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JUL 08 2017

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OFC. OF ENVIRONMENTAL
QUALITY CONTROL

June 26, 2017

Scott Glenn, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

Dear Mr. Glenn:

Subject: **Draft Environmental Assessment for Keakealani Campus Development Project, TMK (3): 1-9-004:019, Puna District, County of Hawai'i, State of Hawai'i**

With this letter, the Volcano School of Arts and Sciences (VSAS) hereby transmits the draft environmental assessment and anticipated finding of no significant impact (DEA-AFONSI) for the Keakealani Campus Development project for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, one hard copy of the DEA-AFONSI, a CD with an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word.

Please contact Kalima Cayir, VSAS Principal, at (808) 985-9800 if you have any questions.

Sincerely,

Kalima Cayir
Principal

Attachments: As noted above

Cc: (w/o attach) Michele Lefebvre, Project Environmental Consultant

17-545

AGENCY
PUBLICATION FORM

Project Name:	Keakealani Campus Development Project for the Volcano School of Arts and Sciences
Project Short Name:	Keakealani Campus Development
HRS §343-5 Trigger(s):	Use of State Land and Funds
Island(s):	Hawai'i
Judicial District(s):	Puna
TMK(s):	(3rd) 1-9-004:019
Permit(s)/Approval(s):	Building Division Approval and Building Permit Use Permit DOE Approval
Proposing/Determining Agency:	Volcano School of Arts and Sciences
Contact Name, Email, Telephone, Address	Kalima Cayir, director@volcanoschool.net (808) 985-9800 P.O. Box 845 Volcano HI 96785
Accepting Authority:	(for EIS submittals only)
Contact Name, Email, Telephone, Address	
Consultant:	Stantec Consulting Inc.
Contact Name, Email, Telephone, Address	Michele Lefebvre, michele.lefebvre@stantec.com (808) 494-2039 PO Box 191 Hilo HI 96721

Status (select one)	**Submittal Requirements**
_x__ DEA-AFNSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
___ FEA-FONSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the proposing agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
____ FEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The accepting authority simultaneously transmits to both the OEQC and the proposing agency a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.

	FEIS Statutory Acceptance	Timely statutory acceptance of the FEIS under Section 343-5(c), HRS, is not applicable to agency actions.
____	Supplemental EIS Determination	The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.
____	Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____	Other	Contact the OEQC if your action is not one of the above items.

Project Summary. The Volcano School of Arts and Sciences proposes to develop and construct a pre-kindergarten through eighth grade campus on the site of the historic Keakealani School property in Volcano Village. An existing classroom building built circa 1933 which currently is used for the middle school campus will be preserved and become part of the new campus design. Once completed, the Keakealani Campus will be able to accommodate the entire school body (up to 250 students). Without the Keakealani Campus development project, the elementary school students would not relocate and likely have to continue operating without climate control, limited space and facilities, and under unsecure conditions at the Volcano Road Campus (i.e., safety concerns from the existing saw mill and lack of stability with month-to-month lease). With this project, approximately 125 students presently using the Volcano Road Campus and their faculty would move to the Keakealani Campus. Impacts include minor impacts from sedimentation, dust, noise, and visual quality, which will be temporary and mitigated as feasible. No archaeological sites are present on or near the site, but a monitoring plan has been approved for implementation during construction. Several mitigation measures will be implemented to avoid impacts to endangered species.

DRAFT ENVIRONMENTAL ASSESSMENT

Keakealani Campus Development Project for the Volcano School of Arts and Sciences

TMK (3) 1-9-004:019
Puna District, Hawai‘i Island, State of Hawai‘i

July 2017

Prepared for:

Volcano School of Arts and Sciences (VSAS)
PO Box 845
Volcano, HI 96785

DRAFT ENVIRONMENTAL ASSESSMENT

Keakealani Campus Development Project

TMK (3) 1-9-004:019
Puna District, Hawai‘i Island, State of Hawai‘i

APPLICANT:

Volcano School of Arts and Sciences
PO Box 845
Volcano, HI, 96785

DETERMINING AGENCY:

Volcano School of Arts and Sciences
PO Box 845
Volcano, HI, 96785

CONSULTANT:

Stantec Consulting Inc.
PO Box 191
Hilo HI, 96721

CLASS OF ACTION:

Use of State Land
Use of State Funds

This document is prepared pursuant to:

The Hawai‘i Environmental Policy Act,
Chapter 343, Hawai‘i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai‘i Department of Health (DOH) Administrative Rules (HAR)

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SUMMARY OF THE PROPOSED ACTION, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The Volcano School of Arts and Sciences (VSAS) proposes to develop and execute the construction of the pre-kindergarten (PreK) through eighth grade campus on the site of the historic Keakealani School property in Volcano Village. An existing classroom building built circa 1933 which currently is used for the VSAS middle school campus will be preserved and become part of the new campus design consistent with the intent of the property's donor.

The plans for expansion and development involve the following: site preparation and grading; construction of the parking lot and driveway; installing infrastructure for power, water, and internet connectivity; and construction of the buildings and walkways. Once completed, the Keakealani Campus will be able to accommodate up to 250 students and will consist of 16 classrooms to accommodate PreK through eighth grade core, visual art, performing art, music, culture, and technology instruction; open, flexible spaces for students to work on projects; indoor and outdoor breakout spaces for small group instruction and student collaboration; Science, Technology, Engineering, Arts, and Math (STEAM) labs; garden areas; covered walkways; a multi-purpose center for cafeteria services and all school assemblies; a commercial kitchen; an administrative building; staff and visitor parking; and a drop-off/pick-up roundabout.

Reflecting the school's commitment to environmental responsibility and stewardship, the construction plan includes solar electricity, solar hot water, radiant floor hydronic heating, effective use of natural light and ventilation, and the employment of local and renewable resources, as practical and possible. Structures will be small scale and take their design inspiration from the surrounding nature and from those common to the rural communities where the school population is drawn from.

Impacts include minor impacts from sedimentation, dust, noise, and visual quality, all of which will be temporary and mitigated as feasible. No archaeological sites are present on or near the site, but a monitoring plan has been approved for implementation during construction. Several mitigation measures will be implemented to avoid or minimize impacts to threatened and endangered species**.**

PART 1: PROJECT DESCRIPTION, LOCATION AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Location and Property Ownership

The Keakealani Campus Development Project (project) location is a 3.15-acre property in Volcano Village and is under a 60-year no-cost lease between the school and the Hawai‘i Department of Education (DOE). (see Figures 1-3 for maps and photos of area). The site is located on Tax Map Key (TMK) (3)1-9-004:019.

Noting the need for a school in Volcano Village, Peter Lee donated a one-acre site on Haunani Road to the Territory of Hawai‘i for a “school to teach the children of the region”. In 1915 the first school building was constructed – a classic one-room structure, along with a teacher’s cottage, small garage, and water tank. The school was named “Keakealani School” in honor of Lee’s daughter, which name it retains today.

In 1934 the growing student population called for larger facilities and the present two-room building was constructed and the teachers’ cottage and garage demolished, which left the layout we see there today. In the late 1930s the Kennedy Family, who owned the property abutting the school site to the Hilo side, donated 2.25 acres to the Territory to increase the site to its current 3.25 acres. In addition to the two-room building, the property consists of a grassy field with a few open-sided, temporary shelters.

1.2 Purpose and Need

The Volcano School of Arts and Sciences (VSAS) is a successfully operating public charter school that has been open since 2001 for students from kindergarten through the 8th grade. The VSAS is currently renting a four-acre property in Volcano Village on Old Volcano Road, across from the entrance to the Hawai‘i Volcanoes National Park, on a month-to-month basis for its elementary school campus. The month-to-month status impacts the school’s stability and accreditation ratings, and no alternative arrangement with the lease-holder has been identified. The current elementary site was a former saw mill, with large pieces of metal working their way up through the soil where students play creating a safety hazard. The current elementary school property is situated within State Land Use Conservation District land, which limits the VSAS’s building options to temporary structures including tents and portable buildings. For the past decade, students and staff have been housed in tents and portable buildings. Open spaces on the campus are also uneven, with no consistent walkways or paved driveways to offer Americans with Disabilities Act accessibility for visitors or physically disabled students.

With the 60-year no-cost lease, VSAS would relocate the elementary school to the Keakealani campus on Haunani Road, which would bring more stability to the school. Additionally, relocating to the Keakealani campus has the potential to save the school more than $1.2 million over the life of the lease (based on the current rental agreement) in savings from rent at the Old Volcano Road campus.

