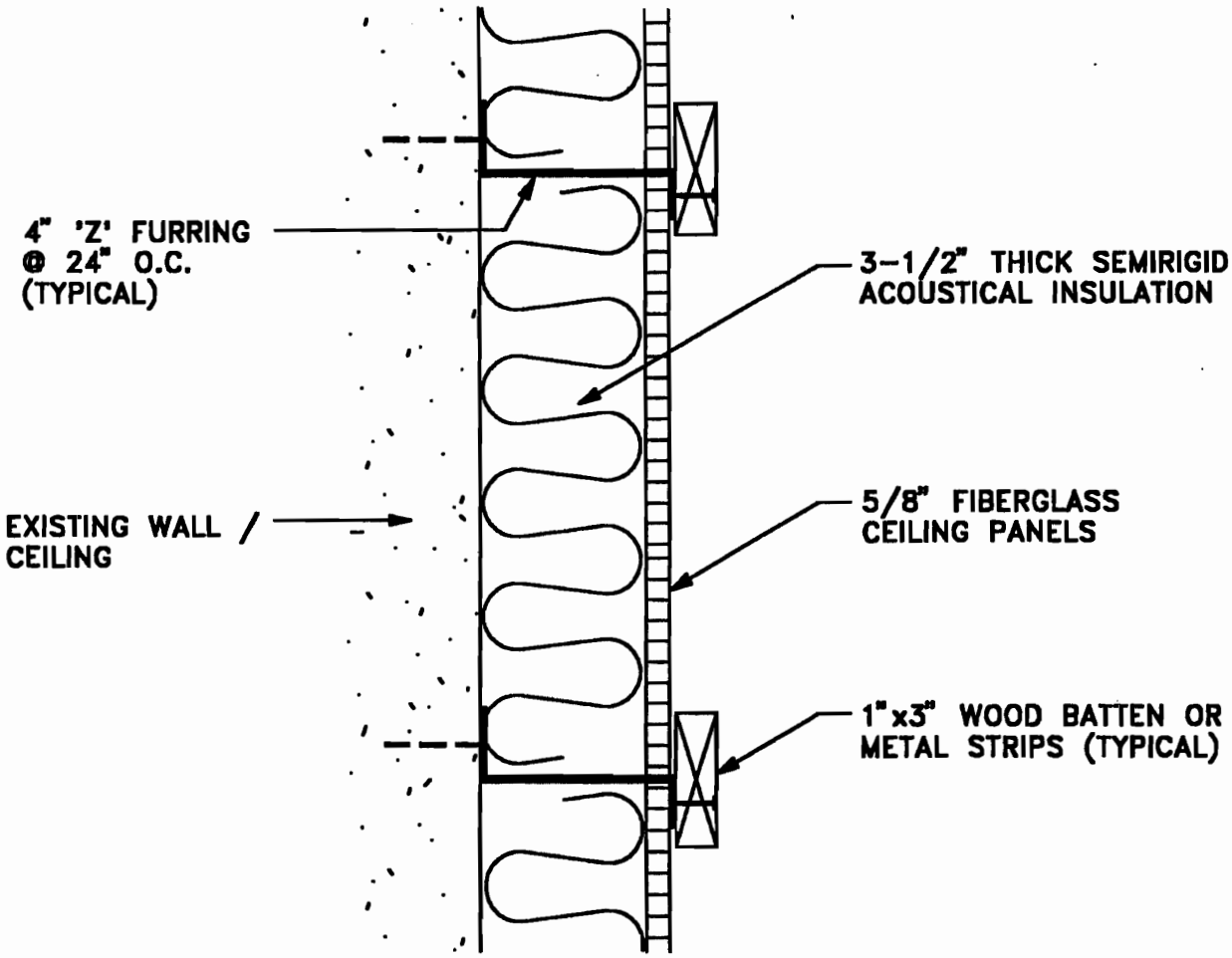
Warranty
See pages 237-240 for details

Application Considerations
Not recommended for cold storage rooms, labs with concentration of fumes, pools, and areas where temperatures exceed 140°F

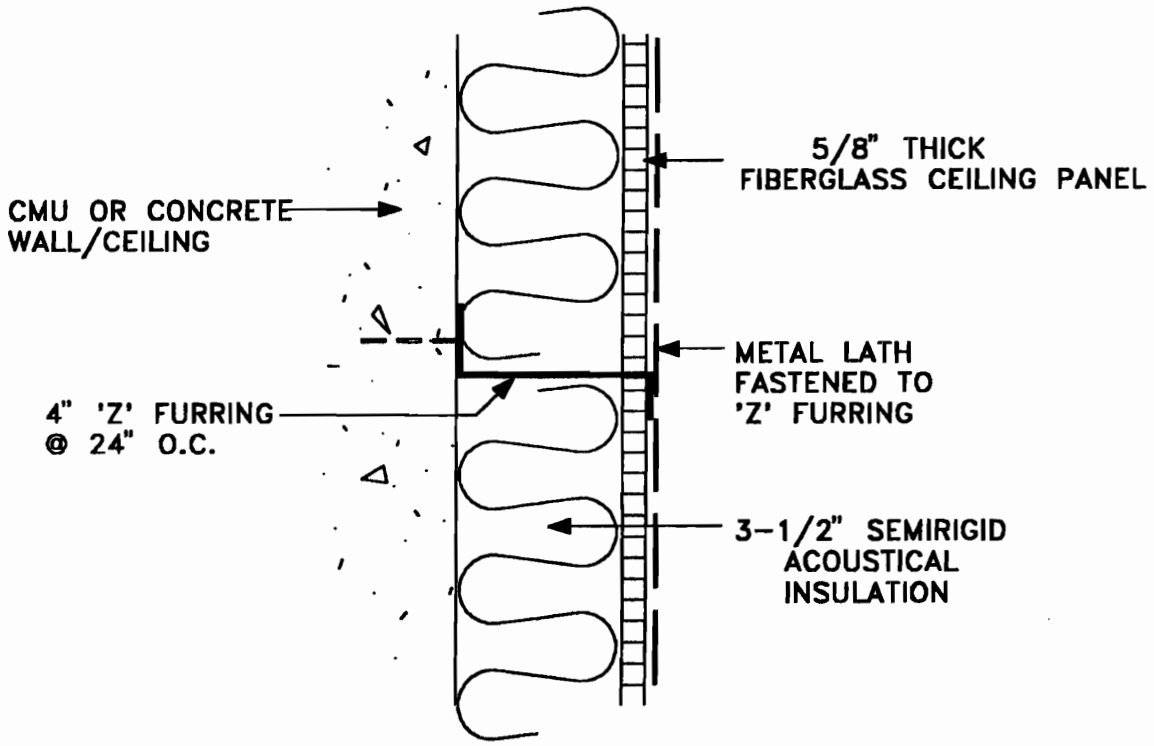
Recommended Suspension System

ITEMS	SUSPENSION SYSTEM	DRAWING DETAIL (Pg. 234-236)
2904, 2905, 2906, 2907, 2908, 2909 2910, 2911, 2927	15/16" PRELUDE (Pg. 182-187)	1

ENCLOSURE 2



ENCLOSURE 3A



DETAIL A

ACOUSTICAL INSULATION

ENCLOSURE 3B

ALPRO

ACOUSTICS

RINELL WOOD SYSTEMS, INC.
429 Waiakamilo Road Room 1
HONOLULU, HI 96817
Phone: 841-7688 FAX 841-7680

METAL

ACOUSTICAL

CEILING

AND

WALL

SYSTEMS

ENCLOSURE 4

SOLUTIONS IN NOISE CONTROL

DT/Document

CATALOG CONTENTS:

GENERAL INFORMATION

This catalog gives an overview of the standard metal acoustical systems manufactured by ALPRO ACOUSTICS, a division of Structural Systems Corporation.

The information that follows describes the standard products available. However, it does not include the many special product fabrication features available to the designer.

MR/Manufacturer

Alpro Acoustics has over forty-five years of experience in the acoustical panel industry and has produced quality products to meet the functional and aesthetic demands of a constantly changing market.

Alpro Acoustics manufactures standard panels yet is flexible enough to produce ceiling and wall systems to custom specifications.

Alpro has an ARCHITECTURAL SERVICE GROUP to assist the architect and designer in the engineering of unusual product sizes, shapes and configurations.

Alpro Acoustical Systems are sold nationally through a network of independent sales representatives. Installation is performed by local qualified contractors chosen by the customer.

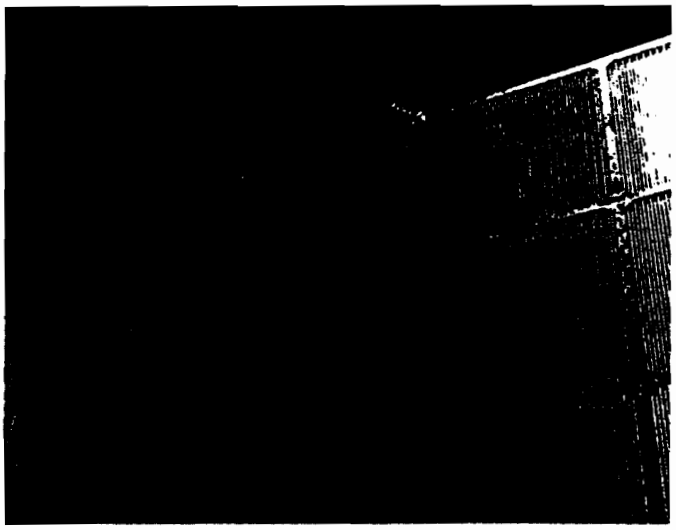
PP/Product Presentation

METAL ACOUSTICAL PANELS

NOISE REDUCTION

CEILINGS

Alpro Acoustics ceiling systems, consisting of modular panels and supporting grid sections with sound absorption media, have been tested by NVLAP certified testing laboratories in accordance with ASTM C-423 mounting. The results obtained showed NRC ratings of 1.00 and above.



Outdoor Amphitheatre

WALLS

Alpro modular wall panels and supporting trim components with sound absorption media produced NRC test ratings to 1.05 when tested in accordance with ASTM-C-423.

GENERAL

NRC ratings can be controlled by varying the thicknesses and/or densities of the sound control media.

ADVANTAGES

- Excellent NRC ratings of 1.00 and above
- Incombustible panels
- Class "A" flame spread rating
- Durable-abuse resistant
- Flexible-easy to install
- Economical
- Electrostatically applied powder paint
- Interior/Exterior applications
- Low maintenance
- Over 45 years proven performance

SOUND ABSORPTION COEFFICIENTS

OCTAVE BAND CENTER FREQUENCY, HZ

Application	Sound Pad	Mount	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	NRC
Ceiling									
Wall									

These tests are shown as examples of representative test results only. Contact Alpro for tests covering your particular noise control problem.

UA/Uses. Applications

Alpro Acoustical System Panels are an economical solution to acoustical problems. They are ideal for industrial, institutional and commercial applications. The panel can be designed for new construction, renovation or retrofit jobs where a reduction of intrusive noise or reverberation time is needed.

MF/Materials, Finishes

STANDARD ALUMINUM PANELS are fabricated in stucco-embossed finish aluminum in thicknesses ranging from .020 to .032 inches.

STANDARD STEEL PANELS are fabricated of G90 hot-dipped galvanized smooth finish steel and are available in 22, 24 and 26 gauge.

STANDARD PERFORATION PATTERN uses 1/8 inch diameter holes located on 21/64 inch staggered centers in both aluminum and steel.

FOR CUSTOM MATERIALS OR PRODUCTS OTHER THAN DESCRIBED ABOVE, PLEASE CONTACT THE FACTORY.

RECOMMENDATIONS

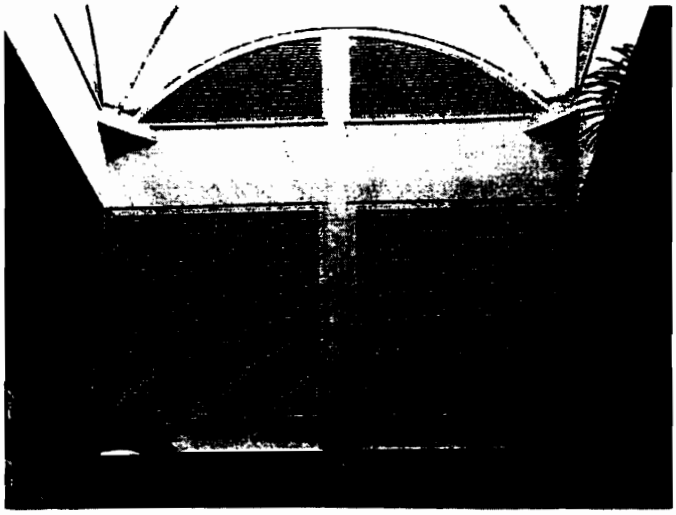
ALUMINUM PANELS

Alpro Acoustics recommends that both perforated and unperforated ALUMINUM PANELS be used in either INTERIOR or EXTERIOR applications.

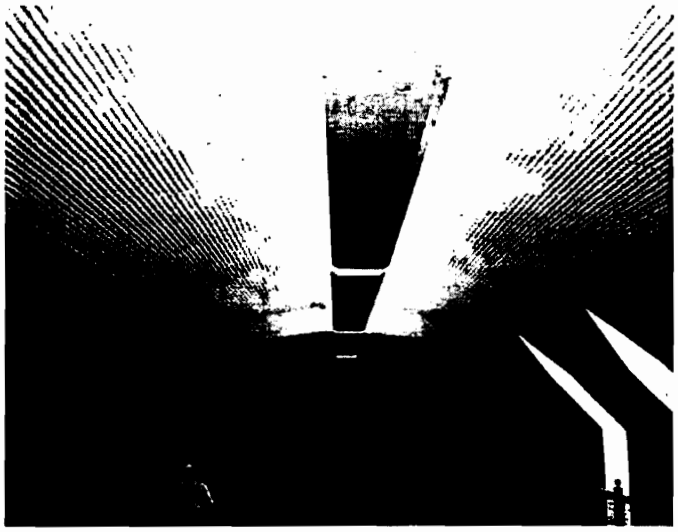
STEEL PANELS

Alpro Acoustics recommends the use of perforated or unperforated STEEL panels for INTERIOR applications only.

Note: The perforating process removes the galvanized protection from the interior perforated surface of the metal. Alpro Acoustics, therefore, does not recommend and will not warrant perforated steel panels used in an exterior environment.



Shopping Mall



College Library

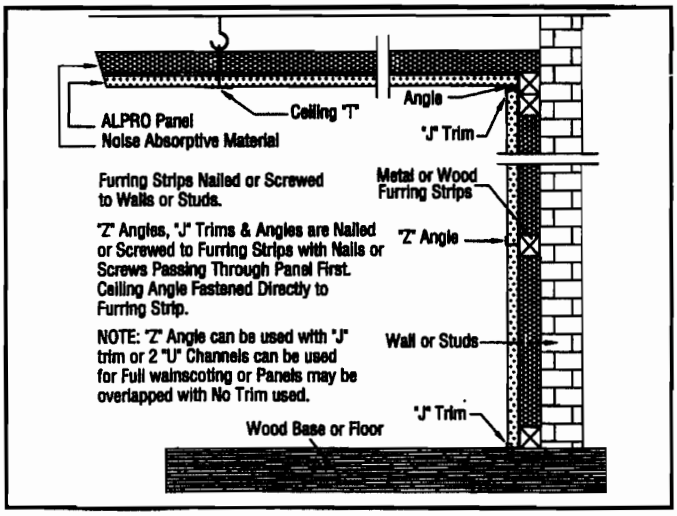
Electrochemical reactions can occur when dissimilar metals such as aluminum and steel are joined. Alpro Acoustics will not accept responsibility for using these products in such a manner.

FINISH

All Alpro panels receive a conversion coat. Alpro offers panels powder coated or degreased. Powder is electrostatically applied in a minimum thickness of 2.0 mils. The powder coated panels are cured in a convection oven.

Alpro standard colors are provided in matte finish (Regal White, Driftwood Gray, Baronet Beige, Graphite Black). Custom colors and other gloss levels are available. Please contact the factory.

TYPICAL ALPRO INSTALLATION



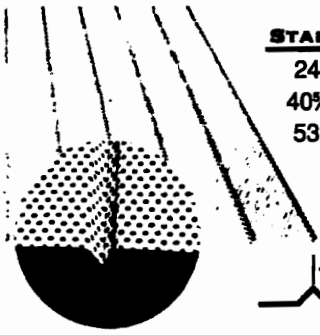
GRID PANEL PATTERNS AVAILABLE

Pattern	23⅞" x 23⅞"	23⅞" x 47⅞"	47⅞" x 47⅞"
A	Yes	Yes	Yes
B	Yes	Yes	Yes
C	Yes	Yes	Yes
E	Yes	Yes	Yes
F	Yes	Yes	Yes
H	Yes	Yes	No
J	Yes	Yes	Yes

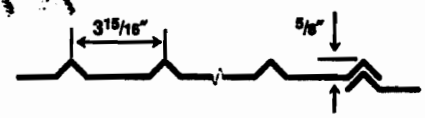
WALL PANEL PATTERNS AVAILABLE

Pattern	Maximum Length	Aluminum Thickness .020"	.032"	Steel Gauge 24	22	20
A	120 inches	X	X	X	X	
B	120 inches	X	X	X	X	X
C-alum.	144 inches	X	X			
C-steel	120 inches			X	X	X
D	120 inches	X	X	X	X	X
E	120 inches	X	X	X	X	X
F	144 inches	X	X	X	X	
H	120 inches	X	X	X	X	X

PATTERN "A"

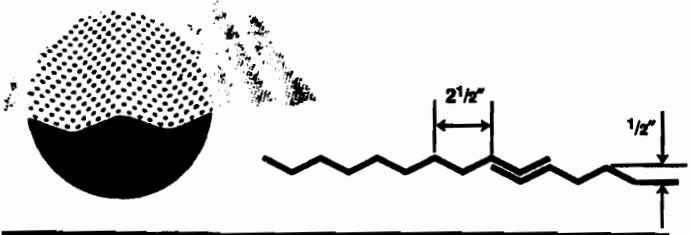


STANDARD WALL PANEL WIDTHS
24⅝" covers 24" when lapped*
40⅝" covers 39¾" when lapped*
53" covers 51⅜" when lapped*



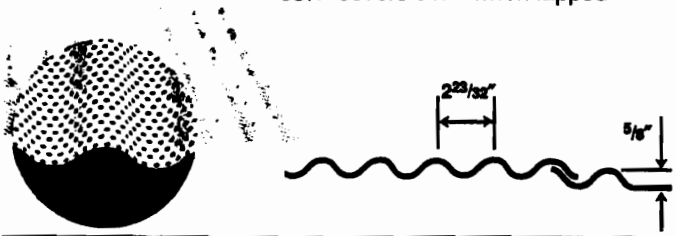
PATTERN "B"

STANDARD WALL PANEL WIDTHS
44¾" covers 42¼" when lapped*
55¾" covers 54½" when lapped*



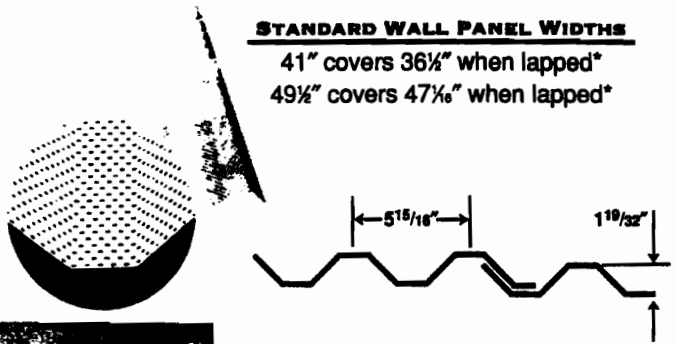
PATTERN "C"

STANDARD WALL PANEL WIDTHS
42" covers 40" when lapped*
53¼" covers 51¼" when lapped*

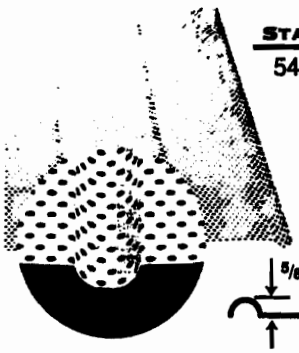


PATTERN "D"

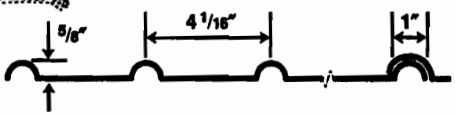
STANDARD WALL PANEL WIDTHS
41" covers 36½" when lapped*
49½" covers 47⅛" when lapped*



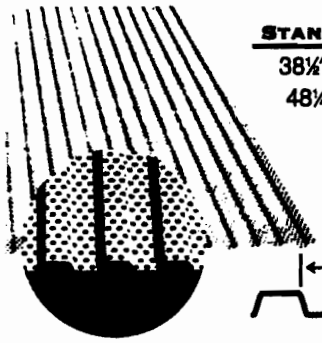
PATTERN "E"



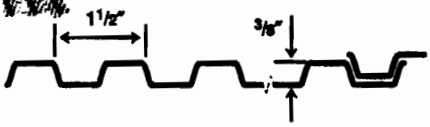
STANDARD WALL PANEL WIDTHS
54½" covers 53⅛" when lapped*



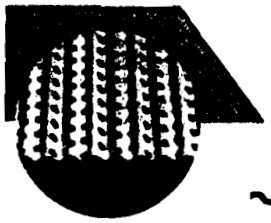
PATTERN "F"



STANDARD WALL PANEL WIDTHS
38½" covers 37½" when lapped*
48¼" covers 47" when lapped*

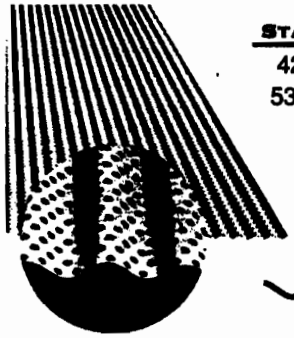


PATTERN "H"

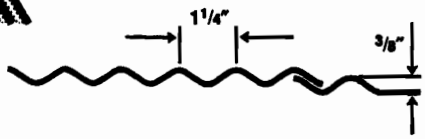


AVAILABLE AS GRID PATTERN ONLY. SEE "GRID PANEL PATTERNS AVAILABLE" CHART.