1.3 Project Description

The project would relocate the elementary campus from its current Old Volcano Road location about one half mile away and build a permanent campus with facilities that would allow for an eventual expansion for up to 250 students. The planned campus, which is depicted in Figure 4, would include the following elements:

- Administration building;
- 16 classrooms to accommodate PreK through 8th grade core, visual art, performing art, music, culture, and technology instruction;
- Indoor/outdoor breakout spaces for small group instruction and student collaboration;
- STEAM labs;
- Garden areas;
- Covered walkways;
- Multi-purpose center for cafeteria services and all school assemblies;
- Commercial kitchen;
- Staff and visitor parking; and
- Drop-off/pick-up roundabout.

The campus design reflects the VSAS vision of a learning village surrounding a center *piko* courtyard for gathering, outdoor learning, and play.

Reflecting the school's commitment to environmental responsibility and stewardship, the master plan includes solar electricity, solar hot water, radiant floor hydronic heating, effective use of natural light and ventilation, and the employment of local and renewable resources, as practical and possible. Air conditioning is not required in the cool climate at 3,750 feet in elevation. Additionally, with the heavy rainfall typical of the area, VSAS is conducting an in-depth study to use rainwater as the primary water source and pioneer a replicable model for other PreK-12 schools across the state. Two new septic systems would be installed: one for the kitchen, multi-purpose, and middle school buildings; and one for the existing Keakealani building, administration building, PreK, and kindergarten through 4th grade buildings. These systems would be designed per Hawaii Administrative Rules (HAR) Title 11 Chapter 62. School gardens throughout the campus would be integrated into the curriculum, utilized in a Farm-to-School initiative, and provide necessary drainage for the site. The goal of the project is to meet or exceed criteria for green schools, such as Hawaii-Collaborative for High Performance Schools and Living Building Challenge, to the extent practical and feasible. The goal of the school is to build a campus that is environmentally responsible and to set an example for the community and the state for effective and attainable methods of employing renewable resources in Hawai‘i's unique ecosystems.

In harmony with the rural setting, structures will be small scale and take their design inspiration from the surrounding built and natural environment common to the rural communities where the school population is drawn from. The intent will be to create a "home-like" atmosphere for the students. It is the goal of the final project to create a campus that is in harmony with the

environment, the community, and the students. Construction would occur in phases and expected to be completed in three to five years.

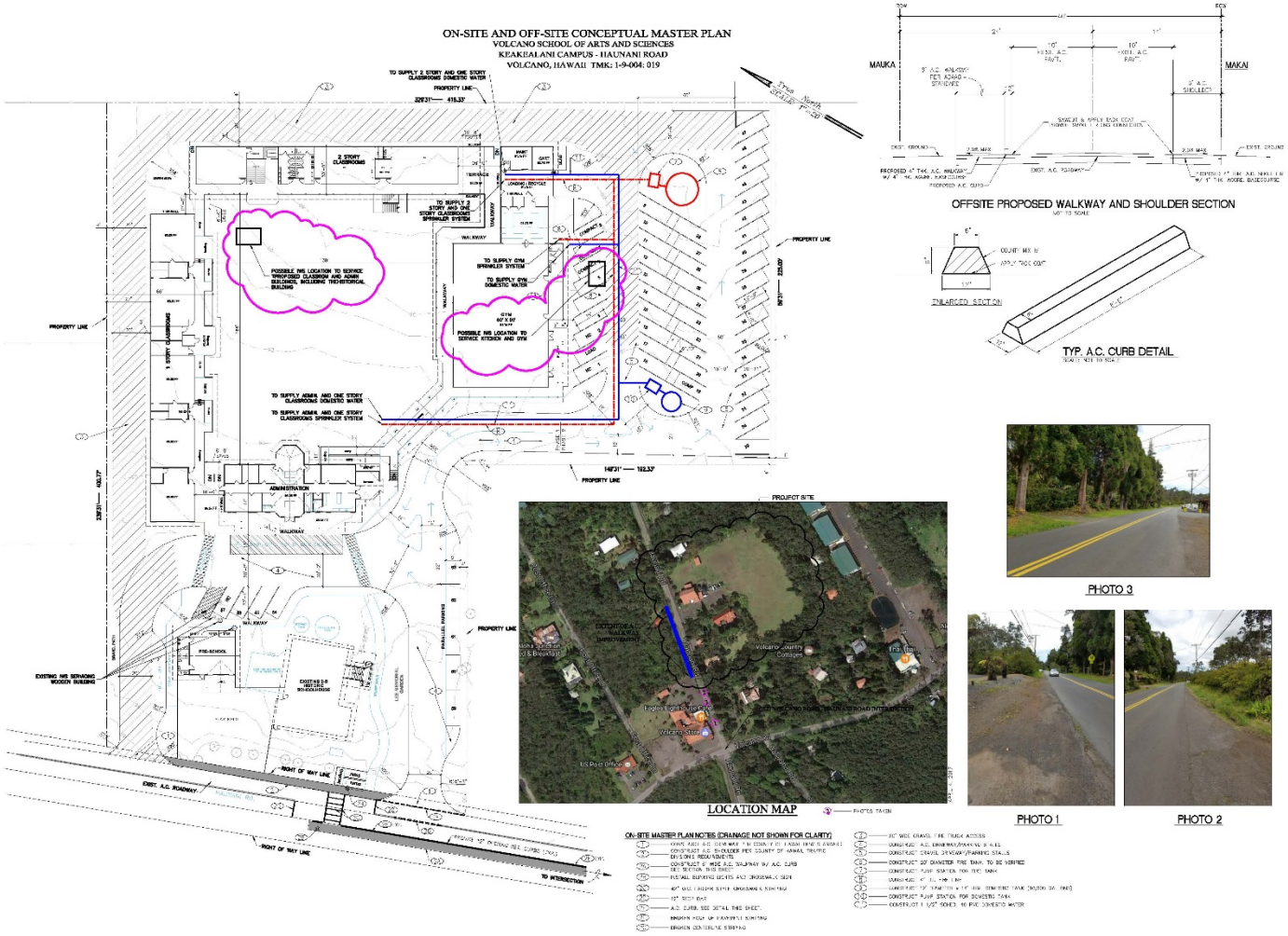
Figure 1 Project Location Map

Figure 2 Proposed Development Site Map

Figure 3 Project Site Photos

▲Existing Keakealani School Building ▼ Open field part of project site

Figure 4 Site Plan



1.4 Environmental Assessment Process

This Environmental Assessment (EA) process is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact process in the State of Hawai‘i.

Section 343-5, HRS established nine types of actions that “trigger” compliance. The use of State or County lands or funds is one of these “triggers.” Since the project would use both State funds and lands for the proposed Keakealani School property, compliance with HRS and HAR is required.

According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria.

Part 4 of this document states the finding (anticipated in the Draft EA) that no significant impacts are expected to occur; Part 5 lists each criterion and presents the findings by VSAS, the approving agency. In the EA process, if the determining agency determines after considering comments to the Draft EA that no significant impacts would likely occur, then the agency issues a Finding of No Significant Impact (FONSI), and the action is permitted to occur. If the agency concludes that significant impacts are expected to occur as a result of the proposed action, then an Environmental Impact Statement is prepared.

The VSAS is in a lease agreement with the DOE. In consultation with the DOE, it was determined that VSAS can proceed with a draft EA as the proposing and determining agency. Charter schools are considered as an “agency” (see HRS subsection 343-2) by definition. In this case a government agency is proposing the action, submitting the EA, and making the determination. In accordance with the lease agreement with DOE, the DOE must provide written approval for any construction or improvement projects.

1.5 Public Involvement and Agency Coordination

The following agencies and organizations were consulted in development of the EA:

Federal:
- National Park Service

State:
- Department of Land and Natural Resources
- Office of the Governor
- Environmental Planning Office
- Office of Hawaiian Affairs

County:
- Civil Defense Agency
- Planning Department
- County Council
- Department of Public Works
- Police Department
- Fire Department
- Department of Water Supply

Private:
- Ohelo Cafe
- Kilauea Lodge
- Sierra Club
- The Volcano Store Inc.
- Kilauea General Store
- True Value
- Volcano Art Center

Individuals:

Taketa Family Trust	Norman/Diana Silva Trust
Rosie Chong Trust	Lindsey Capellas
Ronald and Marie Onouye	Laurence and Frederick Capellas
Sharon Ziegler Trust	Kuuleiohuokalani Cooper Trust
Margie Kanemitsu	Tricia-Lani Au
Nancy Yano Trust	Jesse Flores
Wendell Ing	Norman Fujisaki
Robert Laird	Maurice and Jiranon Thomas
Paul and Joette Lee	Garret and Sandra Gooding

Copies of communications received during early consultation are contained in Appendix 1 and relevant aspects of reply letters are discussed in the text of the EA.

The VSAS held a community meeting on January 20, 2017, at the Keakealani schoolhouse at 5:00 p.m. The meeting was attended by members of the community, as well as a few parents of current students. A presentation of the proposed campus development was presented by Boone Morrison Architects, Inc.

PART 2: ALTERNATIVES

2.1 Proposed Project

The action under consideration is described in Sections 1.1 to 1.3, above.

2.2 No Action

Under the No Action Alternative, the school would not relocate and would likely have to continue operating without climate control, limited space and facilities, and under unsecure conditions (i.e., safety concerns from the existing saw mill and lack of stability with month-to-month lease).

2.3 Alternate Sites

As discussed in Section 1.3, the current site is a month-to-month lease which limits abilities for long-term improvements. The Keakealani campus is currently being used as the middle school and is the ideal location for relocating the elementary school to unify the school in one location, improve the learning environment, and provide a long-term home for the school. There are potentially other sites in Volcano Village that might be appropriate for a charter school, but with the 60-year no cost lease of the Proposed Action, no other site would be more cost effective. Also, the existing Keakealani School building and proposed campus expansion is consistent with the use of the land which was donated by Peter Lee for a school. The site is ideal of improvement. The remaining area of the parcel is a grass field that is currently used by local residents as a dog park and for sports activities. At this time, school officials have been unable to identify any other feasible and desirable sites in Volcano Village, and therefore none are carried forward for detailed analysis in this EA.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The Keakealani property that will be leased is referred to throughout this EA as the *project site*. The term *project area* is used to describe the general environs in this part of Volcano Village.

The site includes all of TMK (3) 1-9-004:019. It is located along Haunani Road in Volcano Village (see Figures 1-3). Adjacent land is held by private landowners. The project site is located approximately 0.5 mile north of the Hawai‘i Belt Road, Highway 11.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils, and Geologic Hazards

Environmental Setting

The climate in the area is cool and humid (UH Hilo 1998), with an average annual rainfall of about 127 inches (Giambelluca et al. 2013). The geology underlying the project site consists of two different lava flows, both originating from Kilauea. The northern half of the project site is covered by pahoehoe lava flow consisting of Puna basalt dating from 400 to 750 years ago, and the southern part of the parcel is located on Aila‘au lava flow, also of Puna basalt, dating back to 1410 to 1460 A.D. (Wolfe and Morris 1996). The soils that have developed over both of these pahoehoe flows belong to the Puhimau ashy silt loam soil unit (Soil Survey Staff 2016). These are shallow, well drained soils that formed in volcanic ash and pumice over lava bedrock (Sato et al. 1973:47-78).

The relatively level project site is not subject to subsidence nor landslides or other forms of mass wasting. The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard as assessed by the United States (U.S.) Geological Survey in this area of Kilauea Summit Region is Zone 1, on a scale of ascending risk from 9 to 1 (Heliker 1990:23). The hazard risk is based on the fact the Kilauea summit vents have been repeatedly active in historic time. Volcanic hazard Zone 1 areas have greater than 25% of their land area covered by lava or ash flows since the year 1800 and greater than 65% of their land area covered by lava in the past 750 years.

The Island of Hawai‘i experiences high seismic activity and is at risk from major earthquake damage, especially to structures that are poorly designed or built, as the 6.7-magnitude quake of October 15, 2006, demonstrated (USGS 2000).

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the development project. Facility design will meet all appropriate seismic standards. School officials are trained in evacuation procedures in the event of a volcanic emergency.

3.1.2 Flood Zones and Drainage

Existing Environment

The project site is about 12 miles from the ocean at an elevation of about 3,750 feet above sea level. The Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) 1551661325C (4/2/2004) shows that the project site is in Flood Zone X, outside the 0.2% annual chance floodplain. State of Hawai‘i Office of Planning Geographic Information System (GIS) data show the parcel outside the area that should be evacuated during a tsunami warning (State of Hawai‘i 2017). No known areas of local flooding are present at the project site.

Impacts and Mitigation Measures

The project does not involve construction within a flood zone. The project would be required to follow County regulations and policies related to flooding and drainage, among them Chapter 27 of the Hawai‘i County Code. Chapter 27 requires the difference between pre-development and post-development runoff to be contained onsite, limiting impacts.

3.1.3 Water Features and Water Quality

Existing Environment

The project site is not near perennial surface water bodies. According to maps from the U.S. Fish and Wildlife Service confirmed by field inspection, no wetlands are present (http://www.fws.gov/wetlands/Data/Mapper.html). The nearest mapped surface water is a pond located approximately 0.4 miles southwest of the project site.

The project site is located near Class 1 streams and watersheds. The HAR 11-54-03(b)(1) states that the objective for class 1 waters is:

> "that these waters remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. To the extent possible, the wilderness character of these areas shall be protected." Waste discharge into these waters is prohibited, except as provided in section 11-54-4(e). Any conduct which results in a demonstrable increase in levels of point or nonpoint source contamination in class 1 waters is prohibited."

Compared to mainland states, Hawai‘i has very few ground water problems. The state designated watershed reserves to protect the purity of rainfall recharging ground water. The Underground

Injection Control Program also prohibits wastewater injection in areas surrounded by "no-pass" lines. However, aquifers outside of reserves and no-pass lines may be impacted by landfills, leaking underground storage tanks, agricultural activities, and hazardous waste generators. Petroleum compounds, metals, nitrate, and organic pesticides pose the greatest risk for future contamination. (U.S. EPA 2000). Proper implementation and enforcement of construction best management practices (BMPs) are important to safeguard water quality. However, the project is site is currently graded and covered and covered with grass.

The project currently houses a 24,000-gallon reservoir for non-potable water and another 10,000-gallon water catchment tank for fire suppression. The water in the 24,000-gallon reservoir is being trucked in regularly for non-potable use. Drinking water is purchased in the form of bottled water (5-gallon jugs) for use in classroom dispensers. There is no well drilling involved or the use of any existing wells involved in this project.

Impacts and Mitigation Measures

During construction the project will be required to conform to Chapter 10 of the Hawai‘i County Code, which requires projects that disturb the ground to prevent erosion and sedimentation. Since the project may disturb an acre or more than one acre of soil, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained by the contractor before the project commences. This permit requires the completion of a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff, the SWPPP will describe the emplacement of a number of BMPs for the project. These BMPs may include, but will not be limited to, the following:

- Minimization of soil loss and erosion by revegetation and stabilization of slopes and disturbed areas of soil, possibly using hydromulch, geotextiles, or binding substances, as soon as possible after working;
- Minimization of sediment loss by emplacement of structural controls possibly including silt fences, gravel bags, sediment ponds, check dams, and other barriers in order to retard and prevent the loss of sediment from the site;
- Minimizing disturbance of soil during periods of heavy rain;
- Phasing of the project in order to disturb a minimum necessary area of soil at a particular time;
- Application of protective covers to soil and material stockpiles;
- Construction and use of a stabilized construction vehicle entrance, with designated vehicle wash area that discharges to a sediment pond;
- Washing of vehicles in the designated wash area before they egress the project site;
- Use of drip pans beneath vehicles not in use in order to trap vehicle fluids;
- Routine maintenance of BMPs by adequately trained personnel; and
- Clean up of significant leaks or spills and disposal at an approved site, if they occur.

There are no surface streams in the project area. Any pollutants potentially spilled in the parking lot could flow towards groundwater; however, impacts would be partially remediated through the natural process of slow infiltration through soil and rock.

The facility would not increase runoff from the project site and would treat all wastewater in conformance with strict permit requirements in order to avoid pollution. No marked effect to water quality is expected to occur as a result of the project.

As stated in their letter received during early consultation, the catchment tank used for fire suppression must meet the Hawai‘i Fire Department’s requirements (Appendix 1).

3.1.4 Flora, Fauna and Ecosystems

Existing Environment

Given the high rainfall in the area (approximately 127 inches per year), the original natural vegetation would have been a montane wet forest dominated by ‘ōhi‘a (*Metrosideros polymorpha*) and hapu‘u (*Cibotium* spp.) (Gagne and Cuddihy 1990). The project site has, however, been mostly cleared of vegetation and now consists primarily of a mowed grass yard that is dominated by non-native grasses, weedy herbs, and a few native grasses, mosses and sedges, notably pycreus (*Cyperus polystachyos*) (Figure 3).

An inspection in February 2017 by Dr. Ron Terry found within the managed area a number of remnant ‘ōhi‘a trees and a variety of plantings of non-native ornamentals and native trees. Other natives included hapu‘u, koa (*Acacia koa*) and mamaki (*Pipturus albidus*). One planted ma‘o hau hele (*Hibiscus brackenridgei*), an endangered species, was present near a cleared edge of the property. Botanist Tim Tunison, a former VSAS board member, kindly conducted an additional botanical reconnaissance focused on identifying species planted by the school. VSAS confirmed that the ma‘o hau hele was planted from a cutting, which was given to the school from a private garden. A wide variety of ornamentals were present but azalea (*Rhododendron* sp.), ti (*Cordyline fruticosa*), and camellia (*Camellia japonica*) bear mention.