PATTERN "J"



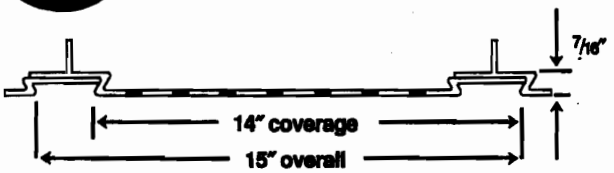
STANDARD WALL PANEL WIDTHS
42½" covers 40⅝" when lapped*
53⅜" covers 51⅛" when lapped*



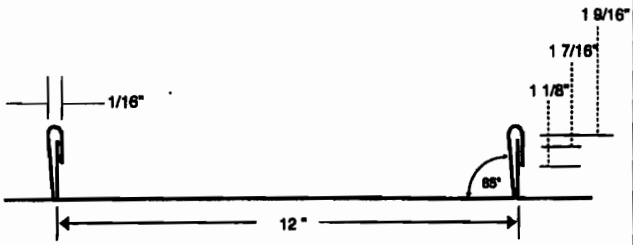
NOTE: Dimensions may vary depending on material.

PATTERN MARK-7

MATERIAL – Stucco-embossed aluminum or galvanized steel.
PANEL LENGTH – As required to 10'0".
PANEL WIDTH – 15" covers 14" when lapped.
USE – Primarily as a wall panel
NOTE: Special perforation with solid border stocked in .020 aluminum in the shown dimensions only. Other materials and dimensions available without solid border.



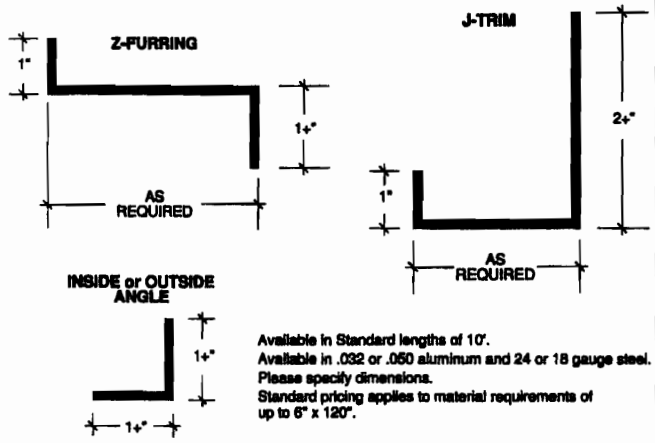
ACCESSIBLE PANEL H-S



Accessible Panel H–S

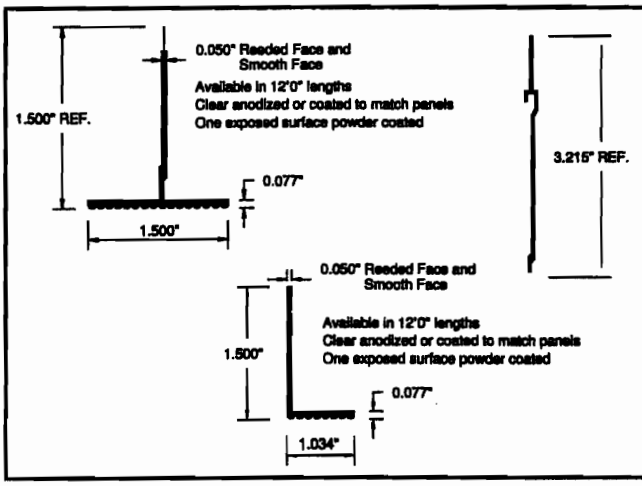
MATERIAL – Stucco-embossed aluminum or galvanized steel.
PANEL LENGTH – As required to 12'0".
PANEL WIDTH – 12" standard. Other widths available with factory approval.
USE – Primarily as a corridor panel.

MOUNTING ACCESSORIES



Available in Standard lengths of 10'.
Available in .032 or .050 aluminum and 24 or 18 gauge steel.
Please specify dimensions.
Standard pricing applies to material requirements of up to 6" x 120".

TEES AND ANGLES



GENERAL NOTES:

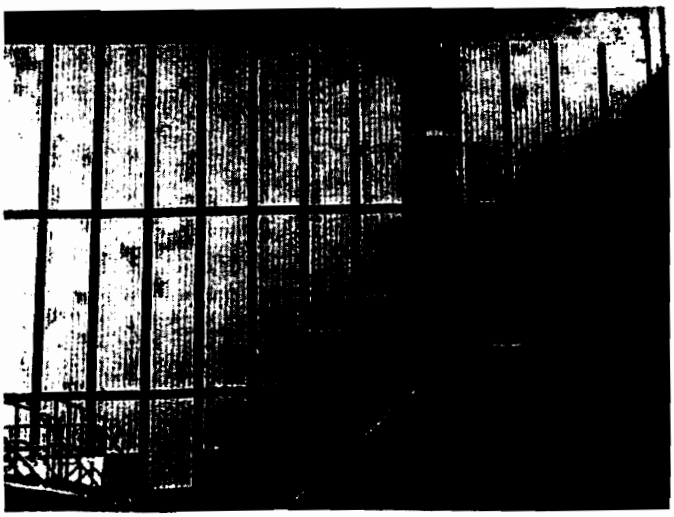
Degreased materials recommended for field painting only.

Panels available in both perforated and non-perforated metal.

Freight terms: Prepaid/Add or Collect, FOB New Orleans.

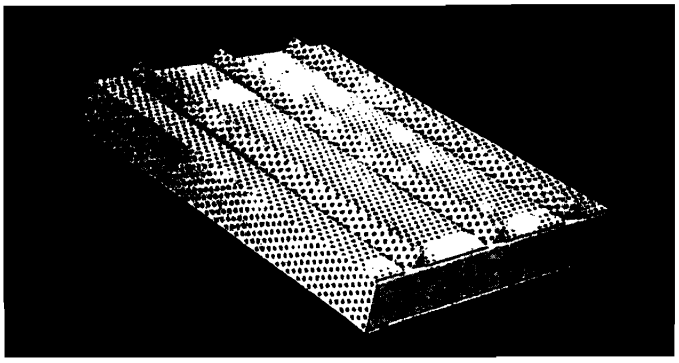
Approximate shipping weights per square foot:

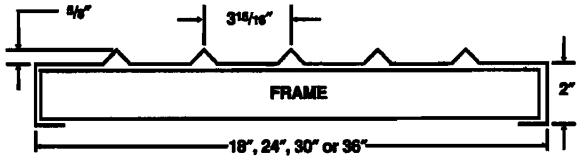
Aluminum:	Steel:	Baffle:
.020 - .40#	26G - 1.10#	.020 - .50#
.032 - .65#	24G - 1.40#	.032 - .70#
	22G - 1.70#	26G - 1.42#
		24G - 1.68#
		22G - 1.95#



Baffle Panels

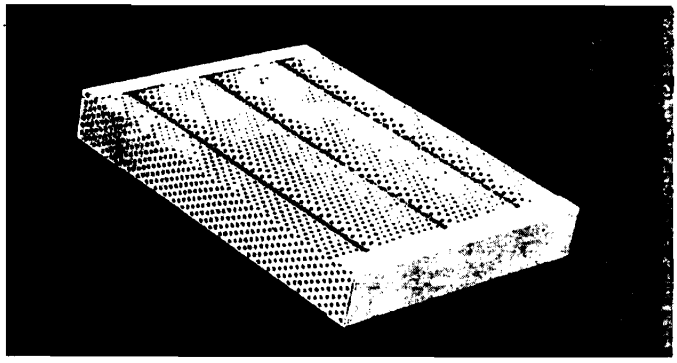
AO-BAF

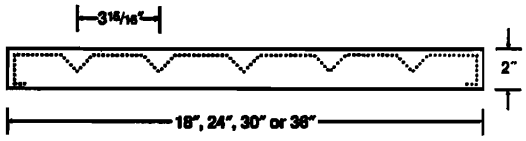




Maximum 10' length

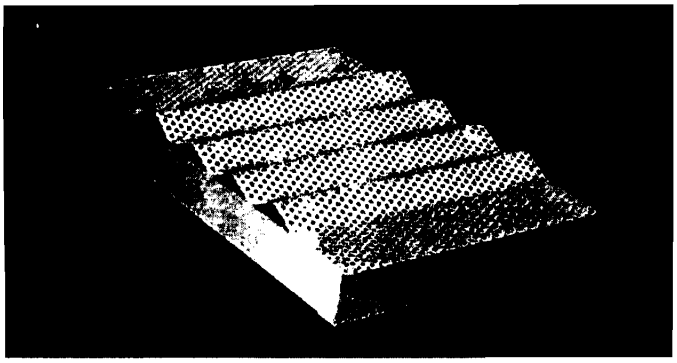
AI-BAF

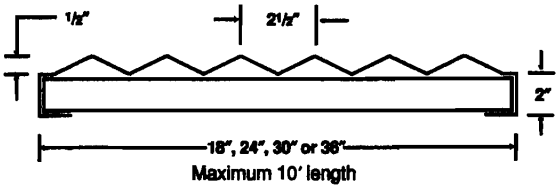




Maximum 10' length

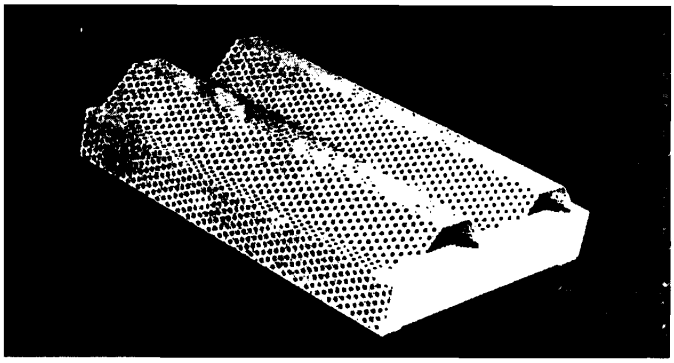
B-BAF

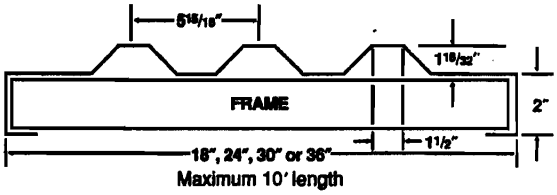




Maximum 10' length

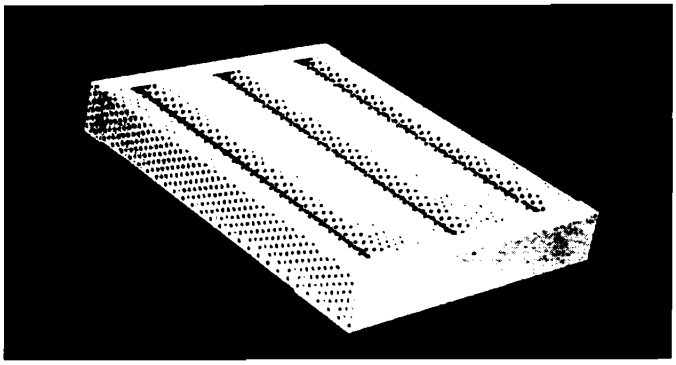
D-BAF

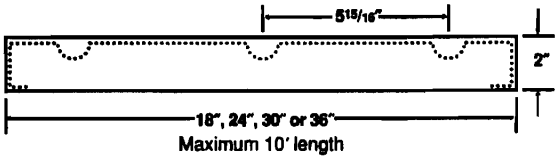




Maximum 10' length

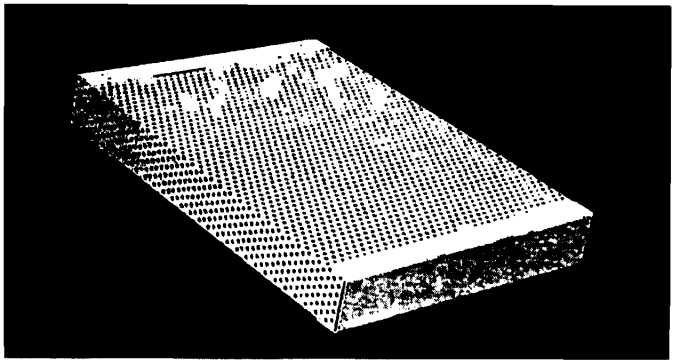
E-BAF

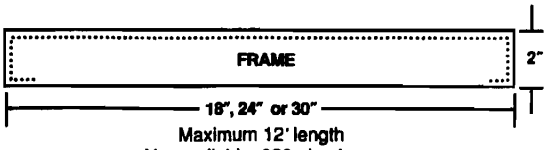




Maximum 10' length

FLAT-BAF





Maximum 12' length
Not available .020 aluminum

PP/Product Presentation

METAL ACOUSTICAL BAFFLE PANELS

GENERAL

The Alpro Acoustics baffle panel is a modular unit consisting of a metal frame interfaced with a perforated metal skin which encapsulates and protects an acoustical energy-absorbing material.

The perforated skin is transparent to sound and allows the sound waves to enter the energy absorbing material where a portion is transformed to other forms of energy.

NOISE REDUCTION

NRC

The noise reduction coefficient (NRC) value of the acoustical baffle panels ranges from .90 to 1.15 when tested in accordance with ASTM C-423.

STC

Sound transmission loss results ranged from an STC of 13 to an STC of 31 when tested in accordance with ASTM E-90.

U/A Uses, Applications

Alpro Acoustics Metal Acoustical Baffle Panels are used primarily as sound absorbers and secondarily as sound transmission attenuators.

Metal Acoustical baffle panels can be mounted to the walls of the treated space in continuous runs or in clusters to achieve maximum sound control.

Baffle panels can also be suspended from the ceiling in a vertical pattern, on a horizontal plane as a monolithic system, or separately to create a "cloud" effect.

Alpro Acoustics baffle panels are designed for INTERIOR application and are NOT recommended for EXTERIOR application or where exposed to the weather.

In an interior environment of high humidity, Alpro recommends that ALUMINUM be used in lieu of steel and that a protective wrapping for the sound media be used.

Should panels require field painting, the acoustical media should be removed and a spray painting system should be used.

MF/Materials, Finishes

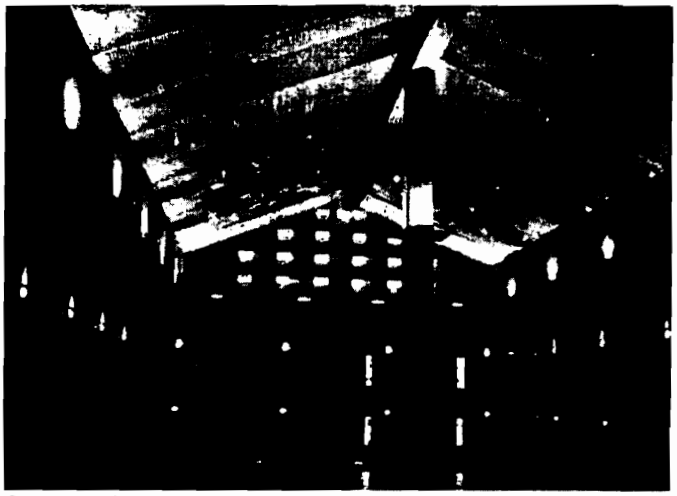
METAL FACING

The perforated metal facing (1/8 inch diameter holes on 21/64 inch staggered centers) is fabricated of stucco-embossed finish aluminum in thicknesses of .020 and .032 inches or G90 hot-dipped galvanized steel in thicknesses of 22, 24 or 26 gauge.

Heavier gauges available upon request.

FRAMES

The pre-formed metal facings are mechanically attached to a concealed or semi-concealed U-Channel of compatible metal in either .050 aluminum or 18 gauge galvanized steel.



State Prison Facility

Standard baffle frames accept a 2 inch thick sound pad. Panel thicknesses are available from 1 to 6 inches.

MOUNTING METHODS

Alpro offers three types of standard mounting methods for the baffle panels.

The first method is a two part "Z" clip. One piece is attached to the back of the baffle and the other is mounted on the mounting surface. "Z" clips are available in .050 aluminum or 18 gauge G90 galvanized steel. "Z" clips can be mounted flush to the surface or offset to the surface. Offset mounts can be 1″ offset, 2″ offset or 4″ offset. Generally, an offset mount will improve the acoustic characteristics.

The second method consists of eyelets bolted into the rear four corners of the baffle so that it can be suspended from the ceiling using hanger wire.

The third method consists of a reinforced thru-bolt from face to rear of the baffle at each corner. This allows bolting directly to the mounting surface.

PANEL WIDTH

Standard completed panel widths are 18, 24, 30 and 36 inches.

PANEL LENGTH

Panel lengths range from 2 to 12 feet depending on the metal facing selected.

FINISH

All Alpro baffle panels receive a conversion coat. Alpro offers panels powder coated or degreased. Powder is electrostatically applied in a minimum thickness of 2.0 mils. The powder coated panels are cured in a convection oven.

Alpro standard colors are provided in matte finish (Regal White, Driftwood Gray, Baronet Beige, Graphite Black). Custom colors and other gloss levels are available. Please contact the factory.

GENERAL ARCHITECTURAL SPECIFICATIONS

A. GENERAL

Provide metal acoustical panels as specified herein. Metal acoustical (CEILING PANELS) (WALL PANELS) (BAFFLE PANELS) shall be custom type as manufactured by ALPRO ACOUSTICS, a division of Structural Systems Corporation.

The metal acoustical (CEILING PANELS) (WALL PANELS) (BAFFLE PANELS) shall meet the requirements of Federal Specification SS-S118B; shall have a flame spread classification of 0 to 25 feet for a Class "A" rating, as tested in accordance with ASTM E-84; shall have an NRC rating of (SPECIFY), as tested in accordance with ASTM C-423 for noise reduction.

B. PRODUCT

1. MATERIALS:

The metal acoustical (CEILING PANELS) (WALL PANELS) (BAFFLE PANELS) shall be corrugated using (SPECIFY ALPRO PATTERN TYPE) and perforated using 1/8" diameter holes on 21/64" staggered centers, providing a 13% open area.

The panels shall be fabricated of stucco-embossed aluminum (.020) (.032) inches thick (OR) smooth finish G90 hot-dipped galvanized (22) (24) (26) gauge steel.

2. FINISH:

The panels shall receive a conversion coat prior to receiving an electrostatically applied (ACRYLIC) (OTHER) powder coated finish. All cut edges including perforated holes must be coated. Finish shall be cured and bake-dried to insure proper adhesion and uniform surface hardness. Color to be selected from (ALPRO STANDARD COLOR) (APPROVED SPECIAL COLOR).