In addition, the fringes of the property, although mostly weedy, also included many native trees and shrubs. Natives included ‘ōhi‘a, hapu‘u, koa, ‘ōlapa (*Cheirodendron trigynum*), forest ‘ohelo (*Vaccinium calycinum*), kāwa‘u (*Ilex anomala*), pilo (*Coprosma* sp.), and uluhe (*Dicranopteris linearis*). The non-native component was dominated by glory bush (*Tibouchina urvilleana*), sugi or Japanese cedar (*Cryptomeria japonica*), strawberry guava (*Psidium cattleianum*), faya tree (*Morella faya*), Himalayan raspberry (*Rubus ellipticus*), and various gingers (*Hedychium* spp.).

Other than the planted ma‘o hau hele, no threatened or endangered plant species appeared to be present or would be expected on the project site.

Birds observed or heard during the site reconnaissance included the non-native Japanese white-eye (*Zosterops japonicus*) and the native birds Hawai‘i ‘amakihi (*Hemignathus virens*) and the ‘apapane (*Himatione sanguinea*). Although not observed, several other less common native birds such as the ‘oma‘o (*Myadestes obscurus*) and even the ‘i‘iwi (*Drepanis coccinea* - proposed by the U.S. Fish and Wildlife Service in the Federal Register of September 16, 2016, to be listed as endangered) are likely present at times.

The endangered Hawaiian hawk (*Buteo solitarius*) undoubtedly forages in the general area, as it is commonly seen in the project area. The project site fringes have a number of large trees (e.g., sugi) that may be utilized as nesting sites by the Hawaiian hawk. Nesting Hawaiian hawks are vulnerable to disturbance by noisy construction activities during the nesting period from March 1 to September 30.

It is also possible that small numbers of the endangered endemic Hawaiian petrel *(Pterodroma sandwichensis)* or ua‘u, band-rumped storm petrel (*Oceanodroma* castro), and the threatened Newell’s shearwater *(Puffinus auricularis newelli),* or ‘a‘o*,* over-fly the project site (Appendix 1). To reduce the potential for interactions between nocturnally flying Hawaiian petrels, band-rumped storm petrels, and Newell’s shearwaters and external lights and man-made structures, all projects in Hawai‘i should ensure that any external lighting be shielded, in keeping with Hawai‘i County Code § 14 – 50 *et seq.* which requires the shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting to the astronomical observatories located on Mauna Kea.

No mammals were observed on the property. With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), discussed below, all terrestrial mammals currently found on the Island of Hawai‘i are alien species, and most are ubiquitous. Wild cats (*Felis catus*), small Indian mongooses (*Herpestes a. auropunctatus*), and some species of rats and mice, such as roof rats (*Rattus r. rattus*)*,* Norway rats (*Rattus norvegicus),* Polynesian rats (*Rattus exulans*)*,* and European house mice (*Mus musculus domesticus*)*,* probably make occasional use of the project site, as they are common in the Volcano vicinity.

Little is known about the habits of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), which is often found in a surprisingly broad range of sites in both alien and native vegetation in a variety of locations throughout the island of Hawai‘i. This species is cryptic and it is not possible to systematically detect their roosting sites. It should be presumed that bats may forage in the area that roosting bats could be present in shrubs and trees taller than 15 feet on and surrounding the project site. Roosting bats may be vulnerable to disturbance during the summer, when pups could be killed or abandoned if the tree they are roosting on is disturbed.

Impacts and Mitigation Measures

With implementation of the mitigation measures specified below, no substantial adverse effects to flora and fauna, including threatened or endangered species, will occur.

- The ma‘o hau hele shrub, which was planted by the school, will be relocated to the front of the existing school building prior to construction and operation of the school. VSAS would work with the State for any permits necessary to relocate it.
- No cutting or removal of vegetation taller than 15 feet will occur between June 1 and September 15, when Hawaiian hoary bats may be sensitive to disturbance.
- If land clearing or removal of any large trees occurs between the months of March and September, inclusive, a pre-construction hawk nest search by a qualified ornithologist using standard methods will be conducted. If Hawaiian hawk nests are present, no land clearing will be allowed until October, when hawk nestlings will have fledged.
- The project will not involve any unshielded lighting for either construction or operation, in conformance with Hawai‘i County Code § 14 – 50 *et seq,* which will avoid impacts to listed seabirds.

3.1.5 Noise

Environmental Setting

Noise currently occurs on the project site from use by the middle school students, with an increase in the school population noise is likely to increase.

Impacts and Mitigation Measures

Operationally, the campus would generate the moderate levels of noise found in public schools with active programs. This level of noise would not exceed State standards for urban land uses.

3.1.6 Air Quality and Odors

Environmental Setting

Air quality in Hawai‘i is generally good, below criteria levels for most pollutants in most locations at almost all times. While there are no State Department of Health (DOH) air monitoring stations in the immediate vicinity of the project site, air quality in this relatively remote area can be considered to be in compliance with the State’s ambient air quality standards. The nearest DOH monitoring station is at Mountain View, approximately 14 miles northeast of the project site. Air pollution in Mountain View, and similarly in the area around Volcano National Park, is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic aerosol haze (vog).

Impacts and Mitigation Measures

Operationally, the project should not have any substantial air quality impacts. The proposed action will not measurably affect air quality except minimally during grubbing, grading and construction. In order to minimize impacts from dust, VSAS and/or its contractor will consult with the DOH and, if required, will prepare a dust control plan compliant with provisions of

HAR, Chapter 11-60.1, "Air Pollution Control," and Section 11-60.1-33, "Fugitive Dust." The school would implement existing policies to minimize students exposure to vog at the project site.

3.1.7 Scenic Resources

Environmental Setting

The general area around VSAS is a rural landscape. In the vicinity of Volcano are a number of sites considered significant for their scenic character in the Hawai'i County General Plan including the scenic views of Mauna Loa from Volcano-Ka'u Highway (heading southwest from Volcano), scenic view of shoreline between Pahala and Punalu'u (approximately 27 miles southwest of Volcano), Ninole Cove and Springs (approximately 31 miles southwest of Volcano), and Punalu'u (approximately 31 miles southwest of Volcano) (Hawai'i County Planning Department 2005).

Impacts and Mitigation Measures

The project is not located within any of these scenic sites or areas, and the proposed project will not detract from the scenic values of the area. However, the project facilities are being designed to have visual interest as well be functional for the school (see Site Plan in Figure 4).

3.1.8 Hazardous Substances, Toxic Waste, and Hazardous Conditions

Existing Environment

No systematic assessment of the project site was conducted to determine if hazardous materials, toxic substances or other hazardous conditions are or may have once been present on the site. Reconnaissance of the very open site during topographic, botanical and design surveys did not reveal evidence of such conditions, nor have there been reports of such conditions. Because there is no evidence that the project site has been previously used or developed for any purpose, the potential for use or storage of regulated or hazardous chemicals onsite is low. Based on this, there does not appear at this time to be any outstanding concern related to these issues. If evidence of suspicious materials or conditions appears during excavation or other construction, VSAS may undertake a systematic assessment of the area in question to determine if further evaluation and remediation are required.

Impacts and Mitigation Measure

The use of the project site for a school does not involve large or reportable quantities of hazardous materials or toxic substances. Small quantities of cleaning and agricultural chemicals will be present. They are relatively low hazard and will not be used or stored in quantities sufficient to trigger government monitoring or reporting.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics and Land Use Compatibility

The project will serve the public students and parents of Volcano and the larger surrounding community. The community is located adjacent to the eastern boundary of Hawai‘i Volcanoes National Park, and is on the westernmost edge of the district of Puna and the eastern edge of the Ka‘u district. Approximately 61% of the VSAS students live in the Puna district, 34% live in the Ka‘u district, and the remaining 5% of students live in the district of Hilo. Approximately 39% of students travel 25 miles or more each way to school.

Population as measured in the 2010 U.S. Census (the most recent U.S. census) for Volcano, a Census Designated Place, was 2,575 (U.S. Census Bureau 2010a). Many National Park employees, including biologists, geologists, maintenance, and office personnel live within the greater Volcano community. In addition, there are many Volcano residents who drive to Hilo for work each day. Other Volcano residents work from home remotely, or work at small businesses located in the community. Table 1 provides information on the socioeconomic characteristics of the State of Hawai‘i, the County of Hawai‘i, and Volcano, from the U.S. Census Bureau.

Table 1 Selected Socioeconomic Characteristics

Description	State of Hawai‘i	County of Hawai‘i	Volcano
Total Population	1,360,301	185,079	2,575
Median age (years)	37.2	40.9	51.2
Total housing units	519,508	82,324	1,740
Median Household Income[2]	$69,515	$52,108	$50,543*
Individuals below poverty level[2]	11.2%	19.5%	18.8%*
Race and Hispanic Origin			
White alone	24.7%	33.7%	51.5%
Black or African American	1.6%	0.6%	0.7%
American Indian or Alaska Native	0.3%	0.5%	0.4%
Asian alone	38.6%	22.2%	11.6%
Native Hawaiian	5.9%	8.5%	9.4%
Two or More Races	23.6%	29.5%	25.6%
Hispanic or Latino (of any race)	8.9%	11.6%	8.8%

Source: U.S. Census Bureau 2010a, 2010b, and 2010c
[2]Source: U.S. Census Bureau 2011a
*Estimates have a high margin of error.

According to the American Community Survey five-year estimates for 2011 to 2015, approximately 45% of the civilian employed population in the Volcano Census Designated Place works in the arts, entertainment, recreation, and accommodation and food service industries, followed by the retail trade which employs approximately 12% of the civilian population. Approximately 29% of the civilian employed population in the Volcano Census Designated Place is considered a government worker (U.S. Census Bureau 2011a). As of December 2016, the County unemployment rate was 3.1%, slightly higher than the State which had a 2.6 unemployment rate (Hawai‘i Workforce Infonet 2017).

In comparison with the County and State as a whole, Volcano has an older median age, substantially higher percentage of whites, lower percentage of Asians and persons reporting two or more races, and similar percentage of Native Hawaiians as the State. The median household income is lower than the County and the State. The percentage of individuals below poverty level is also lower than the County, but higher than for the State. Specific 2015 U.S. Census American Community Survey for data for Volcano on population age is shown in Table 2.

Table 2 Population Age Estimates for Volcano Census Designated Place

Age	Estimate (%)
Under 5 Years	3.1
5 to 9 Years	12.8
10 to 14 Years	0.6
15 to 19 Years	4.8
20 to 24 Years	1.6
25 to 29 Years	4.4
30 to 34 Years	3.5
35 to 39 Years	5.4
40 to 44 Years	5.5
45 to 49 Years	13.0
50 to 54 Years	7.2
55 to 59 Years	15.0
60 to 64 Years	11.9
65 to 69 Years	3.5
70 to 74 Years	3.4
75 to 79 Years	1.5
80 to 84 Years	0
85 Years and Over	3.0

Source: U.S. Census Bureau 2011b

VSAS students are about 42% White and 31% part Hawaiian, with representatives of many other ethnic backgrounds in smaller numbers (Black, Native American, Hispanic, Filipino, other Asian, etc.). Approximately 64% of VSAS students are considered low-income (VSAS 2017).

Impacts and Mitigation Measure

The project is not expected to affect population size or demographics. The primary impact on socioeconomic conditions would be to the neighbors of the Keakealani Campus. While the current condition includes middle school (grades five through eight), relocating the entire campus to Keakealani would increase the number of students on this campus. However, the maximum capacity of total students attending VSAS would not increase with the development of the Keakealani campus (maximum capacity of 194 students). Currently 176 students attend VSAS (total for both campuses), and with the project all the students would be located at the Keakealani campus. Therefore, while the project would increase the number of students attending the Keakealani campus, it would not increase the student capacity of the of the VSAS. Impacts associated with traffic generation and noise are discussed in Sections 3.3.2 and 3.1.5, respectively.

The school would serve the needs of students in Volcano and surrounding community with the multi-purpose center being used for the school's cafeteria services and school assemblies.

3.2.2 Cultural Practices and Sites

The cultural impact assessment contained in this section is based on a memorandum prepared by ASM Affiliates, Inc. (2017) contained in Appendix 2.

The current study area is located within Volcano Village in the southwestern corner of the traditional land division of ʻŌlaʻa in the District of Puna, near the boundary with the Keauhou in the District of Kaʻū. Tuggle and Tomonari-Tuggle (2008:32) note that the district of Puna had little distinction throughout its entire history, which was "bound up with the fortunes of the ruling families on either side" of the district (i.e., Kaʻū and Hilo). They quote Mary Pukui's (in Barrère 1959:17) descriptions of Kaʻū as "Kaʻū Makaha" (Kaʻū-the-savage) and Puna as "Puna Kumakaha" (Puna-resembling-the savage) to indicate the ties between the two lands. By this spatial and historical association, the lands around Volcano Village are broadly linked to the vast body of legend and cultural practice associated with Pele and Kīlauea Volcano (see, for example, Kanahele 1989; Nimmo 1992). Tuggle and Tomonari-Tuggle (2008:69) describe one of these associations:

> The final reference to Pele in *The History of Kanalu* occurs in the time of Kalanuiohu (ca. late AD 1400s) and includes a chant to Pele by "Kamakauahi, one of the priests [kahuna] of Pele who lived by her yam mounds [*puʻu uhi*] of Laʻa. The guardian [*kahu*] of Pele used this appeal to worship the fire gods in accordance with the tradition of the many gods" (Nāmakaokeahi 2004:156, brackets added with words from the Hawaiian text). The reference to Laʻa may mean the voyager/demi-god Laʻa-mai-Kahiki or it may refer to a place (or to both). Pukui et al. (1974:126) indicate that Laʻa is an old name for ʻŌlaʻa, a "legendary area for collecting bird feathers." The name also shows up in the battle of Hiʻiaka with the demons of Panaʻewa where the "ohiʻa o Laʻa" is mentioned

> (Emerson 1993:34). This all suggests that this kahuna (a priestess) of Pele lived in or near HAVO [Hawai‘i Volcanoes National Park] in the ‘Ōla‘a forest region.

The name ‘Ōla‘a connotes sacredness (its root being "*la‘a"* meaning sacred, holy, set apart or reserved as for sacred purposes; Pukui and Elbert 1986), and in native tradition it is a land famed for its sacred spaces, forests, birds, and *olonā* (*Touchardia latifolia*) resources (Maly and Maly 2004). Maly and Maly (2004:6) translate an ancient chant in the collection of Ho‘ohila Kawelo that tells of the relationship between men and birds in the uplands of ‘Ōla‘a:

Ka Uka holo kia ahi manu ‘Ola‘a	The birds fly like flaming darts to the uplands of ‘Ola‘a,
I pa e noe ka uahi noe i ka nahele, Nōhenohea ka makani ‘ūhau pua,	Where the mist and smoke darken the forest, Spread out by the breeze which lays out the blossoms,
He pua ‘oni ke kanaka, he mea laha ‘ole...	Man is like a flower, roving about, something that is irreplaceable...

Although broadly associated with these two traditions, the current study area was developed beginning in the early twentieth century as a public school. As such, the parcel has been cleared of the surrounding forest (as has much of Volcano Village), and no traditions explicitly tie the parcel to events in various *mo‘olelo* of Pele and her family. The following cultural impact assessment is based partially on other research performed by this and other authors in the Kīlauea region, and also on an informal interview with Mr. Kilona Moku Young, a Hawaiian cultural practitioner, crew member of *Hōkūle‘a*, and teacher of Hawaiian culture at Volcano School of Arts and Sciences.

A Generalized Model of Hawaiian Prehistory

Kirch (2011) and others (Athens et al. 2014; Duarte 2012; Wilmshurst et al. 2011) have convincingly argued that Polynesians may not have arrived in the Hawaiian Islands until at least A.D. 1000, but expanded rapidly thereafter, with colonists possibly from the southern Marquesas Islands. During an initial Settlement Period (A.D. 1000 to 1100), early Hawaiian farmers developed new subsistence strategies during this period, adapting familiar patterns and traditional tools for use in their new environment. Order was kept through adherence to their ancient and ingrained philosophy of life and through the principle of genealogical seniority. Hawaiians brought from their homeland a variety of Polynesian customs including the major gods of Kane, Ku and Lono; the *kapu* system of law and order; *pu‘uhonua* or places of refuge or asylum; the *‘aumakua* concept of a family or ancestral spirit and the concept of *mana*.

The subsequent Developmental Period (A.D. 1100 to 1350) brought changes that included an evolution of traditional tools as well as some distinctly Hawaiian inventions. The evolution of

the adze was an example of the former, while the latter included the two-piece fishhook and the octopus-lure breadloaf sinker. Another invention was the lei niho palaoa, an item worn by those of high rank and symbolized a trend toward greater status differentiation

The Expansion Period (A.D. 1350 to 1650) is characterized by the greatest social stratification, major socioeconomic changes, and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands were settled and the more marginal leeward areas were being developed. The greatest population growth occurred during the Expansion Period. It was during the Expansion Period that a second major migration settled in Hawai‘i, this time from Tahiti in the Society Islands. According to Kamakau (1976), the *kahuna* Pā‘ao settled in the islands during the 13th century, arriving first in Puna before settling in Kohala.