3. ACOUSTICAL INSULATION:

Provide (FIBERGLASS) (MINERAL FIBER) (OTHER) insulation (INCHES) thick and (POUNDS/CUBIC FOOT) pound density. The metal acoustical (CEILING PANEL) (WALL PANEL) (BAFFLE PANEL) with insulation shall have a noise reduction coefficient of (NRC VALUE) as tested in accordance with ASTM C-423 and shall be rated Class "A" as tested in accordance with ASTM E-84. Acoustical insulation shall be (UNWRAPPED); encapsulated in (POLYVINYLCHLORIDE (PVC)) (POLYETHYLENE) (OTHER).

4. MOUNTING DEVICES:

As recommended by manufacturer or as required by designer.

C. EXECUTION

1. INSTALLATION:

The acoustical contractor shall furnish and install the Alpro products, including moulding, clips and fasteners, in strict accordance with the manufacturer's recommendations in order to provide a satisfactory installation.

All materials and workmanship furnished under this section shall be guaranteed by the contractor for a period of one year from completion date and, on written demand by the architect, any defective materials or workmanship shall be replaced or corrected.

2. WARRANTY:

ALPRO ACOUSTICS warrants the metal acoustical panels and baffles for defects from the manufacturing process for one year from the date of shipment. Written notice of the defect is required.

3. MAINTENANCE

Maintenance consists of cleaning metal acoustical panels with a damp soft rag, warm water and mild soap.

STANDARD TOLERANCES

PANELS *Length* of Panel Length Tolerance	18"-48" ± 3/32"	48"-120" ± 1/8"	120"-144" ± 5/32"
Width of Panel Width Tolerance	18"-36" ± 1/8"	36"-55" ± 5/32"	
Squareness Diagonal Measurement Diagonal Tolerance	18"-48" ± 1/8"	48"-120" ± 5/16"	120"-144" ± 3/8"
OVERLAP Seam Sag Length of Span Maximum Sag	12"-48" 1/4"	48"-60" 1/4"	Over 60" No Specification
WALL ANGLES Straightness Tolerance Angular Tolerance	.0125" x length in ft. ±1- 1/2° from 90°		
EXTRUDED SUBSTEES Straightness Tolerance Angular Tolerance	.0125" x length in ft. 1/4" x length in ft., 3° Maximum		
PERFORATED EDGE MARGINS Width from panel edge to nearest hole for minimum margins	17/32" maximum—No Minimum—measured from panel edge to nearest hole tangent line. Depends heavily on metal width tolerance as supplied by the mill.		

ALPRO ACOUSTICS

P.O. Box 10220
New Orleans, LA 70181-0220
TEL:(504) 733-3836 • FAX:(504) 733-3851
888-733-3836

2250 KW

Young Touchstone
A Webtec company

91 dBA @ 23'

DS1
SIZING PROGRAM

INPUT DATA

Series Type	Face Area	System Type	Core Split	Circuit 1 FPI	Circuit 1 #Rows	Circuit 1 #Pass	Motor HP	Fan Speed	Circuit 2 FPI	Circuit 2 #Rows	Circuit 2 #Pass	Custom
Model Number												
VB	56	F	50	2	5	2	50	H	2	5	4	

COOLING SYSTEM REQUIREMENTS

	Core #1	Core #2
Heat Rejection (Btu/min)	47884	34065
Coolant Type	50/50 EG/W	50/50 EG/W
Coolant Flow (gpm)	350	140
Max Coolant Temp at	Inlet Tank	Outlet Tank
is	200	140
Number Inlet Conn.	1	1
Inlet Diameter (in.)	5.00	3.50
Number Outlet Conn.	1	1
Outlet Diameter (in.)	5.00	3.50

GENERAL INFORMATION

Elevation (feet)	500
Standard Guards?	Yes
Additional Fan Static (in. H2O)	0.25
Application	

RATED MODEL PERFORMANCE

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AIR		COOLANT	Core #1	Core #2
Max Inlet Temp (°F) =	106.1 ← OK for 95°F Outside + 11° Approach... 106°F	Inlet Temp (°F) =	200.0	173.1
Outlet Temp (°F) of	Core #1 = 171.8	Outlet Temp (°F) =	181.5	140.0
	Core #2 = 133.4			
Static Restrictions (in H2O)		Pressure Drops (psi)		
External	0.25	Tanks	0.34	0.23
Frame	0.36	Core	2.75	3.89
Core #1	0.95	Total	3.09	4.12
Core #2	0.88			
Total	2.43	Limiting core No. 1	Variance (°F)	5.9

Fan: 8-84-WHISPR 16 84in dia. 8 blades 15.0° Pitch Fan RPM: 671

Actual Fan HP: 46 Air Flow (ACFM): 75,221 ← 11° Temp rise possible with CAT Gen

Series Description: VB - Vertical Core, Belt Driven Fan 9° Temp rise possible with Kohler Gen.
Overall Size Description: H over Tanks x W over Side Frames x D over Motor and Core Guard
Overall Size: 112 x 101.11 x 91.26

System Type: F - Front-to-Back Arrangement
Core Size #1: 91.25 in. over fins x 89.00 in. over tubes
Core Size #2: 91.25 in. over fins x 89.00 in. over tubes

	Core #1	Core #2
Fins Per Inch:	12	12

ENCLOSURE 5

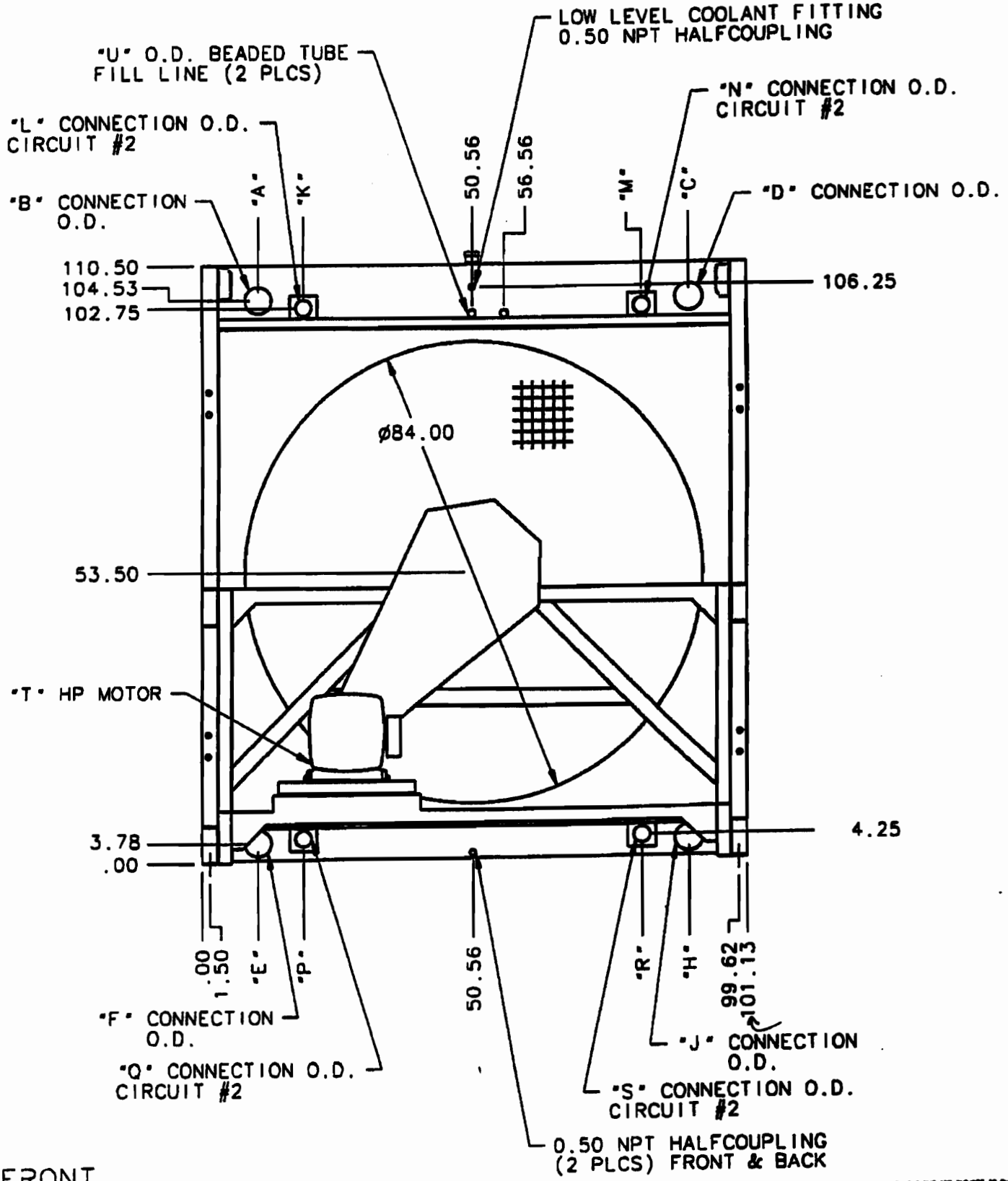
# Rows:	5	5
# Passes:	2	4

	Tanks #1		Tanks #2	
	Quantity	Diameter	Quantity	Diameter
Inlet:	1	5.00	1	3.50
Outlet:	1	5.00	1	3.50

Young Touchstone
A Nidec Company

VB56FXX

POWER GENERATION
SUBMITTAL/APPROVAL DRAWING



ALL DIMENSIONS ARE SUBJECT TO CHANGE.

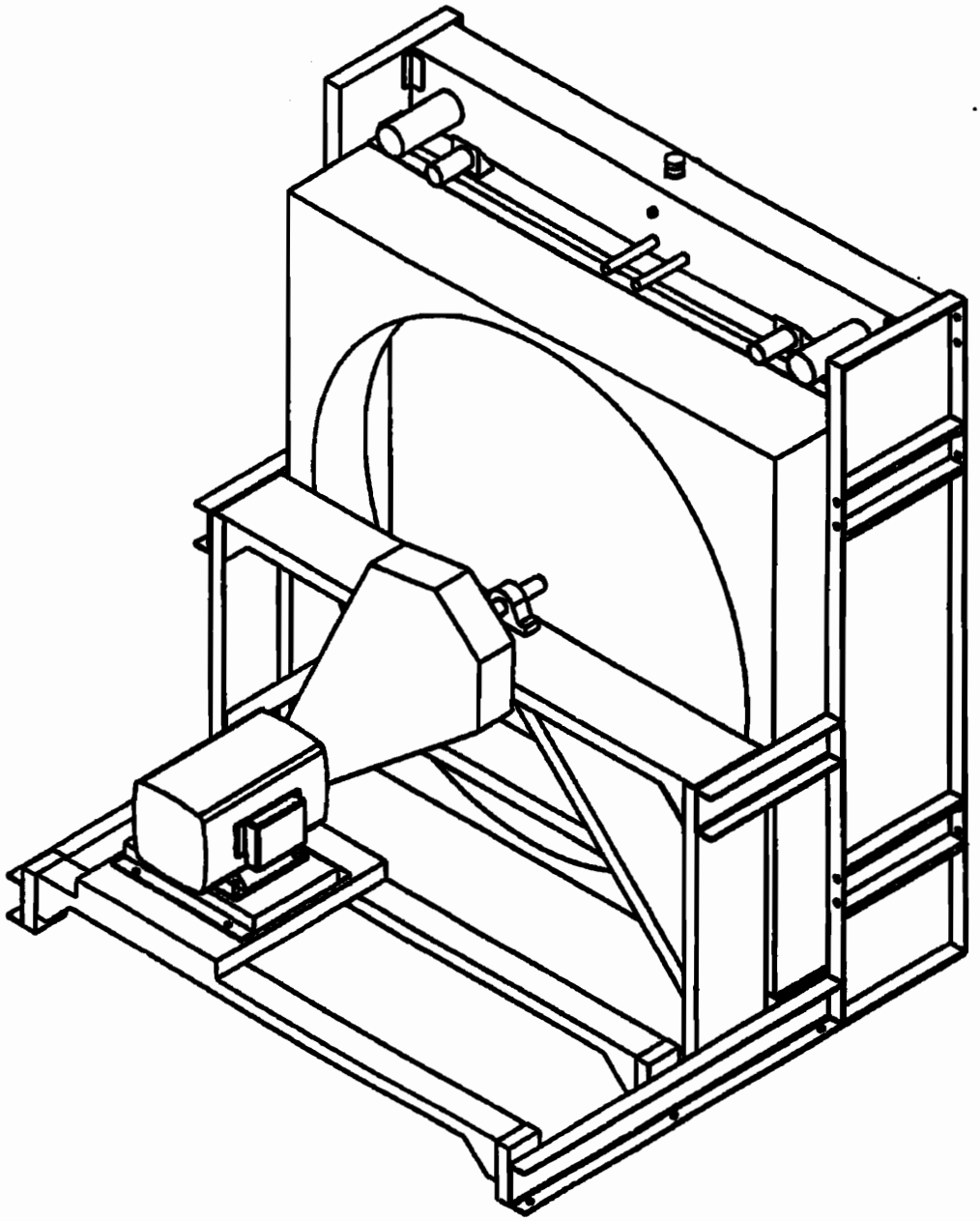
8/28/02

ARR

Young Touchstone
A Nidec Company

VB56FXX

POWER GENERATION
SUBMITTAL/APPROVAL DRAWING



ISOMETRIC

8/28/02

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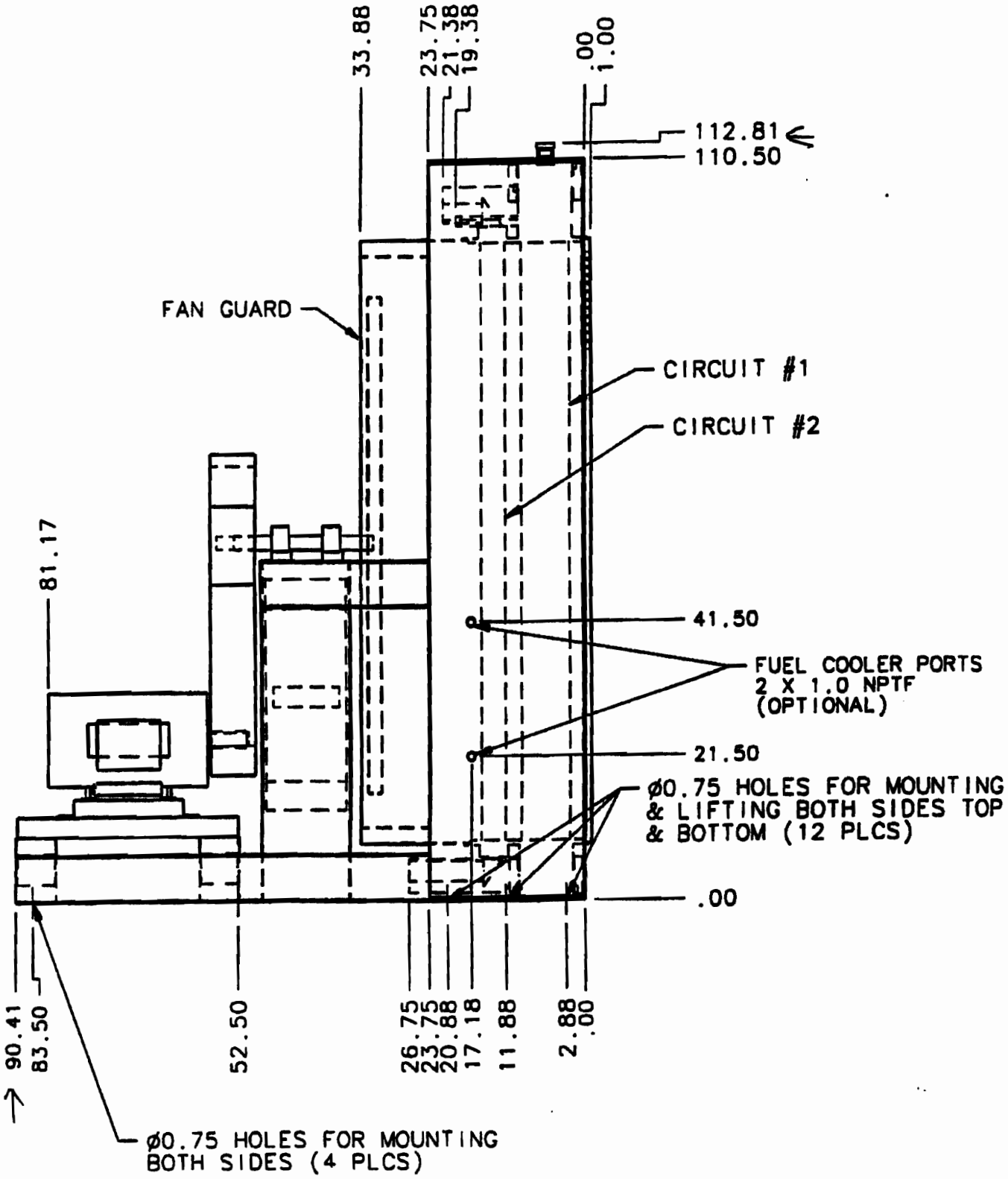
A Nidec Company

VB56FXX

POWER GENERATION
SUBMITTAL/APPROVAL DRAWING



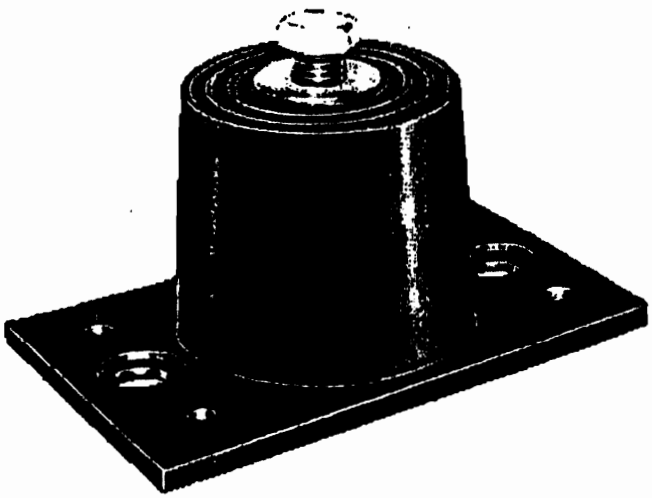
SIDE

ALL DIMENSIONS ARE SUBJECT TO CHANGE.

8/28/02

MASON INDUSTRIES

Neoprene Mounts Bulletin ND-26w



ND Mounts

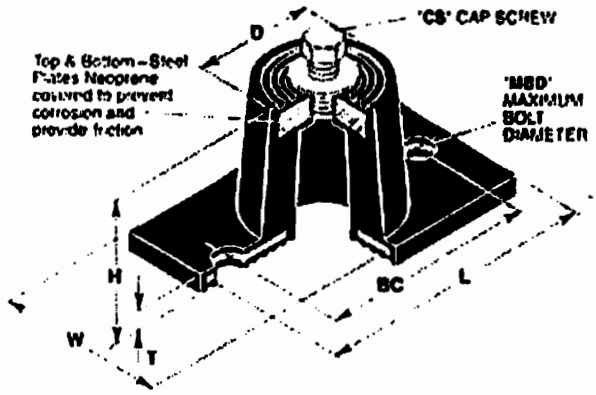
- All mounts are double deflection
- Offer more than three times the deflection of pads
- Prevent noise and high frequency vibration
- Isolate a wide range of equipment
- Supplied with cap screw and washer

Exclusive Features

- Bottom friction surface makes bolting unnecessary in most installations
- Neoprene covering prevents corrosion of steel parts
- Molded in commercial Neoprene
- Bridge bearing Neoprene, Natural Rubber or other elastomers available

Specification

Neoprene mountings shall have a minimum static deflection of 0.35" (9 mm). All metal surfaces shall be Neoprene covered to prevent corrosion and have friction pads, both top and bottom. Bolt holes shall be provided on the bottom and a tapped hole with cap screw and washer on top. Mountings shall be Type ND, as manufactured by Mason Industries, Inc.

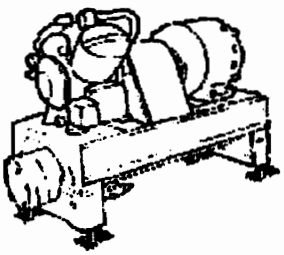


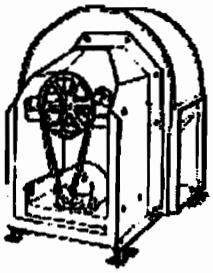
TYPE ND DIMENSIONS(Inches mm)

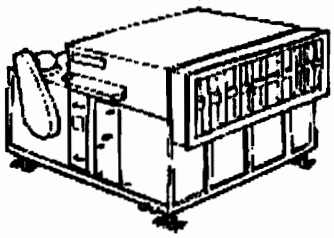
Size	D	H	L	T	W	BC	CS	MBD
ND-A	1-3/16 30	1-1/2 38	3-3/16 81	3/16 5	1-5/8 41	2-3/8 60	5/16 -18 x 3/4" x 19	5/16 8
ND-B	1-3/4 44	1-7/8 48	3-7/8 98	1/4 6	2-5/16 59	3 76	3/8 -16 x 1" x 25	5/16 8
ND-C	2-9/16 65	2-3/4 70	5-1/2 140	1/4 6	3-5/16 84	4-1/8 105	1/2 -13 x 1" x 25	1/2 13
ND-D	3-3/8 86	2-3/4 70	6-1/4 159	5/16 8	4 102	5 127	1/2 -13 x 1" x 25	1/2 13

ND-DS	3-3/8	86	2-3/4	70	6-3/4	171	5/16	8	4-3/8	111	5-1/2	140	1/2 -13 x 1" x 25	1/2	13

Applications







TYPE ND RATINGS					
Size (Color Mark)	Duro_ Meter	Rated Capacity Range (lbs)	(kgs)	Max Rated Defl (in)	(mm)
ND-A-Black	30	15-45	7-20	0.35	9
ND-A-Green	40	30-75	13-34		
ND-A-Red	50	60-125	27-57		
ND-B-Black	30	50-100	23-45	0.40	10
ND-B-Green	40	75-150	34-68		
ND-B-Red	50	110-235	50-107		
ND-B-White	60	180-380	82-172		
ND-B-Yellow	70	300-600	136-272		
ND-C-Green	40	140-260	64-118	0.50	13
ND-C-Red	50	200-400	91-181		
ND-C-White	60	310-600	141-272		
ND-C-Yellow	70	520-1000	236-454		
ND-D-Yellow	70	1060-2100	481-953	0.50	13
ND-DS-Yellow	70	2200-4300	998-1950	0.50	13
Mounts have straight line deflection curves.					

top of page

Quiet-Duct Silen...

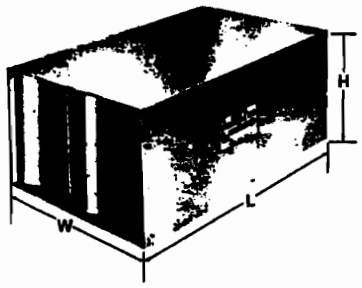
...with FORWARD and REVERSE Flow...

Type Ms Quiet-Duct Silencers have been rated with procedures certified in accordance with applicable portions of ASTM E 477. All Dynamic Insertion Loss and Self-Noise Acoustic Performance Data were obtained in IAC's Aero-Acoustic Laboratory using the duct-to-room reverberant test facility *with air flowing through the silencers.*

- **Forward Flow (+)** occurs when noise and air travel in the same direction, as in a typical supply or fan discharge system.
- **Reverse Flow (—)** occurs when noise and air travel in opposite directions, as in a typical return or fan intake system.

For other IAC Rectangular Silencers and Tubular Conic-Flow® Silencers, see Application Manual. Use SNAP FORM for System Noise Analysis Procedures and PRESS FORM for cost optimization and Picking the Right Energy Saving Silencer.

HOW TO DESIGNATE TYPE Ms QUIET-DUCT MODELS AND SIZES



EXAMPLE:

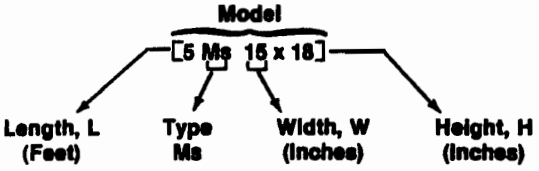


TABLE I DIMENSIONS AND WEIGHTS OF Ms SILENCER MODULES

Nominal Length	W, in. / H, in.	7½ / 12	7½ / 24	7½ / 36	15 / 12	15 / 18	15 / 24	15 / 30	15 / 36	15 / 42	15 / 48	30 / 18	30 / 24	30 / 30	30 / 36	30 / 42	30 / 48	45 / 30	45 / [illegible]	45 / 42	45 / 48
3 feet	Wt, lb	22	40	51	37	47	57	67	80	89	100	80	95	110	130	145	160	156	177	197	218
5 feet	Wt, lb	44	67	91	63	80	96	114	134	150	167	135	161	187	222	248	274	275	310	345	381
7 feet	Wt, lb	63	95	129	88	112	135	159	193	216	240	188	224	261	310	347	384	—	—	—	—
10 feet	Wt, lb	89	135	180	125	159	192	226	273	—	—	—	319	371	440	—	—	—	—	—	—

NOTE: (—) indicates size not available as standard.

TABLE II DYNAMIC INSERTION LOSS (DIL) RATINGS: FORWARD (+)/REVERSE (–) FLOW

IAC Model Number	Octave Band Hz	1	2	3	4	5	[illegible]	[illegible]	[illegible]
		63	125	250	500	1K	[illegible]	[illegible]	[illegible]
	Silencer Face Velocity, fpm	Dynamic Insertion Loss [illegible]							
3Ms	– 4000	6	8	14	23	27	20	12	8
	– 2000	6	8	14	23	27	20	14	8
	+ 2000	4	7	12	19	23	23	18	11
	+ 4000	2	6	11	15	22	23	18	11
5Ms	– 4000	9	12	21	34	43	33	22	9
	– 2000	8	11	18	32	42	33	22	11
	+ 2000	6	10	18	30	42	34	23	14
	+ 4000	4	9	17	29	38	34	23	15
7Ms	– 4000	11	15	27	38	50	40	27	13
	– 2000	10	15	26	36	49	40	28	14
	+ 2000	10	14	24	36	48	44	31	18
	+ 4000	9	12	22	36	47	44	31	19
10Ms	– 4000	14	24	36	44	53	50	34	19
	– 2000	13	21	35	43	52	50	37	20
	+ 2000	12	20	34	42	51	52	43	22
	+ 4000	11	16	32	42	50	53	43	23

NOTE: All DIL and Self-Noise Acoustic Performance Data were obtained in IAC's Aero-Acoustic Laboratory using the duct-to-room reverberant test facility with *air flowing through the silencers.* See reverse side for Self-Noise and Aerodynamic Data.

ALSO SEE REVERSE SIDE FOR NOTE ON WHEN DILs EXCEED 50 dB

TABLE III AERODYNAMIC PERFORMANCE DATA OF Ms SILENCER MODULES

Physical Data		Module	Static Pressure Drop, i.w.g.											
			.080	.10	.180	.20	.250	.30	.40	.50	.60	.75	1.0	1.25
			.090	.12	.180	.24	.300	.36	.48	.60	.72	.90	1.2	1.50
			.120	.15	.225	.30	.375	.45	.60	.75	.90	1.13	1.5	1.88
			.140	.18	.270	.37	.470	.55	.74	.93	1.11	1.40	1.88	2.32
			Airflow, cfm											
7½ x 12	0.63	Type Ms — Medium Pressure Drop	442	626	765	884	990	1085	1252	1400	1530	1712	1980	2218
7½ x 24	1.25		884	1252	1530	1770	1980	2170	2504	2800	3060	3424	3960	4436
7½ x 36	1.88		1326	1878	2295	2652	2970	3255	3756	4200	4590	5136	5940	6654
15 x 12	1.25		884	1252	1530	1770	1980	2170	2504	2800	3060	3424	3960	4436
15 x 18	1.88		1326	1878	2295	2652	2970	3255	3756	4200	4590	5136	5940	6654
15 x 24	2.50		1770	2504	3060	3540	3960	4340	5008	5600	6120	6848	7925	8872
15 x 30	3.13		2210	3130	3825	4420	4950	5425	6260	7000	7650	8560	9906	11030
15 x 36	3.75		2652	3756	4590	5304	5940	6510	7512	8400	9180	10272	11880	13308
15 x 42	4.38		3104	4382	5355	6192	6932	7595	8764	9800	10710	11984	13865	15551
15 x 48	5.00		3540	5008	6120	7080	7925	8680	10016	11200	12240	13696	15850	17744
30 x 18	3.75		2652	3756	4590	5304	5940	6510	7512	8400	9180	10272	11880	13308
30 x 24	5.00		3540	5008	6120	7080	7925	8680	10016	11200	12240	13696	15850	17744
30 x 30	6.25		4420	6260	7650	8840	9900	10850	12520	14000	15300	17120	19800	22180
30 x 36	7.50		5304	7512	9180	10608	11880	13020	15024	16800	18360	20544	23760	26616
30 x 42	8.75		6208	8764	10710	12384	13865	15190	17528	19600	21420	23968	27730	31102
30 x 48	10.00		7080	10016	12240	14160	15850	17360	20032	22400	24480	27392	31700	35488
45 x 30	9.38		6630	9390	11475	13260	14850	16275	18780	21000	22950	25680	29700	33270
45 x 36	11.25		7976	11268	13770	15920	17825	19530	22536	25200	27540	30816	35650	39924
45 x 42	13.13		9322	13146	16065	18580	20800	22785	26292	29400	32130	35952	41600	46678
45 x 48	15.00		10620	15024	18360	21240	23760	26040	30048	33600	36720	41088	47520	53232
Silencer Entering Face Velocity, fpm			705	1000	1225	1410	1585	1740	2000	2240	2450	2740	3170	3550

NOTE 1: For module availability see Table I.

NOTE 2: The tabulated air flow is in cfm based upon tests conducted in the IAC Research & Development Laboratory Facilities in accordance with applicable AMCA, ASME, and ADC Airflow Test Codes. These codes require specified lengths of straight duct both upstream and downstream for the test specimen. The downstream measurements are made far enough downstream to include "static regain". Therefore, if silencers are installed immediately before or after elbows, or transitions, or at the intake or discharge of the system, sufficient allowance to compensate for these factors must be included when calculating the operating static pressure loss through the silencer. *These conditions can add from 1/2 to several velocity heads, depending on specific conditions.* All acoustic and aerodynamic data obtained on 15 in. x 24 in. production units.

TABLE IV SELF-NOISE POWER LEVELS, dB re: 10^{-12} WATTS

Module Number		2	3	4	5	6	7	8
		500	1K	2K	4K	8K		
		Self-Noise Power Levels, dB						
Ms All Sizes	- 4000	74	67	67	71	64	67	73	75
	- 3000	67	63	61	66	61	64	67	67
	- 2000	60	56	56	56	57	59	58	49
	- 1500	53	52	50	51	54	56	52	41
	- 1000	46	45	45	41	50	51	43	23
	+ 1000	44	32	36	34	31	32	29	21
	+ 1500	55	47	45	43	40	42	40	34
	+ 2000	63	54	52	50	47	48	47	44
	+ 3000	74	64	60	58	56	58	59	57
	+ 4000	82	72	67	65	63	64	67	67

WHEN DIL REQUIREMENTS EXCEED 50 dB

- Noise flanking around the silencer or along duct silencer walls may limit actual performance to approximately 50 dB Dynamic Insertion Loss for many systems.
- Self-Noise interference should be checked out especially for systems with high noise reduction requirements.
- Specially designed silencers and full-scale or scale-model testing are available for applications requiring silencing in excess of 50 dB or other unusual requirements.
- Call your local IAC Representative for details.

TABLE V FACE AREA ADJUSTMENT FACTORS

Add or subtract from PWL values above

Quiet-Duct Face Area, sq ft*	.625	1.25	2.5	5	10	15	30	60
PWL Adjustment Factor, dB	-6	-3	0	+3	+6	+9	+12	+15

**For intermediate face areas, interpolate to nearest whole number.*

CONVERSIONS

Multiply	By	To Obtain
cfm	4.719×10^{-4}	cubic meters per second (m^3/sec)
fpm	0.00508	meters per second (m/s)
in.	25.4	millimeters (mm)
i.w.g.	249.1	Newtons per square meter (N/m^2)
ft	0.3048	meters (m)
ft^2	0.0929	square meters (m^2)
lb	0.4535	kilogram (kg)

DIL, Self-Noise, and Airflow Data CERTIFIED in accordance with ASTM E-477

We reserve the right to improve design and specifications without notice at any time.

AVAILABLE UPON REQUEST: Specially designed silencers and full-scale or model testing for unusual applications.

iac
THE STANDARD OF SILENCE

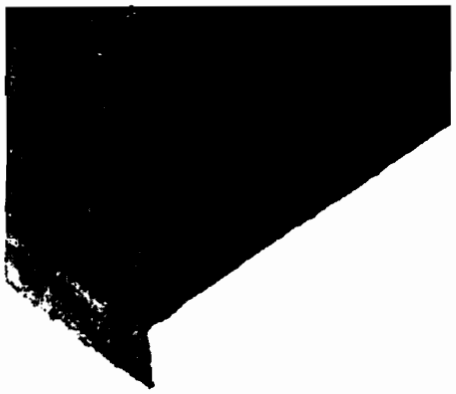
***NOTE:** PAGES 5 THROUGH 52 OF THIS CATALOG ARE AVAILABLE AS INDIVIDUAL SHEETS FROM INDUSTRIAL ACOUSTICS COMPANY. REQUEST BY NUMBER SHOWN IN UPPER RIGHT HAND CORNER.*

SUBMITTAL SHEET

OWENS CORNING FIBERGLAS

Fiberglas• Duct Liner Board

Thickness:
~~1.0"~~ — In Stock
☐ 1.5"
~~2.0"~~



Uses

Fiberglas• duct liner board is used as an acoustical insulation to absorb air conditioning and heating equipment and blower noise in sheet metal ducts and plenums operating at velocities to 4000 fpm and temperatures to 250F. It also acts as thermal insulation, and may eliminate the necessity of insulating ducts externally to conserve heat or prevent condensation. The product is applied to the interior of the ductwork or plenum.

Description

Fiberglas duct liner board is a semi-rigid bonded board of glass fiber coated with a black-pigmented, fire-resistant coating on the side toward the airstream. This coating tightly bonds the surface fibers to resist damage during installation and in service, and provides a uniquely tough airstream surface. It is available in thicknesses of 1", 1½", and 2". It complies with the requirements of NFPA 90A.

Physical Properties	Test Method	Specification
Surface burning characteristics* (UL listed)	UL 723*	Flame spread 25* Smoke developed 50
Thermal conductivity (k) @ 75F mean temperature, Btu•in/hr•ft²•deg.F	ASTM C 518	"k" = 0.23
Nominal density	ASTM C 167	3.0 lb./cu. ft.
Corrosiveness	ASTM C 665	Will not cause corrosion greater than that caused by sterile cotton on aluminum, steel, or galvanized steel (1)
Fungi resistance	ASTM C 665	Will not support or promote mold or fungus growth.

(1) when wet, duct liner board in contact with galvanized steel will cause discoloration of the sheet metal.

*The surface burning characteristics of this product have been determined in accordance with UL 723. This standard should be used to measure and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use. Values are reported to the nearest five (5) rating.

Specification compliance

Owens-Corning Fiberglas duct liner board insulation complies with the property requirements of ASTM specification C 1071, which replaces Federal Specification HH-I-545B (Amend.2) except as noted in the acoustical performance properties data.

Product packaging

Standard: Non-compression packaged in a corrugated sleeve with a tight heat-shrunk polyethylene film covering all sides.

48" x 96" duct liner board is available on a made-to-order basis palletized with a polyethylene shroud.

Product marking

Insulation thicknesss, name of manufacturer and production date are printed on the airstream surface of Owens-Corning duct liner board for easy identification. This assures that the installed product can be inspected for specification compliance after installation.

Availability

Fiberglas duct liner board is available in the following standard widths and lengths: 24" x 48"
48" x 96"

ENCLOSURE 8

Acoustical Performance Properties

ASTM C 1071 is considered to be the current industry standard. Specification values are shown in the table at right. Test values for Owens-Corning Duct Liner Board are shown below them.

The designer should use any of this data with the realization that they were collected using a limited sample size and are not absolute values. Therefore, reasonable tolerances must be applied when using these data. Several techniques for evaluating duct liner acoustical performance are in common use. However, some of the specification values in existence were derived using now obsolete test methods.

For more information, contact your Owens-Corning sales representative.

Sound absorption coefficients, Specification ASTM C 1071

Product	Thickness	Octave band center frequencies, Hz 125	250	500	1000	2000	4000	NRC	Test Method
Type II (rigid)	1.0"	.02	.20	.52	.73	.82	.84	.60	ASTM C 423
	1.5"	.05	.40	.77	.88	.88	.86	.75	Type A Mtg.
	2.0"	.12	.67	.99	.97	.91	.87	.90	

Sound absorption coefficients, as measured

Product	Thickness	Octave band center frequencies, Hz 125	250	500	1000	2000	4000	NRC	Test Method
	1.0"	.03	.22	.60	.84	.98	.97	.65	ASTM C 423
	1.5"	.16	.39*	.91	1.01	1.01	1.01	.85	Type A Mtg.
	2.0"	.24	.79	1.13	1.13	1.04	1.05	1.00	

*Below ASTM C 1071 specification value.

Application recommendations

All portions of duct designated to receive duct liner board shall be completely covered. Transverse joints shall be neatly butted and there shall be no interruptions or gaps.

The black coated surface of the duct liner board shall face the air stream.

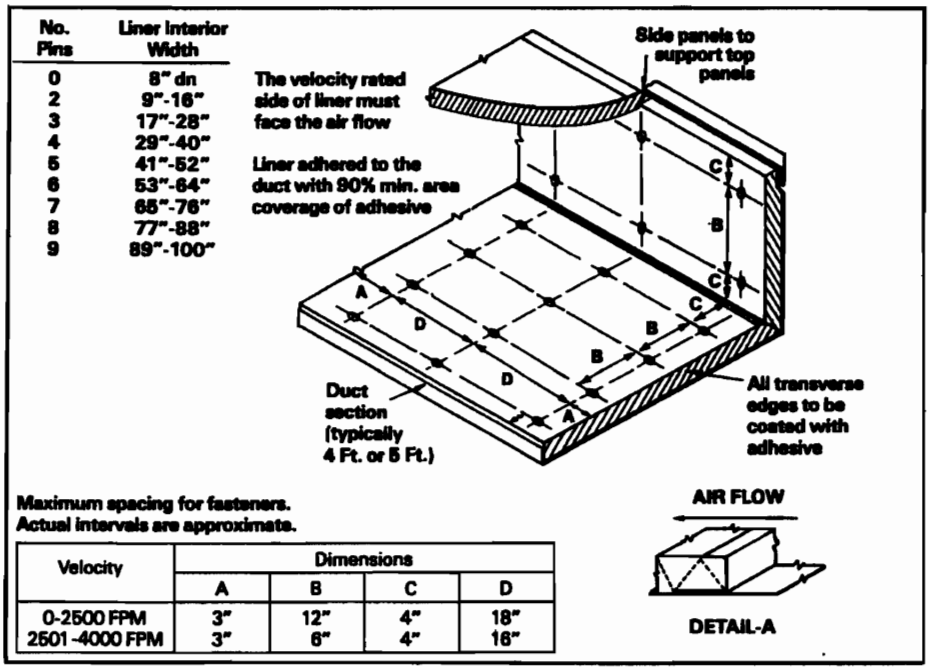
Duct liner board shall be adhered to the sheet metal with 90% coverage of adhesive, and all exposed leading edges and all transverse joints coated with adhesive. Owens-Corning recommends only the use of adhesives complying with ASTM C 916.

Duct liner board shall be additionally secured with mechanical fasteners which shall compress the duct liner sufficiently to hold it firmly in place.

Duct liner board shall be cut to assure tight, overlapped corner joints. The top pieces shall be supported at the edges by the side pieces.

After installation, blow out duct system prior to occupancy to remove any cutting scraps and foreign material remaining in the duct.

No. Pins	Liner Interior Width
0	8" dn
2	9"-16"
3	17"-28"
4	29"-40"
5	41"-52"
6	53"-64"
7	65"-76"
8	77"-88"
9	89"-100"



Maximum spacing for fasteners.
Actual intervals are approximate.