The concept of the *ahupua‘a* was established sometime during the A.D. 1400s, adding another component to a then well-stratified society (Kirch 1985). *Ahupua‘a* were usually wedge or pie-shaped, incorporating all of the eco-zones from the mountains to the sea and for several hundred yards beyond the shore, assuring a diverse subsistence resource base (Hommon 1986). This land unit became the equivalent of a local community with its own social, economic and political significance. The *ahupua‘a* were further divided into smaller sections such as the *‘ili, mo‘o‘aina, pauku‘aina, kihapai, koele, hakuone,* and *kuakua* (Hommon 1986; Pogue 1978). The chiefs of these land units gave their allegiance to a territorial chief or *mō‘ī* (king). ‘Ōla‘a, in which the current study area is located, was traditionally administered as a *kalana*, a discrete land unit larger than an *ahupua‘a* but smaller than a district (*moku o loko*) and comprised of several other land divisions that contributed to its wealth. As Maly and Maly (2004:6) explain, “the land of ‘Ōla‘a stood alone, almost independent of the other lands adjoining it in Puna, though it had no ocean frontage — being cut off by Kea‘au and Waiākea.” ‘Ōla‘a was reserved for the reigning monarch, as the forest resources were exploited for the birds of the area, whose feathers made fabulous cloaks “reserved exclusively for the king of a whole island” as his battle or ceremonial cloak (Takamoto 1976). Sandalwood as well as cordage made from *mamaki* and *olonā* were also prized forest resources of the area.

An increase in war marked the Proto-Historic Period (A.D. 1650-1795), both locally and between islands. Hawai‘i’s history took a sharp turn on January 18, 1778 with the arrival of British Captain James Cook in the islands. On a return trip to Hawai‘i ten months later, with the Maui turmoil still raging, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawai‘i Island. Cook exchanged gifts with Kalaniopu‘u at Kealakekua Bay the following January, and Cook left Hawai‘i in February. However, Cook’s ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealakekua, setting the stage for his death on the shores of the bay.

The following year, in 1780, Kalaniopu‘u designated his son, Kiwalao, to be his successor, and granted Kamehameha guardianship of the war god Kuka‘ilimoku. When it appeared Kiwalao was not honoring his land claims, Kamehameha usurped Kiwalao’s authority with a sacrificial ritual and retreated to his district of Kohala where he farmed the land, growing taro and sweet

potatoes. Civil war broke out when Kalaniopu‘u died in 1782 and Kiwalao was killed. The wars between Maui and Hawai‘i Island would continue until 1795.

By 1796, Kamehameha had conquered every island kingdom except Kauai, but it wasn’t until 1810, after Kaumuali‘i of Kauai pledged his allegiance to Kamehameha, that all of the Hawaiian Islands were unified under a single ruler. Subsequently there was a continuation of the trend toward intensification of agriculture, *ali‘i*-controlled aquaculture, settling of upland areas and development of traditional of oral history. However, the western influence was being felt in the introduction of trade for profit and a market-system economy. By 1810, the sandalwood trade established by Europeans and Americans twenty years earlier was flourishing. That contributed to the breakdown of the traditional subsidence system, as farmers and fishermen were required to toil at logging which resulted in food shortages and a decline in population.

Following the death of Kamehameha I in 1819, the relaxing of customary *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. The family worship of *‘aumakua* images was allowed to continue. The Protestant missionaries who arrived from Boston in 1820 soon were rewarded with land and government positions as many of the *ali‘i* were eager to assimilate western-style dress and culture. But at the same time, the continuing sandalwood trade was becoming a heavier burden on commoners. The rampant sandalwood trade resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of Western ways continued with the short-lived whaling industry to the production of sugarcane, which was more lucrative but carried a heavy environmental price.

Upland ‘Ōla‘a and Puna-Ka‘ū Region

Theodore Kelsey, a historian born in Hilo in the late 1800s, recorded that ‘Ōla‘a was a land of bird catchers (Maly and Maly 2004). In 1921, many of the traditional bird catching techniques specific to ‘Ōla‘a and the Hilo area were related to him by an elder Hawaiian man named Rev. Henry B. Nālimu, who was born in Hilo in 1835. The feathers were used to make lei, cloaks, and other emblems of Hawaiian royalty. The ‘ō‘ō, ‘i‘iwi, ‘ō‘ū and ‘akakane were the specific birds mentioned in the accounts of Rev. Nālimu. Bird catching also figures in the tradition of Pikoiaka‘alalā, written by S. M. Kaui and printed in the Hawaiian language newspaper Ku Okoa between December 16, 1865 and March 10, 1866 (translated by Kepā Maly), provides detailed narratives describing customary practices in the upland forests of ‘Ōla‘a (see Maly and Maly 2004:8–19).

The collection and cultivation of olonā and māmaki (Pipturus sp.) within the forested regions of ‘Ōla‘a was practiced in more traditional times. According to Ellis (1963) the people of ‘Ōla‘a were famed for their fine māmaki. which could be processed to make a durable barkcloth and highly valuable cordage. Native Hawaiians would obtain wood from ‘ōhi‘a and koa trees from ‘Ōla‘a’s forests (Ellis 1963), and later they exploited it for sandalwood (Santalum paniculatum) during the early decades of the nineteenth century (Stewart 1833). Handy et al. (1991) also

describe the practice planting banana, ti and taro as well as yams along streams and trails in the forest to provide a supplemental food source in times of drought or crop failure.

Written accounts describing lands in the vicinity of ʻŌlaʻa contained in the journals, letters, and articles of many of the early European visitors to Hawaiʻi Island (see Maly and Maly 2004) typically describe the trailside lands as the visitors passed through the area on their way between Hilo and Kīlauea or Mauna Loa. The most traveled route between Hilo and Kīlauea was the Volcano Trail. McEldowney (1979), citing several historical sources (Bloxam 1925; Douglas 1914; Ellis 1963; Macrae 1922; Pickering 1840; Stewart 1833), describes this trail sparsely populated during the first part of the nineteenth century, with the occasional small village located along the trail. The historic accounts do not mention any such village in the current location of Volcano Village During the *Māhele ʻAina* of 1848, all lands were divided among three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. As a result of the *Māhele* of 1848, the *kalana* of ʻŌlaʻa was distributed to Kaunuohua, who relinquished the land to the king (Soehren 2005), who then retained ʻŌlaʻa as Crown Land. All lands awarded during the *Māhele* were subject to the rights of the native tenants therein, who could claim, and acquire title to, *kuleana* parcels that they actively lived on or farmed. In Puna, however, very few claims for *kuleana* were submitted. Only one Land Commission claim was made for a *kuleana* within ʻŌlaʻa, but it was not awarded (Maly and Maly 2004). In conjunction with the *Māhele* of 1848, the King authorized the issuance of Royal Patent Grants to applicants for tracts of land, larger than those generally available through the Land Commission. The process for applications was clarified by the "Enabling Act," which was ratified on August 6, 1850. The Act resolved that portions of the Government Lands established during the *Māhele* should be set aside and sold as grants. Despite the stated goal this program to enable native tenants to purchase lands of their own, in reality many of the Government Lands were sold or leased to foreigners. The Enabling Act set a precedence for the legal framework within which ʻŌlaʻa would be divided into homestead lots and sold as grants after the overthrow of the monarchy.

In the decades following the *Māhele*, economic interests in the region swiftly changed from traditional Hawaiian subsistence farming and regional trading networks to the gathering or growing of export cash crops such as the short-lived *hapuʻu pulu* boom in the 1860s. More successful ventures included coffee, tobacco, sugar, timber, and pineapple, and also dairy farming and cattle ranching. A critical step toward developing agriculture in ʻŌlaʻa was the creation of a modern road between Hilo and Kīlauea located *mauka* of the Volcano Trail. Although Kīlauea had become a viable tourist destination by the 1860s, poor roads to the volcano were thought to deter visitors from staying longer. In 1888, the government appropriated $30,000 for a new carriage road between Hilo and Volcano that became today's Volcano Highway (Duensing 2015). Work on the road began in 1890 using mainly prison labor, and in September of 1894 the entire road was completed. The Volcano House Company, which had been formed in 1891, acquired the Volcano House at the rim of Kīlauea crater, and had a new and larger hotel constructed. The Company also purchased the Punaluʻu Hotel and made its previous owner, Peter Lee, manager of both the Punaluʻu Hotel and the Volcano House. Lee would remain as manager of the Volcano House until 1898.

Peter Lee established a home on land near the center of the ʻŌlaʻa Summer Lots 29-Mile subdivision, which later become Volcano Village. Paul Lee, a descendant of Peter Lee, recalled that Haunani Street, which borders the parcel, was named for one of Peter Lee's daughters (Reeve and Cleghorn 2014). Lee purchased the parcel from the Government in 1912 as Land Grant 5461. In 1914, Lee donated a one-acre portion of this Volcano property to the Territorial Board of Education so that a school could be established for the children of Volcano. Constructed around 1915, the original school building was a one-room school house. The school (Keakealani School Lot Executive Order No. 1040) was named for Keakealani Lee, another of Lee's daughters. Other structures built about this time included an outbuilding and a residence for teachers who came up from Hilo by horse and stayed overnight. The Keakealani School was established as a Public Education School in 1920, teaching grades Kindergarten through 8th grade. Expansion of the school around 1933 included the construction of the present school building and the addition of land from the adjacent lot. The school continued to operate until 1974, when it was closed, and the Volcano area children were sent to the larger school at Mountain View. In 1975, the campus was put back into use as an educational center, and in 1979 the Keakealani Outdoor Education Center (KOEC) was established to serve as an environmental residential camp for sixth graders from schools throughout the state (Wilkinson et al. 2009). KOEC was closed in 2009 due to funding restrictions, and the State considered converting the school building into an office (Reeve and Cleghorn 2014).