Velocity	Dimensions A	B	C	D
0-2500 FPM	3"	12"	4"	18"
2501-4000 FPM	3"	6"	4"	18"

FIBERGLAS

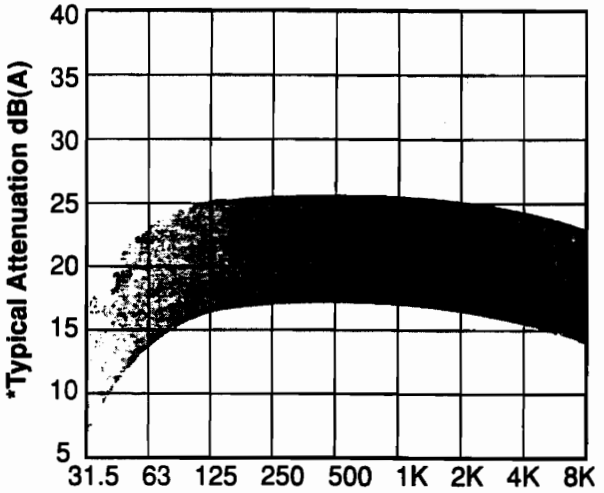
OWENS-CORNING FIBERGLAS CORP.
Mechanical Insulation Products
Fiberglas Tower, Toledo, Ohio 43659

Pub. 1-MS-16396-A Litho in USA November 1990

Residential "200" Level Exhaust Silencers

NELSON® Industries, Inc.

Typical Attenuation Curve dB
(ACTUAL ATTENUATION MAY VARY ACCORDING TO APPLICATION)



Application:
Nelson Residential "200" Level Silencers are designed to reduce total engine exhaust noise 18-25 dB.* These silencers are recommended where minimum silencing is required and ambient noise levels are medium to high.

Construction:
Aluminized Steel: Nelson Silencers through 26" O.D. are fabricated of aluminized steel as standard materials. This material has a maximum operating temperature of 1250°F.

Mild Steel/Aluminized Steel: Nelson Silencers 30" O.D. and larger are fabricated of mild steel and aluminized steel. All silencers 30" O.D. through 36" O.D. have aluminized steel bodies with all other components fabricated from mild steel. Silencers 42" O.D. and larger are fabricated from mild steel.

Silicone Aluminum Paint: Nelson Silencers through 26" O.D. are given a coat of high heat resistant silicone aluminum paint.

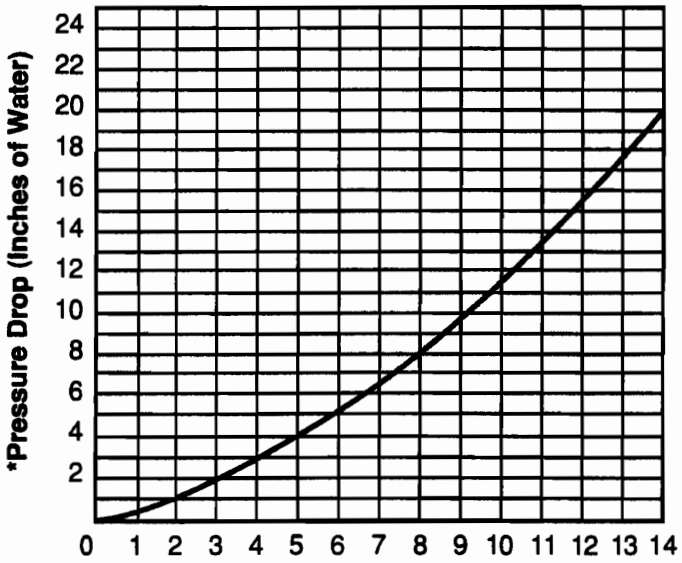
Primer/Silicone Aluminum Paint: Nelson Silencers over 30" O.D. and larger are given a coat of high heat, rust inhibiting primer and then a topcoat of high heat resistant silicone aluminum paint. Physical properties are maintained up to 900°F* on aluminized steel and 1100°F* on mild steel.

"F" Mounting Flange:
Standard in sizes 4" to 22". Drilling matches 125/150# ASA standard.

"P" Male Pipe Threads:
NPT ends offered in sizes 3/4" through 4".

Companion flanges available for 4" to 22".

Pressure Drop

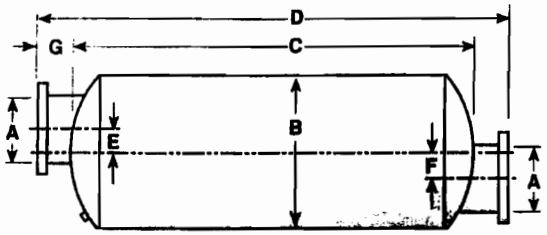


Note: When figuring pressure drop for side inlet or middle side inlet add 3" H_2O to back pressure shown on above curve.

***Estimated**

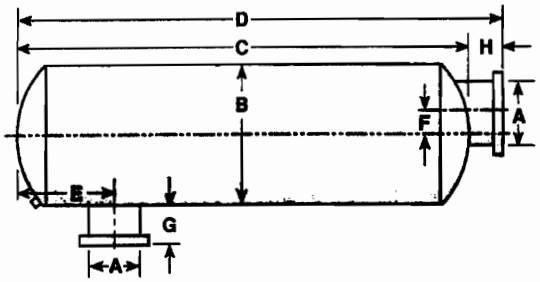
Sample Specification:
The silencer is to be a Nelson Residential "200" Level Silencer constructed of aluminized steel (26" body diameter and smaller) or mild steel/aluminized steel (larger than 26" body diameter) with all welded construction and suitable for mounting in any position. The silencer shall be complete with the following Nelson accessories:

Type 1



Part Number	A Nominal Inlet Diameter	B Body Dia. O.D.	C Body Length	D Overall Length	E Offset To C/L	F Offset To C/L	G Inlet Length
*41220	2	8.1	31.7	35.5	1.25	1.25	1.9
*41225	2.5	9.0	38.8	42.8	1.50	1.50	2.0
*41230	3	10.1	38.2	44.0	2.75	2.75	2.9
*41235	3.5	10.1	44.2	50.0	2.06	2.06	2.9
*41240	4	10.1	49.2	55.0	2.30	2.30	2.9
*41250	5	14.1	43.5	51.3	3.60	3.60	3.9
*41260	6	14.1	57.5	65.3	3.60	3.60	3.9
41280	8	22.1	56.6	64.0	0	0	3.7
41282	10	22.1	84.6	92.0	0	0	3.7
41284	12	26.1	79.7	86.9	0	0	3.6
41286	14	36.1	94.6	101.0	0	0	3.2
41288	16	42.1	108.2	115.0	0	0	3.4
41299	18	42.1	108.2	115.0	0	0	3.3
41221	20	48.3	133.9	139.9	0	0	3.0
41222	22	54.3	135.5	143.1	0	0	3.8

Type 3



Part Number	A Nominal Inlet Diameter	B Body Dia. O.D.	C Body Length	D Overall Length	E Offset To C/L	F Offset To C/L	G Inlet Length	H Outlet Length
43220	2	8.1	31.7	33.6	3.4	0	2.0	1.9
43225	2.5	9.0	38.8	40.8	4.4	1.5	2.5	2.0
43230	3	10.1	38.2	41.1	4.1	1.8	3.0	2.9
43235	3.5	10.1	44.2	47.1	4.6	2.1	3.0	2.9
43240	4	10.1	49.2	52.1	5.1	0	3.0	2.9
43250	5	14.1	43.5	47.4	5.8	2.6	4.0	3.9
43260	6	14.1	57.5	61.4	6.8	3.1	4.0	3.9
43280	8	22.1	56.6	60.3	11.3	0	4.0	3.7
43282	10	22.1	84.6	88.3	11.3	0	4.0	3.7
43284	12	26.1	79.7	83.3	12.9	0	4.0	3.6
43286	14	36.1	94.6	97.8	15.3	0	4.0	3.2
43288	16	42.1	108.2	111.6	16.1	0	4.0	3.4
43299	18	42.1	108.2	111.5	19.1	0	4.0	3.3
43221	20	48.3	133.9	136.9	20.0	0	4.0	3.0
43222	22	54.3	135.5	143.1	21.8	0	4.0	3.8

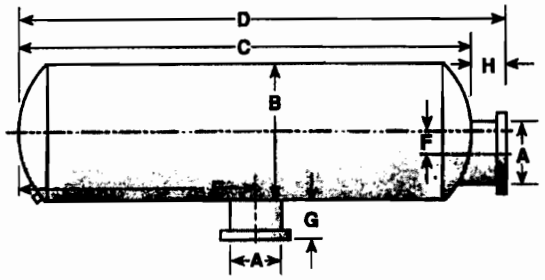
*Inlet and outlet offset from centerline of silencer as shown in dimension E and F.

Drains are standard on all silencers with a 9" body diameter or larger.

Note: Specifications are subject to change without notice.

Note: All dimensions are in inches.

Type 4



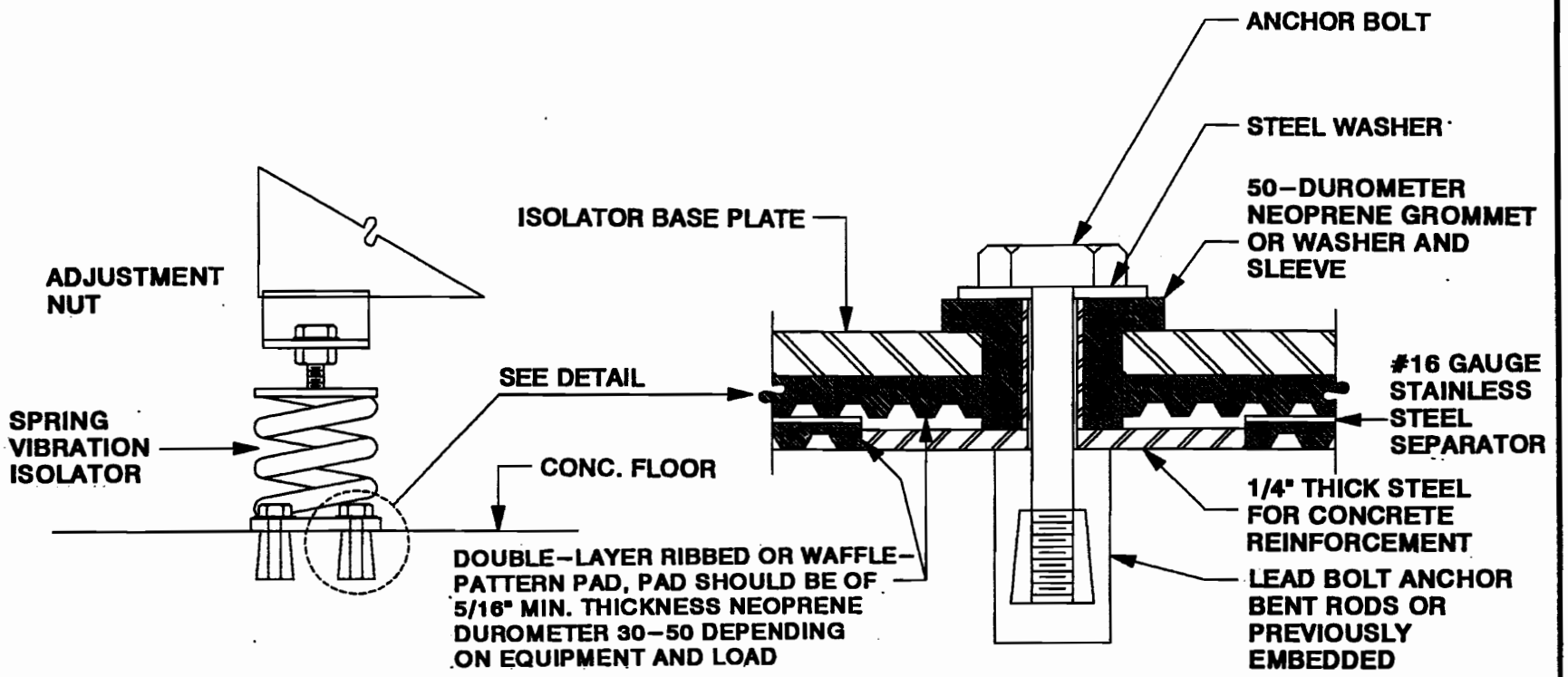
Part Number	A Nominal Inlet Diameter	B Body Diameter O.D.	C Body Length	D Overall Length	E Offset To C/L	F Offset To C/L	G Inlet Length	H Outlet Length
44640	4	10.1	49.2	52.1	24.6	0	3.0	2.9
44650	5	14.1	43.5	47.4	21.8	2.6	4.0	3.9
44660	6	14.1	57.5	61.4	28.8	3.0	4.0	3.9
44680	8	22.1	54.6	58.3	26.3	0	4.0	3.7
44682	10	22.1	84.6	88.2	42.3	0	4.0	3.6
44684	12	26.1	79.7	83.3	39.9	0	4.0	3.6
44686	14	36.1	83.3	86.5	44.3	0	4.0	3.2

NELSON DIVISION
Exhaust & Filtration Systems

Hwy. 51 West. P.O. Box 428
Stoughton. Wisconsin 53589
Telephone (608) 873-4200
Telex 26-5433
Telefax (608) 873-1532

Industries. Inc.

ENCLOSURE 10



SPRING VIBRATION ISOLATOR DETAIL

NTS

Appendix B

AIR QUALITY IMPACT REPORT (AQIR)

PROPOSED EMERGENCY BACKUP POWER PLANT
THE QUEEN'S MEDICAL CENTER

21 June 2007

PREPARED FOR:

The Queen's Medical Center
Honolulu, Hawaii

PREPARED BY:

J. W. MORROW
Environmental Management Consultant
1481 South King Street, Suite 548
Honolulu, Hawaii 96814

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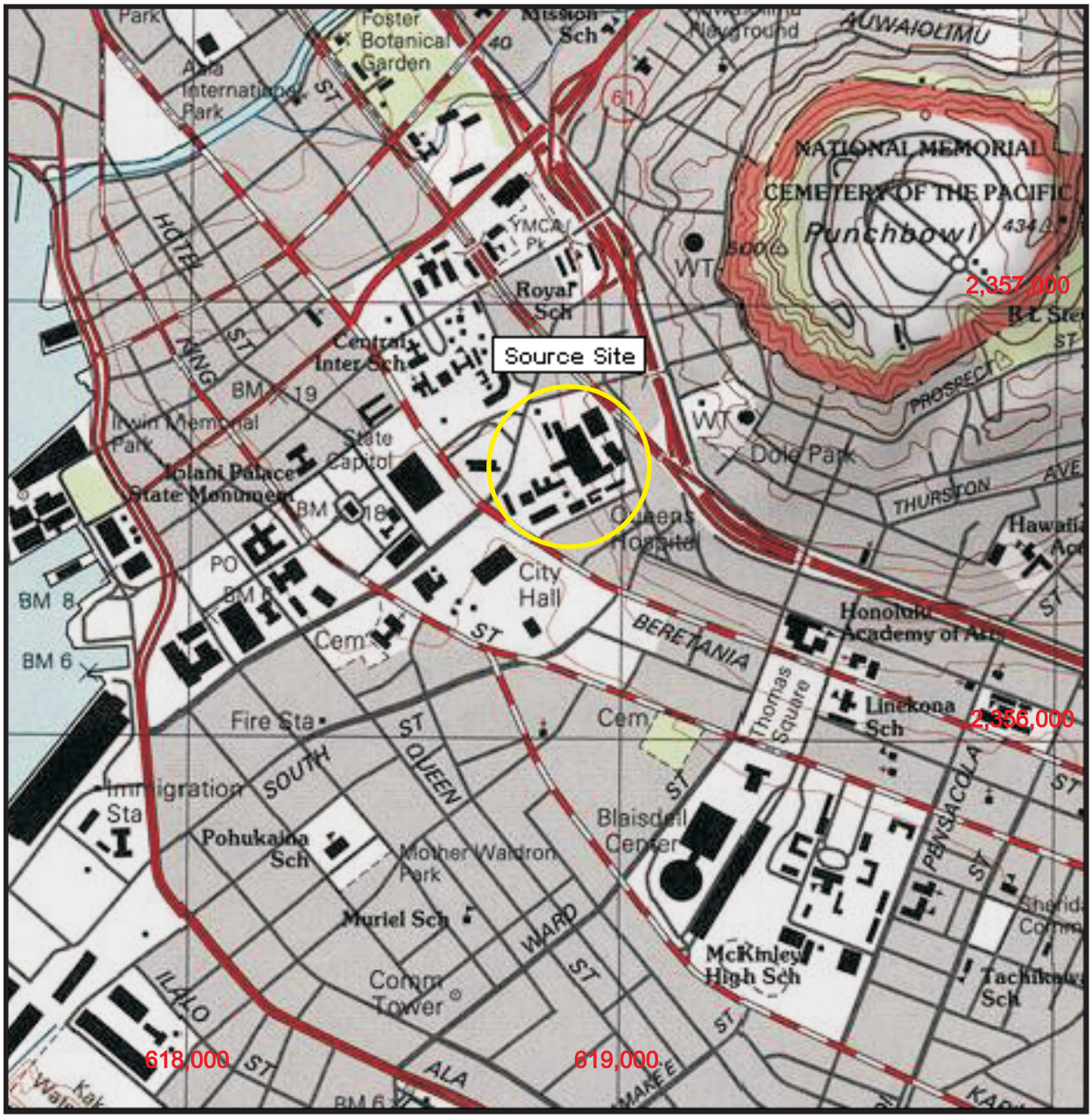
1. INTRODUCTION

The Queen's Medical Center ("QMC") is proposing to install four (4) 2,250 kilowatt (kW) diesel engine generators at its Honolulu facility. The purpose of these units is to provide power to QMC during power outages or under conditions when the local utility, i.e., the Hawaiian Electric Company, determines that a system emergency is imminent and that it must reduce overall load by temporarily disconnecting large customers such as QMC which have the capability of providing their own power. The purpose of this report is to assess the short and long-term impacts of the proposed action on air quality.

While long-term impacts would clearly be related to operation of the proposed generators, short-term impacts are likely related to construction activities. During construction of the new generator building air pollutant emissions will be generated both onsite and offsite by vehicular movement, grading, concrete batching, and general dust-generating construction activities. These impacts have also been addressed.