Cultural Resources and Practices Related to the Keakealani Campus site

Before the establishment of Volcano Village, the site of the VSAS's Keakealani Campus was located in dense rainforest where few people traditionally lived, but would visit to obtain materials needed for many things such as voyaging, housing, spiritual and medicinal practices, clothing, adornments resources. The settlement of Volcano Village beginning in the eighteenth century, however, altered this forested landscape. The creation of houselots, the construction of Peter Lee's house, and the use of the subject parcel as a school in the twentieth century removed these native resources, leaving what is now a grass-covered field.

An informal interview regarding the project's impacts to cultural resources and practices was conducted on January 18, 2017, at ASM's offices in Hilo with Mr. Kilona Moku Young, a Hawaiian cultural practitioner, *Hōkūleʻa* crew member, and the *ʻike Hawaiʻi Kumu* (teacher of Hawaiian knowledge) at the VSAS. Mr. Young began the interview by stating that while he was unaware of traditional cultural resources, practices, or beliefs associated with the Keakealani Campus parcel, the construction of the campus would in fact "add culture to an empty area." The new campus, he stated, would provide a permanent venue for the perpetuation of Hawaiian culture through elements of the VSAS curriculum as well as community activities that could be held at the campus. He offered as an example the VSAS's current practice of digging an *imu* for school functions. The current campus does not have a permanent location for the *imu*, nor is the school able to store materials for the *imu*. Mr. Young has been asked by the project's architect to provide input regarding a permanent *imu* location at the school. Mr. Young has also been asked for input regarding vegetation and a school garden, which he intends to be focused on native

species and to provide a means of teaching students about native plants and their uses. He also noted that the increased parking capacity of the new campus would allow make it easier for the school to host their *makahiki* celebration, which he describes as an opportunity for the school and the community to interact. Mr. Young notes that what is currently missing from the VSAS is a place to come together, where, for example, his culture class can invite kūpuna in to share Hawaiian knowledge with his students. The new campus, in his opinion, will create such a center.

Impacts and Mitigation Measures

The positive impacts of the proposed action on traditional Hawaiian cultural practices, resources, and beliefs are best summarized by Mr. Young's statement that building the new Keakealani Campus will add culture to an essentially empty area. The plans for the new campus will create a permanent venue where Hawaiian traditional practices can be perpetuated and shared with the Volcano community. Other plans include the installation of a school garden to grow native Hawaiian plants, passing on traditional knowledge of their cultivation and use. Thus, valued natural, cultural and historical resources still present in the Kīlauea region will be honored and utilized by the Volcano School of Arts and Science, which represents a significant cultural benefit. No adverse impacts have been identified. No caves, springs, *pu'u*, gathering resources, archaeological sites, burial sites for *'iwi kūpuna*, or other features that might be adversely affected are present on or near the project site; therefore no mitigation measures are necessary.

3.2.3 Historic Resources

Existing Resources

Historic resources are identified during an archaeological study by an archaeologist permitted with the State of Hawai'i, and investigated through examination of historic records and consultation with the State Historic Preservation Division (SHPD). As reported in the archaeological monitoring plan prepared by Pacific Legacy, Inc. (2014), the only archaeological investigations known to be conducted within Volcano Village took place on the Keākealani campus itself. In March of 2007, Cultural Surveys Hawai'i monitored excavations undertaken to install a new 3,000 gallon septic tank and associated sewer line at what was then the Keākealani Outdoor Education Center. This work occurred on the north side of the existing school building, adjacent to the restroom area. The septic tank installation involved the excavation of a trench approximately 20 feet long, 15 feet wide, and nine feet deep.

As described in the cultural resources and sites (Section 3.2.2), the Keakealani School Building is the only remaining historic structure. The Keakealani School Building has determined to be eligible for listing on the Hawai'i Register of Historic Places under Criteria A which includes sites "associated with events that have made a significant contribution to the broad patterns of our history" (the vent being public education) and Criteria C which includes sites "that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and

distinguishable entity whose components may lack individual distinction" (Log No. 2011.1080, Doc. No. 1104TD06) by the SHPD (Pacific Legacy 2014).

Impacts and Mitigation

Since no physical alteration is contemplated for the Keakealani School Building, the SHPD determined, in correspondence with VSAS, that occupation by the building by VSAS will have no effect on historic properties and approved the reuse of the structure (summarized in Pacific Legacy, 2014).

As determined by SHPD in concurrence with a Monitoring Plan prepared by Pacific Legacy (2014), a qualified archaeologist will be present on-site during all trenching activities, and on-call for all other ground disturbing activities. The monitoring plan indicates that adequate measures are in place to stop work and mitigate any unanticipated discoveries.

3.3 Infrastructure

3.3.1 Utilities and Public Services

Existing Facilities and Services

Electrical power to the project site would be supplied by Hawai‘i Electric Company (HEC via a line on Highway 11). Telephone and data service are available from both Oceanic Cable and Hawaiian Telephone.

No sanitary sewer system or other wastewater treatment is available on or near the project site.

Fire, police and emergency management services are available in this part of Puna. A police station is located in Pahoa, about 31 miles way. A volunteer fire station is located in Volcano Village, and a County fire station at KMC. EMT services are provided by the Hawai‘i County Fire Department. Emergency medical services are available at Ka‘u Hospital, approximately 26 miles to the south.

Impacts and Mitigation Measures

Electricity and telephone/data service will be installed in underground lines along existing lines. Two new septic systems would be installed to service the new campus.

3.3.2 Traffic

Existing and Proposed Facilities

Traffic at the Keakealani Campus is from the approximately 55 middle school students (roughly 33% of the total VSAS student body) and 8 teachers and staff that are currently located there; the

remainder of the students and staff are currently located at the Old Volcano Road campus. Most students at the Keakealani Campus arrive by bus and are dropped off in front of the school on Haunani Road.

Haunani Road has a 40-ft right of way, featuring a paved 20-ft wide two-lane road, which is approximately two miles long and dead ends. Shoulders are graded earth. A paved one car wide parking strip fronts the current Keakealani campus at Haunani Road. It is used to load and unload students at the facility. There are 35 full-time occupied and 17 part-time occupied residences located along the road.

The nearest intersection to the Keakealani Campus is located at Haunani Road and Old Volcano Road, and this intersection is not signalized. A Traffic Impact Analysis Report (TIAR) conducted for the project determined that the level-of-service (LOS) at this intersection is rated as level A (LOS-A), which represents free-flow conditions with no congestion (Appendix 3).

Impacts and Mitigation

VSAS currently has an enrollment of 174 students and 28 staff split between the two campuses. Enrollment is not projected to change with the Keakealani Campus Development Project, with a maximum school capacity of 200 students. The project proposes to move approximately 125 students presently using the Volcano Road Campus and their faculty to the Keakealani Campus.

A Traffic Impact Analysis Report (TIAR) conducted for the project by Aina Engineers Inc. in 2015 (included in full as Appendix 3) determined that the anticipated traffic generation increase is 34 trips to and from the Keakealani Campus from surrounding areas. The anticipated impacts of the project's generated traffic should not increase the existing LOS-A experienced at the intersection of Haunani Road and Old Volcano Road.

In response to comments from the County of Hawai‘i Department of Public Works – Traffic Division, the proposed site plan was revised (see Figure 4 for current site plan). The new site plan incorporates a crosswalk as well as an offsite proposed walkway and shoulder section. It also includes a pull-through area for on campus student drop-off (rather than drop-off on Haunani Road), on campus parallel parking for parents at the school entrance, pull in parking for preschool drop-off, and a separate parking lot for parents and VSAS staff. The revision in the site plan does not change the analysis of traffic done in the TIAR, since the number of enrolled students would not change with the proposed project.

All students are expected to arrive to school by drop-off or bus, and the crosswalk and walkway are anticipated to be used by approximately 20 students who walk from school at the end of the day to the Volcano Store at the intersection of Haunani Road and Old Volcano Road.

3.4 Secondary and Cumulative Impacts

The proposed project is minor and does not appear to have the potential to involve any secondary impacts, such as population changes or effects on public facilities.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts. The adverse effects of the project are very limited in severity, nature and geographic scale. At the current time there appear to be very few roadway, utility or development projects being undertaken in the Volcano area that would combine in such a way as to produce adverse cumulative effects related to the construction phase, such as dust, water quality, or traffic congestion.