FIGURE 1

PROJECT LOCATION



USGS Quad Honolulu (1998)
1:24,000 (NAD-83)

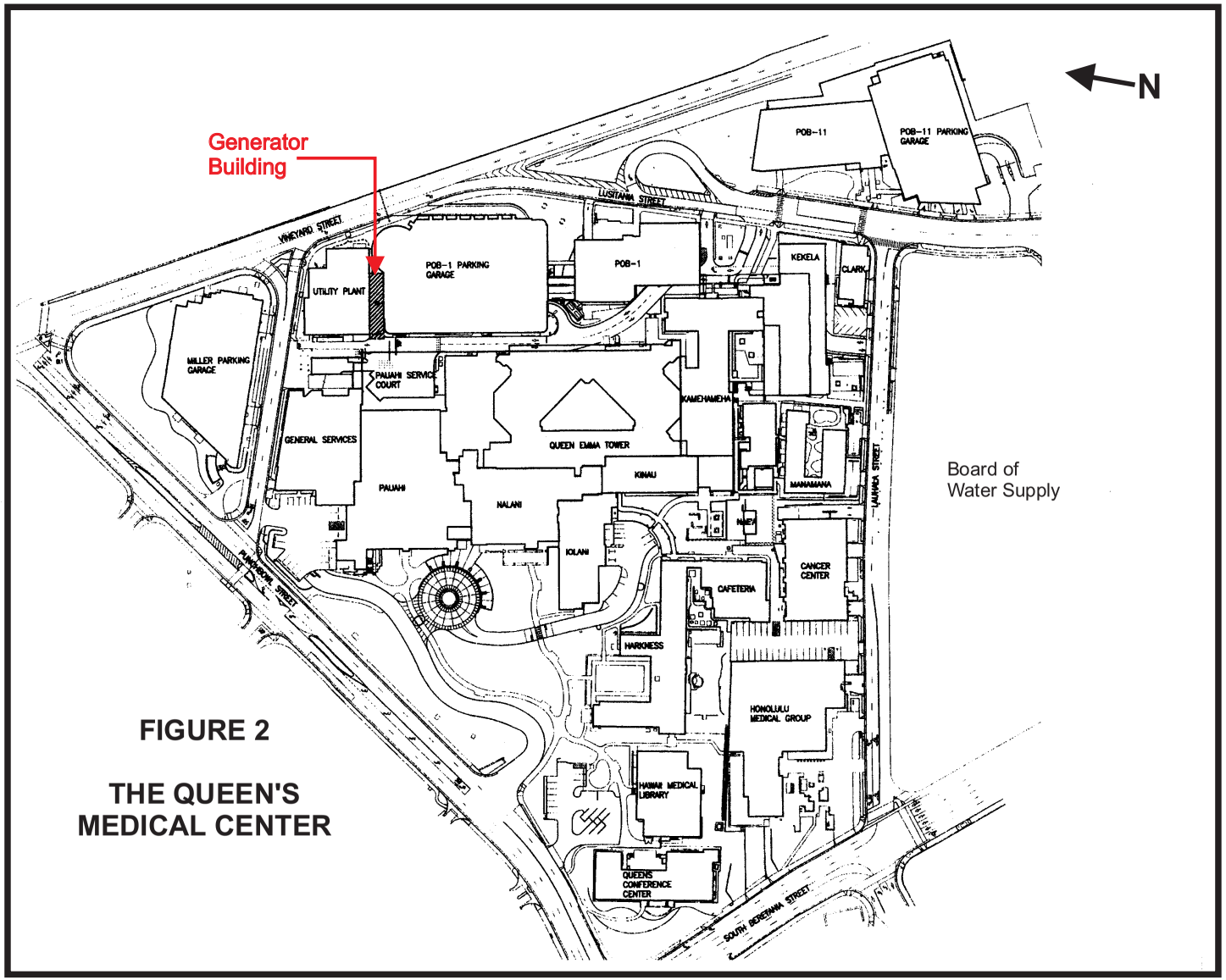


FIGURE 2

THE QUEEN'S MEDICAL CENTER

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards (NAAQS) is presented in Table 1.[1, 2, 3,] Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values [4]. Note that in the case of the principal automotive pollutants [CO, NO_2, and O_3], the primary and secondary standards are identical.

Some of Hawaii's standards (CO, NO_2, and O_3) are clearly more stringent than their federal counterparts and like their federal counterparts in the case of short-term standards, they may be exceeded once per year.

3. EXISTING AIR QUALITY

3.1 General. The state Department of Health (DOH) maintains a network of air monitoring stations around the state to gather data on the following regulated pollutants:

- particulate matter ≤ 10 microns (PM_{10})
- sulfur dioxide (SO_2)

- nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- ozone (O_3)

In the case of PM_{10} , measurements are made on a 24-hour basis to correspond with the averaging period specified in state and federal standards. Depending on the sampling equipment and site, samples are collected either continuously or once every six days in accordance with U. S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide, sulfur dioxide, and ozone, however, are measured on a continuous basis due to their short-term (1- and 3-, and 8-hour) standards. Nitrogen dioxide is also measured with continuous instruments and averaged over a full year to correspond to its annual standards. Lead sampling was discontinued in October 1997 with EPA approval. This was largely due to the elimination of lead in gasoline and the resulting reduction of ambient lead levels in Hawaii to essentially zero.

3.2 Department of Health Monitoring. The nearest DOH air monitoring station is in fact very near, being located across Punchbowl Street from QMC. A summary of the most recent published air quality data [5] from that site and from the Sand Island site (the only ozone monitoring site) is presented in Table 2. These data are representative of the existing good air quality in the project area.

TABLE 1

SUMMARY OF STATE OF HAWAII AND FEDERAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING PERIOD	NAAQS PRIMARY	NAAQS SECONDARY	STATE STANDARDS
PM_{10}	Annual 24-hr	50 150	50 150	50 150
$PM_{2.5}$	Annual 24-hr	15 65	15 65	--- ---
SO_2	Annual 24-hr 3-hr	80 365 ---	--- --- 1,300	80 365 1,300
NO_2	Annual	100	100	70
CO	8-hr 1-hr	10,000 40,000	--- ---	5,000 10,000
O_3	1-hr 8-hr	235 156	235 156	100 ---
H_2S	1-hr	---	---	35
Pb	Calendar Quarter	1.5	1.5	1.5

KEY: PM_{10} - particulate matter ≤ 10 microns
$PM_{2.5}$- particulate matter ≤ 2.5 microns
SO_2 - sulfur dioxide
NO_2 - nitrogen dioxide
CO - carbon monoxide
O_3 - ozone
H_2S - hydrogen sulfide
Pb - lead

TABLE 2

AIR QUALITY DATA
DEPARTMENT OF HEALTH MONITORING SITES
2005

Pollutant		Concentration ($\mu g/m^3$)
Particulate matter ($\leq$ 10 microns) (PM_{10})	Annual	15
	24-hr	64
Particulate matter ($\leq$ 2.5 microns) ($PM_{2.5}$)	Annual	4
	24-hr	45
Sulfur dioxide (SO_2)	Annual	1
	24-hr	23
	3-hr	75
Carbon monoxide (CO)	8-hr	1,610
	1-hr	3,876
Ozone (O_3)	Annual	34
	8-hr	92
	1-hr	116
Nitorgen Dioxide (NO2)	Annual	9

Notes:
1. PM, CO, and SO_2 data from the Honolulu site.
2. No_2 data from the Kapolei site.
3. O_3 data are from the Sand Island site.
4. 24-hr PM_{10} & $PM_{2.5}$ maximum attributed to New Years fireworks.

Source: Hawaii Department of Health (Reference 5)

4. CLIMATE AND METEOROLOGY

4.1 Climate. Climatic norms, means and extremes for Honolulu [6] are presented in Table 3. Analysis of the monthly temperature and rainfall data for the National Weather Service station at Honolulu International Airport in accordance with Thornwaite's scheme for climatic classification, yields a precipitation/evaporation (P/E) index of 26.6 which classifies the area as "semi-arid". [7]

4.2 Surface Winds. Meteorological data records were reviewed from the Honolulu International Airport and Hickam Air Force Base. The annual prevalence of northeast trade winds is clearly shown in Table 4. A closer examination of the data, however, indicates that low velocities (less than 10 mph) occur frequently and that the normal northeasterly trade winds tend to break down in the Fall giving way to more light, variable wind conditions through the Winter and on into early Spring. It is during these times that Honolulu generally experiences elevated pollutant levels. This seasonal difference in wind conditions can be easily contrasted by comparing August and January wind roses (Figures 4 and 5). Of particular interest from an air pollution standpoint were the stability wind roses prepared for Hickam Air Force Base [8]. These data indicated that stable conditions, i.e., Pasquill-Gifford stability categories E and F [9], occur about 28% of the time on an annual basis and 36% of the time during the peak winter month (January). It is under such conditions that the greatest potential for air pollutant buildup occurs.

TABLE 3

CLIMATIC NORMS, MEANS AND EXTREMES
HONOLULU INTERNATIONAL AIRPORT (HIA)

Parameter	Descriptor	Honolulu International Airport
Temperature (deg F)	Daily maximum	84.4
	Daily minimum	70.0
	Annual mean	77.2
Precipitation (inches)	Maximum monthly	20.91
	Minimum monthly	trace
	Annual mean	22.02
Humidity (%)	Normal	68
Wind Speed (mph)	Mean	11.4
Sunshine	Percent of possible	71
Sky cover (mean # days)	Clear	90.0
	Partly cloudy	179.8
	Cloudy	92.0

Sources: National Climatic Data Center (NCDC) (Reference 8)

TABLE 4

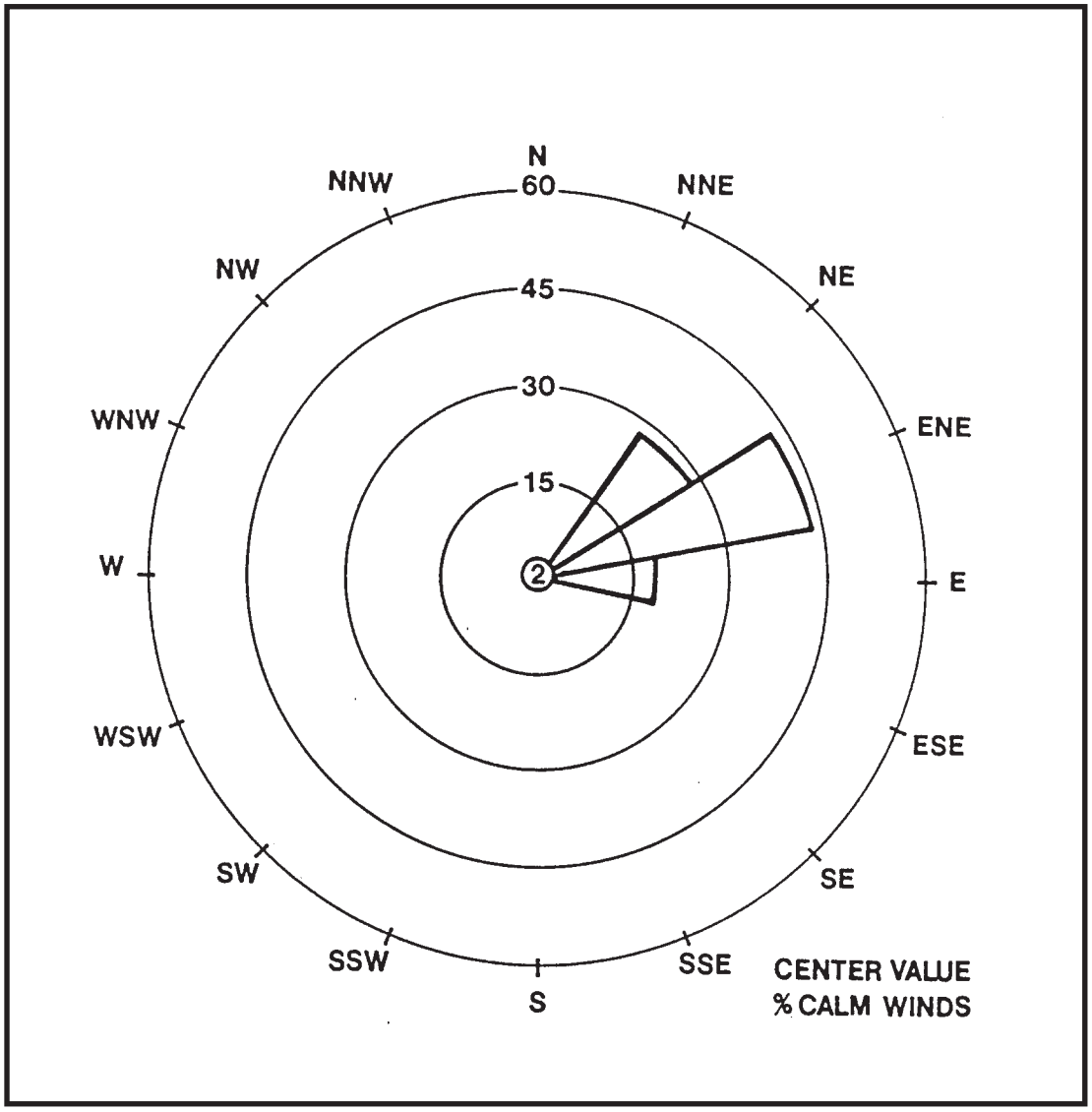
ANNUAL JOINT FREQUENCY DISTRIBUTION
OF WIND SPEED AND DIRECTION
HONOLULU INTERNATIONAL AIRPORT

	Wind Speed (m/sec)						
Dir (deg)	**< 3.1**	**< 4.5**	**< 5.8**	**< 7.2**	**< 8.5**	**>/= 8.5**	**All**
10	0.0065	0.0038	0.0023	0.0016	0.0009	0.0001	0.0151
20	0.0082	0.0041	0.0025	0.0023	0.0011	0.0001	0.0183
30	0.0100	0.0061	0.0051	0.0038	0.0028	0.0007	0.0286
40	0.0188	0.0157	0.0258	0.0222	0.0174	0.0040	**0.1039**
50	0.0268	0.0290	0.0449	0.0385	0.0307	0.0054	**0.1752**
60	0.0344	0.0289	0.0436	0.0273	0.0238	0.0041	**0.1621**
70	0.0250	0.0181	0.0197	0.0122	0.0096	0.0009	**0.0855**
80	0.0113	0.0081	0.0065	0.0039	0.0009	0.0003	0.0310
90	0.0073	0.0049	0.0040	0.0009	0.0008	0.0000	0.0179
100	0.0031	0.0016	0.0014	0.0006	0.0002	0.0000	0.0068
110	0.0027	0.0019	0.0010	0.0007	0.0005	0.0001	0.0069
120	0.0027	0.0013	0.0019	0.0009	0.0003	0.0003	0.0075
130	0.0022	0.0032	0.0018	0.0015	0.0007	0.0002	0.0096
140	0.0034	0.0033	0.0039	0.0018	0.0011	0.0006	0.0141
150	0.0022	0.0030	0.0019	0.0003	0.0002	0.0005	0.0081
160	0.0024	0.0033	0.0023	0.0010	0.0005	0.0000	0.0094
170	0.0031	0.0046	0.0023	0.0007	0.0003	0.0000	0.0109
180	0.0055	0.0042	0.0018	0.0008	0.0005	0.0000	0.0128
190	0.0065	0.0038	0.0013	0.0002	0.0000	0.0000	0.0117
200	0.0057	0.0032	0.0011	0.0001	0.0000	0.0000	0.0101
210	0.0076	0.0038	0.0016	0.0001	0.0000	0.0000	0.0131
220	0.0083	0.0077	0.0016	0.0001	0.0001	0.0000	0.0179
230	0.0076	0.0049	0.0014	0.0001	0.0001	0.0000	0.0141
240	0.0042	0.0016	0.0013	0.0000	0.0000	0.0000	0.0071
250	0.0040	0.0010	0.0003	0.0000	0.0000	0.0000	0.0054
260	0.0064	0.0023	0.0005	0.0000	0.0000	0.0000	0.0091
270	0.0065	0.0010	0.0005	0.0002	0.0000	0.0000	0.0082
280	0.0099	0.0005	0.0002	0.0000	0.0000	0.0000	0.0106
290	0.0123	0.0003	0.0002	0.0001	0.0000	0.0000	0.0130
300	0.0167	0.0018	0.0011	0.0000	0.0000	0.0000	0.0197
310	0.0235	0.0022	0.0015	0.0001	0.0000	0.0000	0.0272
320	0.0200	0.0022	0.0013	0.0006	0.0001	0.0000	0.0241
330	0.0121	0.0023	0.0011	0.0005	0.0000	0.0000	0.0159
340	0.0094	0.0010	0.0003	0.0001	0.0000	0.0000	0.0109
350	0.0082	0.0025	0.0016	0.0002	0.0000	0.0000	0.0125
360	0.0093	0.0027	0.0022	0.0006	0.0005	0.0001	0.0154
All	**0.3537**	0.1898	0.1917	0.1240	0.0932	0.0174	0.9698
						Calms:	0.0302

SOURCE: National Weather Service, 1992

FIGURE 3

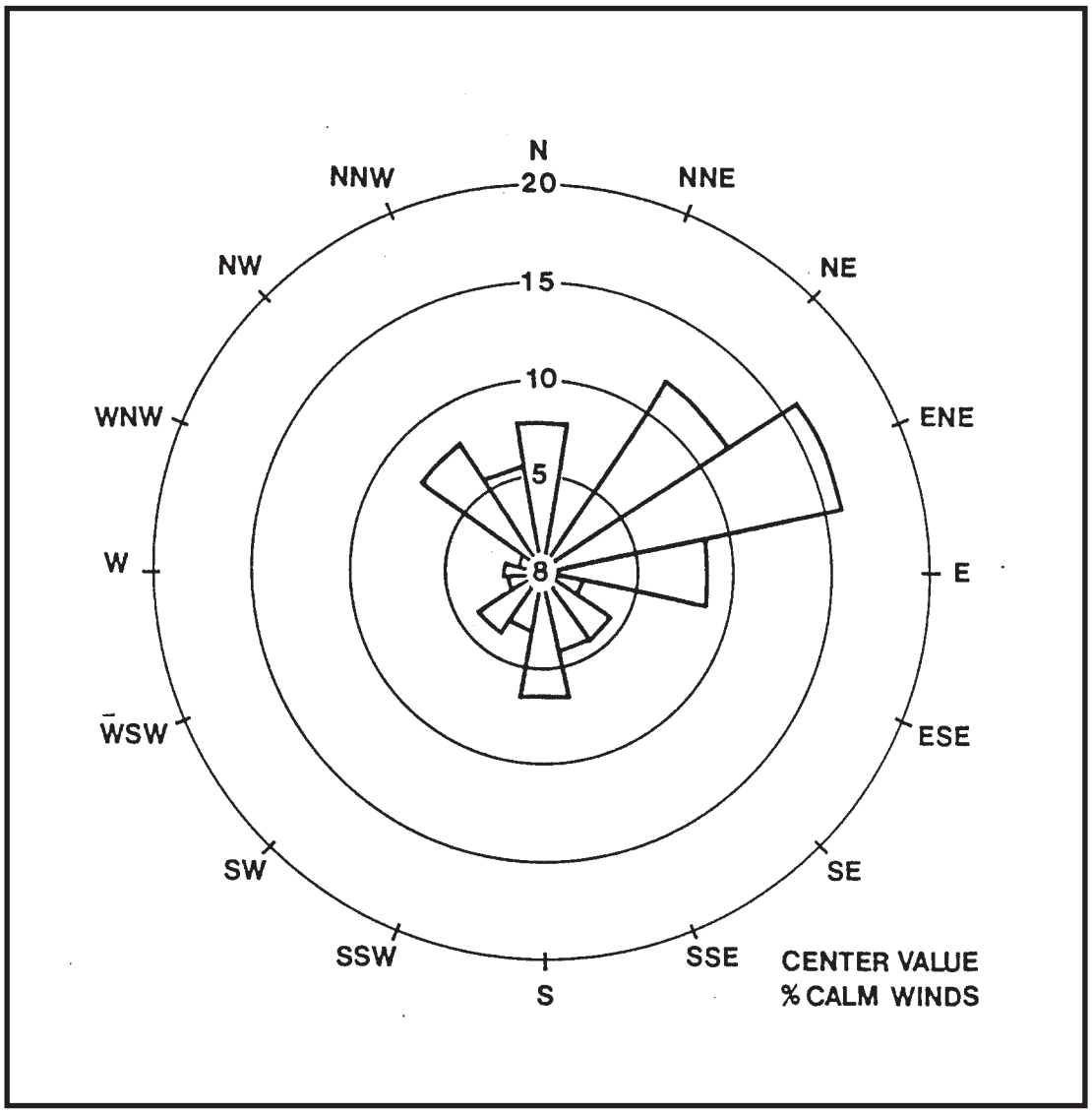
AUGUST WIND ROSE
HONOLULU INTENATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

FIGURE 4

JANUARY WIND ROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

5. SHORT-TERM IMPACTS

5.1 Onsite Impacts. The principal source of short-term air quality impact will be construction-related activity. Construction vehicle traffic on the existing streets may at times cause a temporary reduction in average travel speeds with a concomitant increase in vehicle emissions due to the "stop and go" traffic conditions. Although the site of the new power plant adjacent to the existing parking structure is very small, site preparation will generate some particulate matter (PM) emissions as will construction of the new power plant building. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/ evaporation (P/E) index of 50 [7, 10].

5.2 Offsite Impacts. In addition to the onsite impacts attributable to construction activity, there will also be offsite impacts due to the operation of concrete batch plants needed for construction of the new building. Such plants routinely emit particulate matter and other gaseous pollutants; however. it is too early to identify the specific facilities that will be providing this material and thus the discussion of air quality impacts is necessarily generic. The batch plants which will be producing this concrete must be permitted by the Department of Health Clean Air Branch pursuant to state regulations [11]. In order to obtain these permits they must demonstrate their ability to continuously comply with both emission [11] and ambient air quality [3] standards. Under the federal Title V operating permit requirements [12], now incorporated in Hawaii's rules [11], air pollution sources must regularly attest to their compliance with all applicable requirements. A typical concrete batch plant in Hawaii is equipped with fabric filters, i.e.,

"baghouses" for particulate matter (PM) control. The PM removal efficiency of such controls is normally greater than 99%.

6. LONG-TERM IMPACTS

6.1 Source Activity. The engine which powers each of the proposed generators is a model year 2006 Caterpillar Model 3516B rated at 3,286 horsepower. Except for brief startup periods, no more than three (3) of the diesel engine generators will operate simultaneously at any time. On an annual basis, no more than one (1) million gallons of distillate fuel will be fired, and its sulfur content will not exceed 0.5% by weight. These limits will be included in the required air permit discussed in Section 7.

6.2 Emissions. Emission factors (pounds per hour) for NOx, CO, PM, and total hydrocarbons (THC) were taken from the manufacturer's specification sheets for the diesel engine. These engines are certified at the Tier 1 emission level required by EPA's new source performance standards for diesel engines.[13] THC were assumed to be equivalent to the current term "volatile organic compounds" (VOC). From an air pollution standpoint this is conservative since THC would include methane which is not considered a photochemical oxidant precursor nor a component of VOC. Emission factors for SO_2, lead (Pb) and other air toxics were taken from EPA's compilation of emission factors.[10] Using these emission factors, hourly and annual emissions were computed and are presented in Table 5.

TABLE 5

ESTIMATED MAXIMUM EMISSIONS
PROPOSED QMC POWER PLANT

Pollutant	Emission Factors (lb/MMBTU)	Fuel Rate (gal/hr/eng)	Heat Rate (MMBTU/hr/eng)	Emission Rate (lb/hr/eng)	Fuel Limit (gal/yr)	Total Annual Emissions (T/yr)
SO2	0.505	157.5	22.1	11.14	1,000,000	35.4
NOx	2.988	157.5	22.1	65.89	1,000,000	209
CO	0.423	157.5	22.1	9.33	1,000,000	29.6
PM/TSP	0.0245	157.5	22.1	0.540	1,000,000	1.72
PM10	0.0245	157.5	22.1	0.540	1,000,000	1.72
THC/VOC	0.0168	157.5	22.1	0.37	1,000,000	1.18
Acetaldehyde	2.52E-05	157.5	22.1	5.56E-04	1,000,000	0.0018
Acrolein	7.88E-06	157.5	22.1	1.74E-04	1,000,000	0.0006
Benzene	7.76E-04	157.5	22.1	1.71E-02	1,000,000	0.0543
Formaldehyde	7.89E-05	157.5	22.1	1.74E-03	1,000,000	0.0055
Naphthalene	1.30E-04	157.5	22.1	2.87E-03	1,000,000	0.0091
Toluene	2.81E-04	157.5	22.1	6.20E-03	1,000,000	0.0197
Xylenes	1.93E-04	157.5	22.1	4.26E-03	1,000,000	0.0135
Total PAH*	2.12E-04	157.5	22.1	4.67E-03	1,000,000	0.0148

* PAH = polyaromatic hydrocarbons

6.3 Modeling Methodology. An air quality impact analysis was performed for the diesel engines using EPA's guideline[14] recommended Industrial Source Complex model (ISC3)[15], five years of meteorological data from the Honolulu International Airport[16] preprocessed with EPA's PCRAMMET program[17], and U.S. Geological Survey (USGS) digital elevation model (DEM) data for the Honolulu quadrangle. A grid with 1,156 receptors spaced at 30 meters intervals was established around the plant.

6.4 Modeling Results. The output concentrations from the modeling were combined with background pollutant concentrations taken from the DOH's 2005 monitoring data (see Table 2) with the results presented in Table 6.

TABLE 6

ISC3 MODELING RESULTS

Pollutant	Averaging Period	Concentration (ug/m^3)		
		Power Plant	Background	Total
NO_2	annual	51.5	9	60.5
SO_2	annual	11.6	1	12.6
	24-hr	275	23	298
	3-hr	757	75	832
PM_{10}	annual	0.56	15	15.6
	24-hr	13.3	64	77.3
CO	8-hr	448	1,610	2,058
	1hr	1,300	3,876	5,176

Notes: Background data (CY 2005) from the DOH's monitoring stations:
Honolulu: CO, SO_2 and PM_{10}
Kapolei: NO_2

7. CONCLUSIONS AND MITIGATION

7.1 Short-Term Impacts. Since, as noted in Section 4, the project area is considered to be "semi-arid" by Thornwaite's climatic classification system with a P/E index lower than that associated with the EPA fugitive dust emission factor, there appears to be an increased potential for fugitive dust. It will therefore be important to employ adequate dust control measures during the construction period, particularly during the drier summer months. Dust control could be accomplished through frequent watering of unpaved roadways and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50% [10].

Short-term air quality impacts due to offsite activities supporting the proposed development, i.e., concrete production, appear to be *de minimus* due in large part to the high removal efficiency of control devices typically found on such production facilities. Furthermore, any emissions will be strictly regulated by the Department of Health permit which each batch plant must have in order to operate.

7.2 Long-Term Impacts

7.2.1 Emissions. The emissions presented in Table 5 trigger certain permitting and emission control requirements. The NOx emissions exceed 100 T/yr and thus require the plant to obtain a "Covered Source" air permit pursuant to State air pollution control rules.[11] These rules are the EPA-approved

version of the operating permit rules mandated by Title V of the U.S. Clean Air Act. Hawaii's air program, however, is fully integrated in that the air permit issued is both an "authority to construct" and a "permit to operate". The NOx emissions also exceed the 40 T/yr threshold for "best available control technology" (BACT). The proposed engines meet the BACT requirement by being designed and certified to meet EPA's Tier 1 emission limits which are considered the best available control technology for model year 2006 diesel engines.

7.2.2 Air Quality The results in Table 6 indicate compliance with state and federal ambient air quality standards (Table 1); thus, no further mitigation is required beyond that already resulting from the proposed limits on fuel sulfur content, annual fuel use, and the BACT requirement.

REFERENCES

1. Clean Air Act, 42 U.S.C.A. §7409 (CAA §109), National primary and secondary ambient air quality standards.

2. Code of Federal Regulations, Title 40, Protection of Environment, Part 50, *National Primary and Secondary Ambient Air Quality Standards*.

3. State of Hawaii. Title 11, Administrative Rules, Chapter 59, *Ambient Air Quality Standards*, as amended, 28 August 2001.

4. Library of Congress, Congressional Research Service. *A Legislative History of the Clean Air Amendments of 1970*, Volume 1, p. 411, January 1974.

5. State of Hawaii, Department of Health. *Annual Summary: Hawaii Air Quality Data - 2005*.

6. State of Hawaii, Department of Business, Economics and Tourism. *State of Hawaii Data Book - 1999*.

7. Thornwaite, C. W. Climates of North America According to a New Classification, *Geog. Rev. 21*: 633-655, 1931.

8. U.S. Air Force, Environmental Technical Applications Center Report No. 7461: *Stability Wind Roses, Hickam AFB, HI, 0000-2400 LST By Boundary Layer Section*, 4 September 1974.

9. U. S. Environmental Protection Agency. *Workbook of Atmospheric Dispersion Estimates*, AP-26 (Sixth Edition), 1973.

10. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors*, Fifth Edition, as updated on Air Chief 12 CD, EPA 454/C-05-001, June 2005.

11. State of Hawaii. Title 11, Administrative Rules, Chapter 60.1, *Air Pollution Control*, 28 August 2001.

12. Clean Air Act Amendments of 1990, P.L. 101-549, 15 November 1990.

13. 40 CFR 60, Subpart IIII, July 2006

14. U.S. Environmental Protection Agency. *Guideline on Air Quality Models (Revised)*, 40 CFR 51, Appendix W, 1 July 2006.

15. U.S. Environmental Protection Agency. *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models*, EPA-454/B-95-003a, September 1995.

16. National Oceanographic and Atmospheric Administration/ National Climatic Data Center, U. S. Environmental Protection Agency. *Hourly United States Weather Observations, 1990 - 1995*, October 1997.

17. U. S. Environmental Protection Agency. *PCRAMMET User's Guide*, EPA-454/B-96-001, revised June 1999.

Appendix C

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

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CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

January 11, 2006

Hal Hammatt, PhD
Cultural Survey Hawaii
PO Box 1114
Kailua, Hawai'i 96734

LOG NO: 2006.0065
DOC NO: 0512NM52
Archaeology

Dear Dr. Hammatt:

SUBJECT: Chapter 6E-42 Historic Preservation Review –
Archaeological Monitoring Plan for
The Queen's Medical Center Redevelopment Project
Honolulu Ahupua'a, Kona District, Island of O'ahu
TMK: (1) 2-1-018:048, 2-1-035: 001, 003-008 & 010; 2-1-037:002

We are in receipt of the aforementioned archaeological monitoring plan for our review. We received the plan on October 11, 2005, and apologize for the late response.

This plan is approved. A draft monitoring report shall be submitted 90 days after the completion of fieldwork for review and approval to the State Historic Preservation Division.

If you have any questions please call Nancy McMahon at 808-742-7033.

Aloha,

Melanie A. Chinen, Administrator
State Historic Preservation Division

NM:dlb

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
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KAPOLEI, HAWAII 96707

March 2, 2006

Mr. David W. Shideler
Cultural Surveys Hawai'i, Inc.
PO Box 1114
Kailua, Hawai'i 96734

LOG NO: 2006.0539
DOC NO: 0603CM10
Archaeology

Dear Mr. Shideler:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
Revised Archaeological Inventory Survey Plan in Support of
The Queen's Medical Center Redevelopment Project
Honolulu Ahupua'a, Honolulu (Kona) District, Island of O'ahu
TMK (1) 2-1-018:048; (1) 2-1-035:001, 003–008 & 010; (1) 2-1-037:002

Thank you for the opportunity to review and comment on the aforementioned revised report, which we received on February 14, 2006. In our previous letter (LOG NO: 2006.0076, DOC NO: 0601CM08) dated January 19, 2006, we requested several revisions to the inventory survey plan. Among these revisions were incremental testing (excavation) methodologies designed to more carefully sample the subsurface deposits, in view of the documented presence of human remains (from the 1971 construction of the medical center).

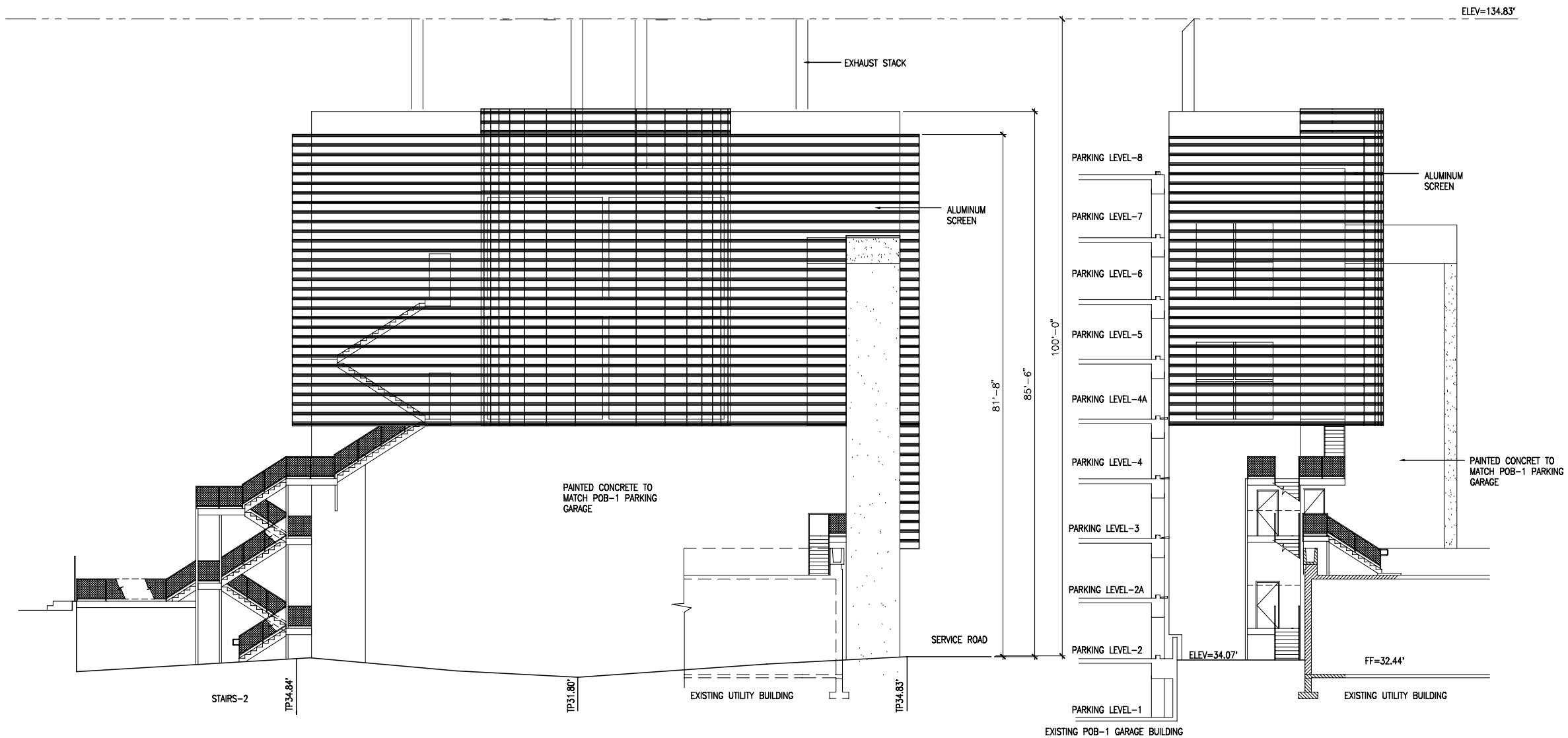
The inventory survey plan is now accepted, in accordance with HAR Chapter 13-276. We look forward to continued consultation on this project, and receipt of your inventory survey report. If you have any questions, please call Dr. Chris Monahan at 808-692-8015.

Aloha,

Melanie Chinen, Administrator
State Historic Preservation Division

CM

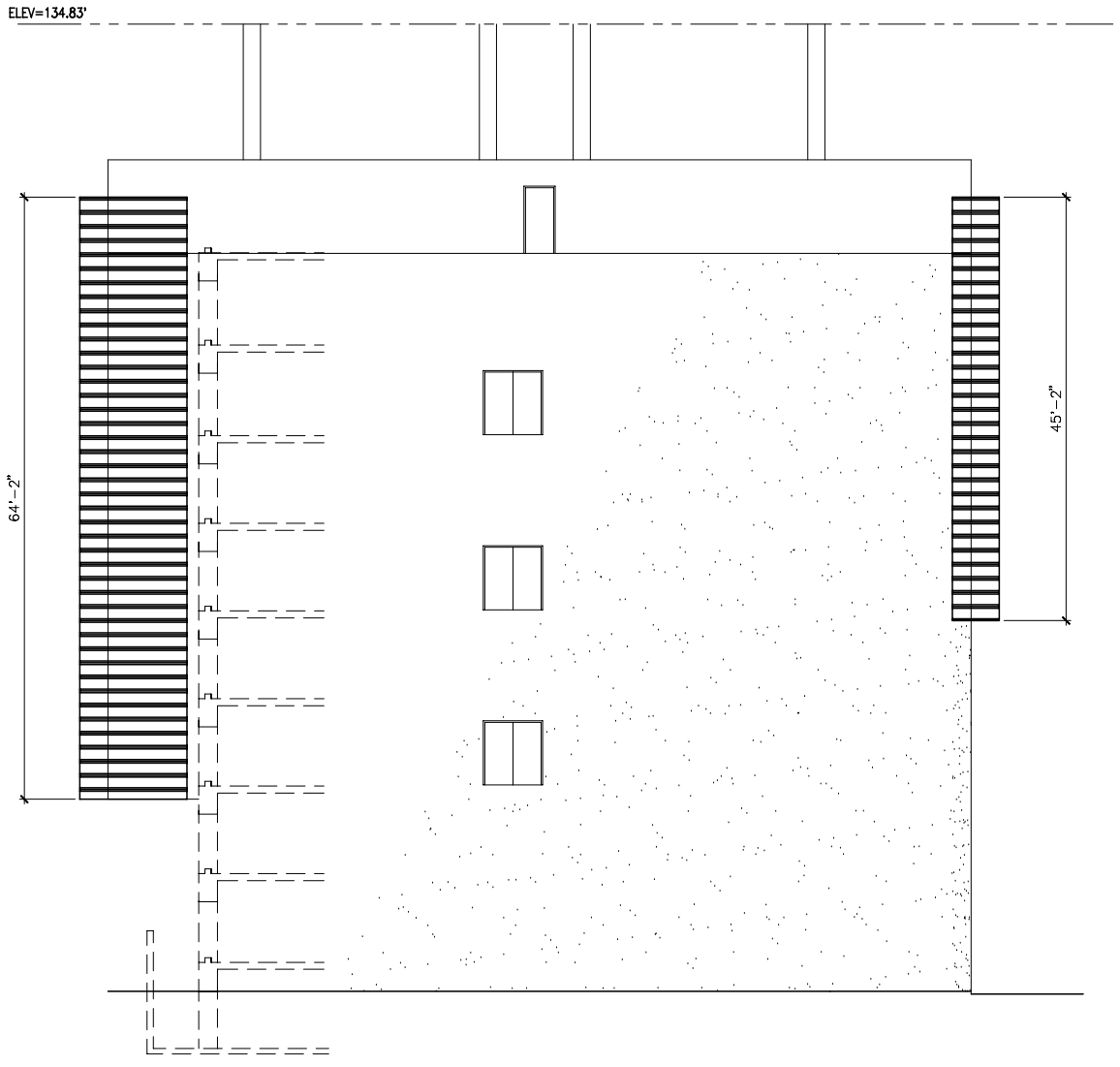
Appendix D



North Elevation

East Elevation

Source: The AES Design Group Inc.



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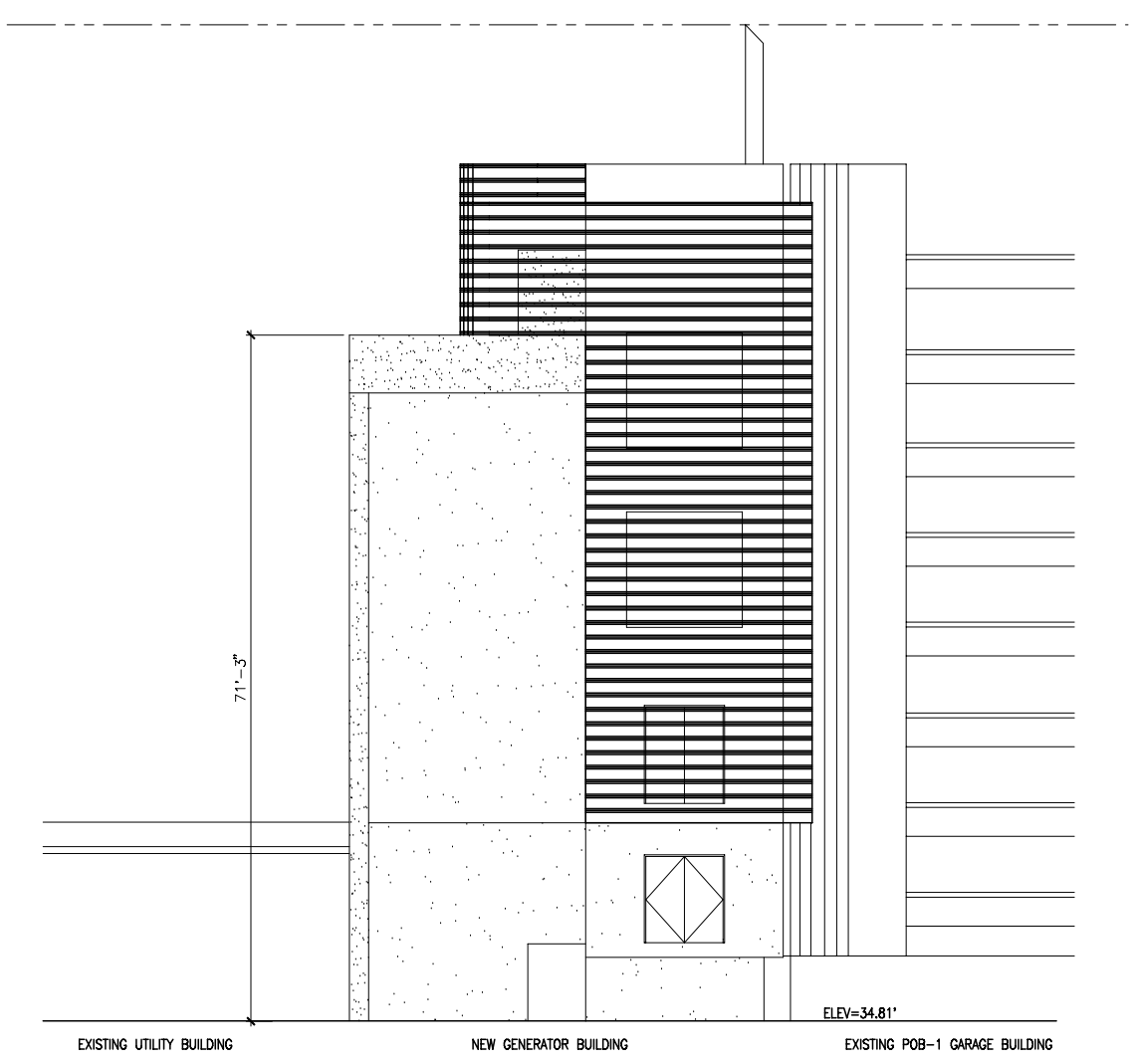

West Elevation

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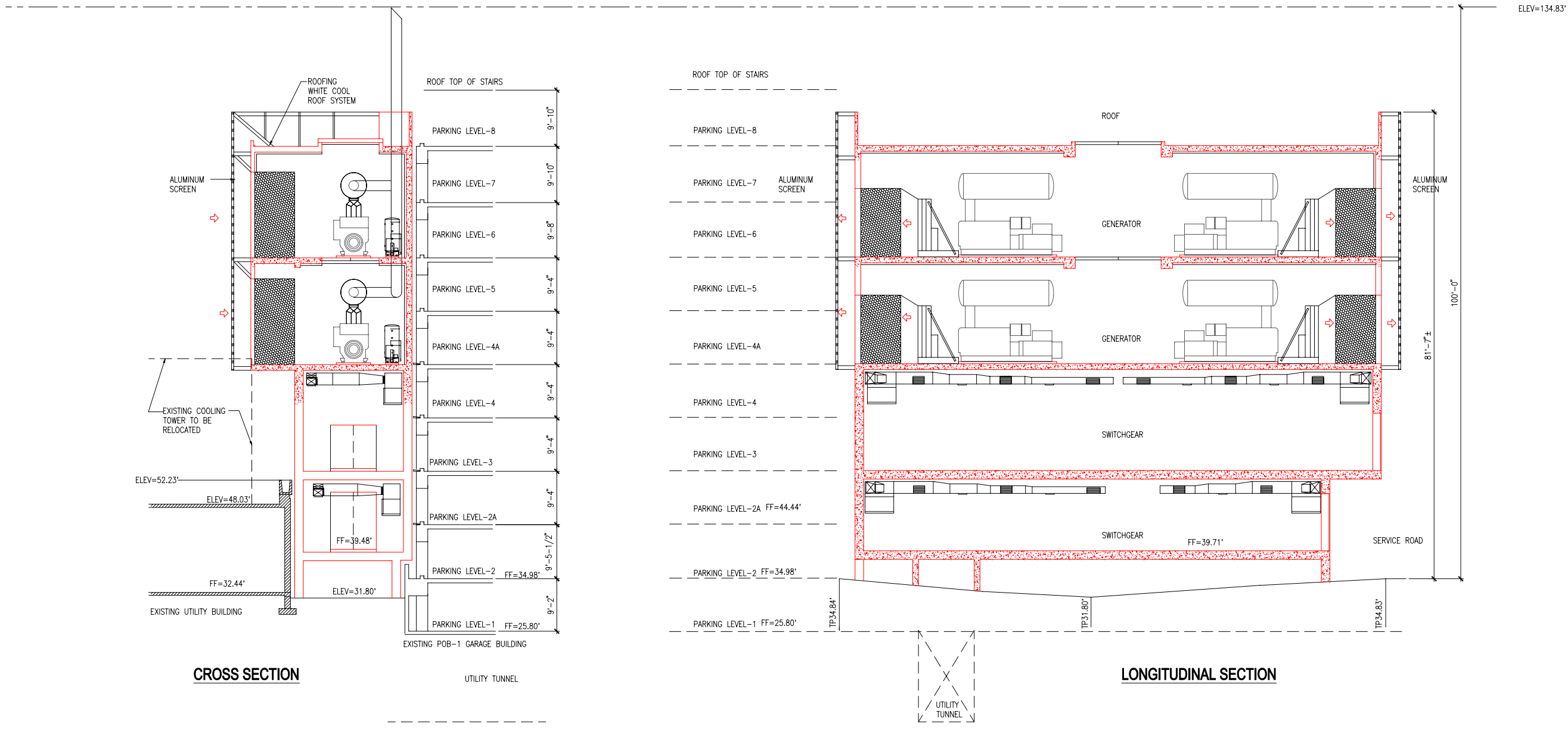
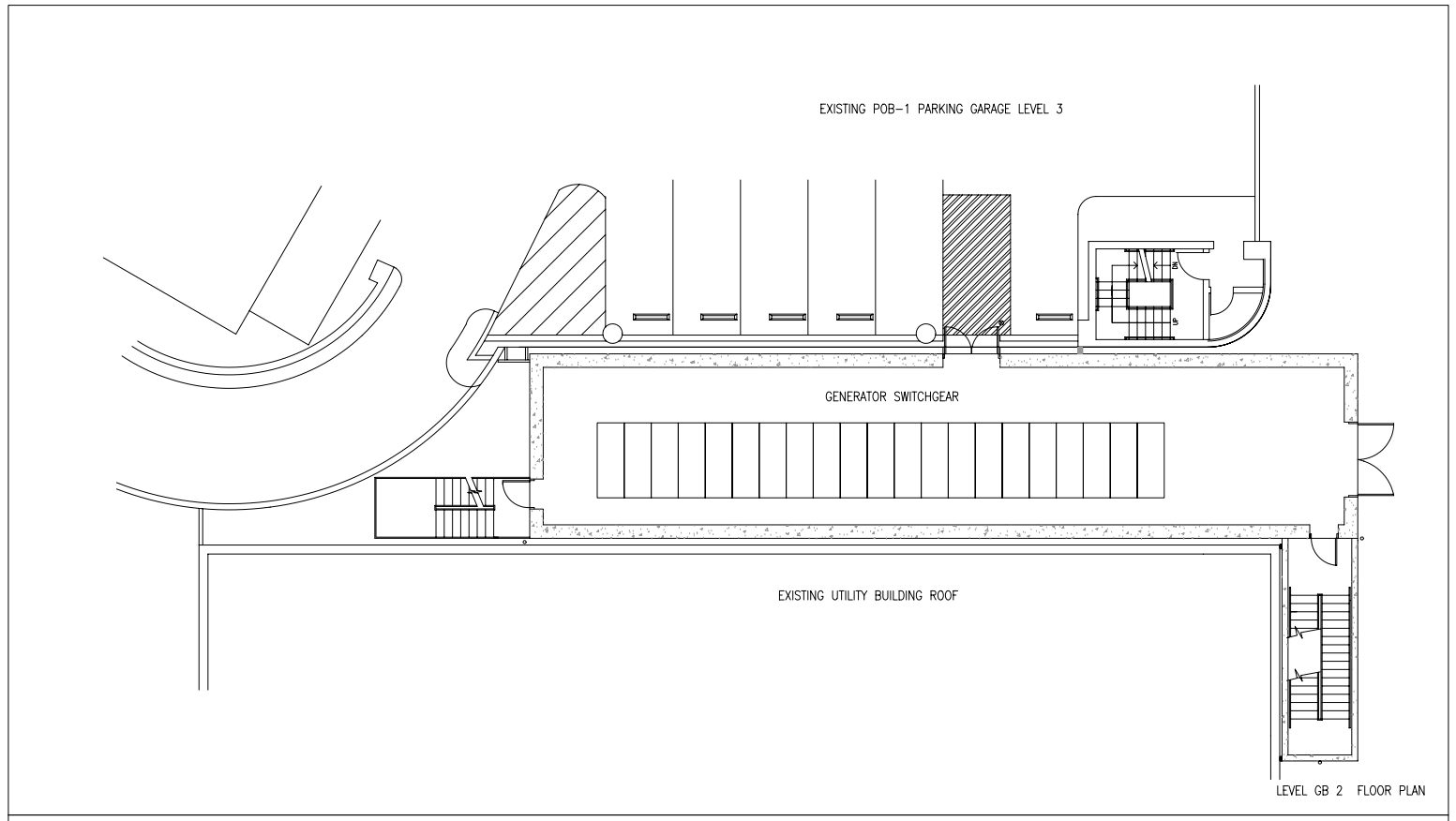
SCALE IN FEET

Source: The AES Design Group Inc.

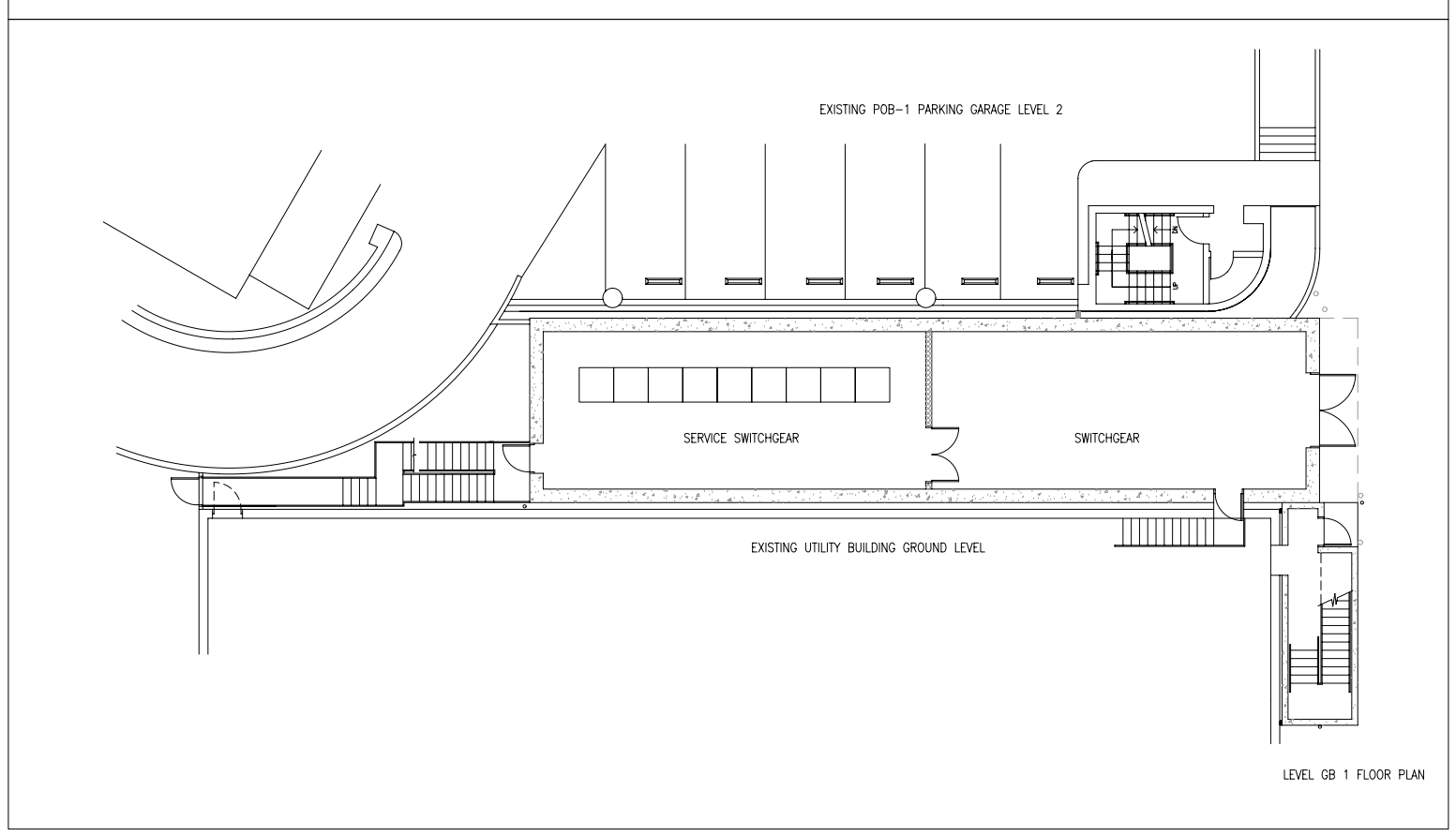


Source: The AES Design Group Inc.

Level 02 Floor Plan Generator Building



Level 01 Floor Plan Generator Building



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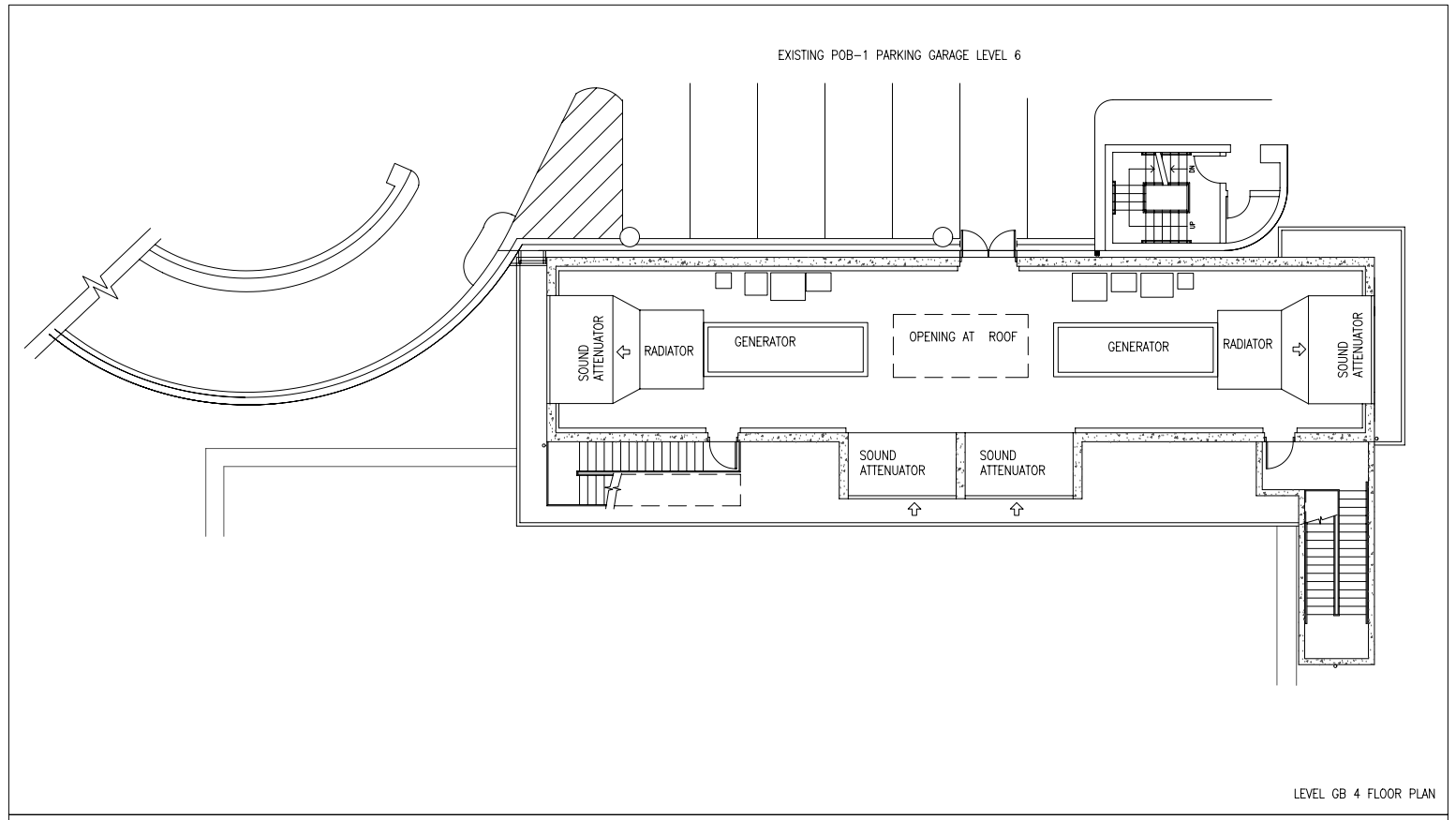
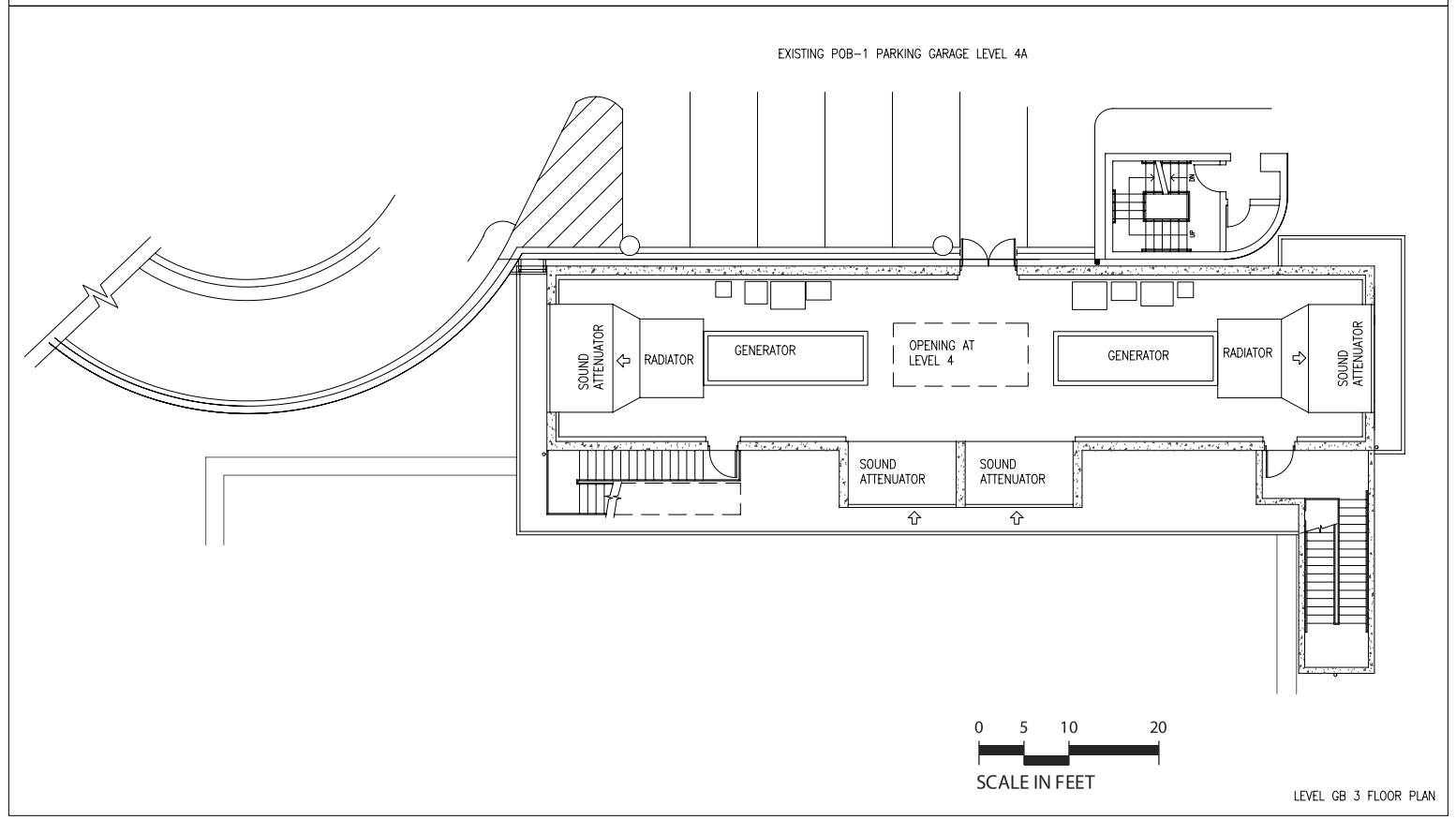
SCALE IN FEET

Source: The AES Design Group Inc.

Level 04
Floor Plan
Generator Building



Level 03
Floor Plan
Generator Building



Source: The AES Design Group Inc.