There are no known projects that would occur in the Volcano community. There may be maintenance associated with roads, Highway 11, utilities, and nearby properties in the area around the project site, but these would not result in any cumulative adverse effects along with the project.

3.5 Required Permits and Approvals

The project requires granting the following permits and approvals, which are listed by responsible agency:

- County of Hawai‘i, Department of Public Works, Building Division Approval and Building Permit;
- County of Hawai‘i, Planning Commission, Use Permit; and
- DOE Approval.

3.6 Consistency with Government Plans and Policies

3.6.1 Hawai‘i State Plan and Hawai‘i State Land Use Law

Adopted in 1978 and last revised in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State’s long-run growth and development activities. The three themes that express the basic purpose of the *Hawai‘i State Plan* are individual and family self-sufficiency, social and economic mobility, and community or social well-being. The proposed facility would improve community well-being by providing an optimum location for a successful public charter school.

Chapter 205 Hawai‘i Revised Statutes classifies all land in the State of Hawai‘i into one of four land use categories – Urban, Rural, Agricultural, or Conservation – and determines permissible uses in each district. The project site is in the State Land Use Urban District. The proposed use is consistent with intended uses for this land use district.

3.6.2 Hawai‘i County Zoning, Special Management Area, and General Plan

The project site is located within the Coastal Zone Management Area (CZMA) but is not located within the Special Management Area (SMA). According to a letter from the Hawai‘i County Planning Department in response to early consultation (see Appendix 1), the project would require approval of a Use Permit from the Planning Commission.

The *General Plan* for the County of Hawai‘i is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawai‘i (County of Hawai‘i 2005). The plan was adopted by ordinance in 1989 and revised in 2005 (Hawai‘i County Planning Department). The *General Plan* itself is organized into thirteen functional elements. In general, the proposed project would be consistent with the goals, policies and objectives, standards, and principles for several functional areas. This section addresses the consistency of the proposed action with relevant policies of the County.

Environmental Quality Goals:

- Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island are viable and sustainable.
- Maintain and, if feasible, improve the existing environmental quality of the island.
- Control pollution.

Environmental Quality Policies:

- Take positive action to further maintain the quality of the environment.

Discussion: The school would incorporate measures to prevent pollution and promote conservation. Part of its mission is environmental education and stewardship.

Historic Sites Goals:

- Protect and enhance the sites, buildings and objects of significant historical and cultural importance to Hawai‘i.
- Appropriate access to significant historic sites, buildings and objects of public interest should be made available.

Discussion: No archaeological sites are present on the property and none will be affected. A monitoring plan has been approved for implementation during construction.

Natural Beauty Goals:

- Protect scenic vistas and view planes from becoming obstructed. Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

Natural Beauty Policies:

- Increase public pedestrian access opportunities to scenic places and vistas.

Discussion: The proposed facility would not degrade the scenic environment of the area or inhibit public pedestrian access.

Land Use Goals:

- Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County.
- Protect and preserve forest, water, natural and scientific reserves and open areas.

Land Use Standards

- The designated land uses will be delineated on the General Plan Land Use Pattern Allocation Guide Map. The broad-brush boundaries indicated are graphic expressions of the General Plan policies, particularly those relating to land uses. They are long-range guides to general location and will be subject to: a) existing zoning; and b) State Land Use District. Similarly, the acreages allocated represent alternatives for the various levels of economic activity and supporting functions, such as resort, residential, commercial and industrial activities. Land required for community and governmental services and programs as well as new towns and resort centers may be accommodated within the allocated acreages.

Discussion: The *Hawai'i County General Plan Land Use Pattern Allocation Guide (LUPAG) and Facilities Map* components of the *General Plan* are graphic representations of the Plan's goals, policies, and standards as well as of the physical relationship between land uses. They also establish the basic urban and non-urban form for areas and the planned public and cultural facilities, public utilities and safety features, and transportation corridors. The project site is classified as medium density urban and low density urban in the LUPAG. As discussed above in this section, the school has been found to be consistent with this designation. The proposed facility would be conveniently located with respect to utilities, public services, and access.

3.6.3 Puna Community Development Plan and Volcano Long Range Plan

The Puna Community Development Plan (CDP) encompasses the judicial district of Puna, and was developed under the framework of the February 2005 County of Hawai'i General Plan. The CDP is intended to translate broad General Plan Goals, Policies, and Standards into implementation actions as they apply to specific geographical regions around the County.

The Puna CDP Action Committee is a volunteer working group whose purpose is to serve as a proactive, community based steward of the CDP's implementation by way of providing guidance and making recommendations to the Planning Director as it pertains to budget priorities, CDP

amendments, General Plan amendments, and program initiatives. The Action Committees are intended to broaden community awareness of the CDP and build partnerships with local communities and organizations to implement CDP goals, objectives, policies, and actions. The Connectivity and Emergency Response Subcommittee (CERS) is a subcommittee of the Puna CDP Action Committee.

The Puna CDP is organized into three overarching themes that correspond to the top three issue that face the region, as identified in the public involvement process (PCDPSC 2008). These three themes are: Mālama I Ka ʻĀina which establishes how the contextual natural, historic and cultural features of Puna should be preserved and respected; growth management which addresses how the future pattern of human settlement and land use should be shaped to respect that context and support the desired quality of life for Puna's residents; and, transportation which focuses on sustainable approaches to transportation to support the goals of Mālama I Ka ʻĀina and growth management (PCDPSC 2008). The vision statement of the CDP is: "Residents of Puna live in harmony with the ʻāina while promoting a sustainable vibrant local economy, healthy communities, and a viable transportation system that is accessible, friendly and safe for now and future generations" (PCDPSC 2008).

The VSAS is generally consistent with all aspects of the Puna CDP. It is in keeping with Chapter 2 Mālama I Ka ʻĀina, particularly Goal 2.3.1(c):

> **There is a strategy to address storm water runoff and localized flooding problems.**

It is in keeping with the Plan's goals in Chapter 3 "Managing Growth", Goal 3.1.1 (c):

> **Services and community facilities are more accessible in village/town centers that are distributed throughout the region, including the underserved subdivisions that have been experiencing higher levels of development growth.**

It is in keeping with the Plan's goals in Chapter 3 "Managing Growth" for Social Services and Housing related to education Goal 3.3.1 (e):

> **Public education is better integrated into Puna's communities.**

It is in keeping with the Plan's goals in Chapter 3 "Managing Growth" for Social Services and Housing including Section 3.3.2 Objectives (f) and (g):

> **Increase opportunity for community involvement in public education.**
>
> **Urge the State to locate its community facilities, such as public schools, in designated town/village centers, and to design them in conformance to the criteria applicable to the type of village/town center at that location.**

It is in keeping with the Plan's goals in Chapter 3 "Managing Growth" for Parks and Recreation Section Action item 3.5.3(c)(10):

To supplement Community Parks, make recreation facilities and meeting rooms at public schools available for community use after school hours, whether through direct requests from a community representative to a school principal or a formal standing agreement between the County and the Department of Education.

It is in keeping with the Plan's goals in Chapter 3 "Managing Growth" for Energy Sustainability including Goal 3.6.1(c):

Puna lowers its dependence on fossil fuels as an energy source, becoming a demonstration area for alternative sources, systems and fuels.

Sensitive to the natural and historic content of its unique place, the Volcano Long Range Plan is the vision and the process for the community development of Volcano (Volcano Community Association 2015). The Volcano Long Range Plan is an action plan, tiered to the 2008 Puna CDP. The Volcano Long Range Plan addresses the three categories set forth in the Puna CDP, providing guidance on growth and development that considers the particulars of Volcano's setting (Volcano Community Association 2015). The main planning challenges addressed in the Volcano Long Range Plan include managing growth, maintaining a tranquil rural environment, and preserving historic neighborhoods and structures (Volcano Community Association 2015). Through project design and community input, this project's design is in conformance with the vision and purpose of the Volcano Long Range Plan, which states:

We envision a community aesthetically and spiritually in harmony with the rare and beautiful native forest which surrounds us.

The project is consistent with the goals for Mālama I Ka 'Āina: Historic/Cultural Properties Goals A (1) and (2):

Cultural and historical features and sites are protected from destruction by development.

Historic structures and cultural sites significant to Volcano's History and cultural traditions are preserved.

It is consistent with Mālama I Ka 'Āina: Natural Resources/Natural Beauty/Environmental Quality Goal B(1):

The natural resources and natural beauty of Volcano are protected from undue exploitation, encroachment, and damage.

It is consistent with Growth Management: Recreation Action item 2:

Develop greater cooperation with Hawai`i Volcanoes National Park, Kīlauea Military Camp, Volcano School of Arts and Sciences, and Volcano Art Center to

provide for greater access to their facilities, and encourage them to expand their recreational offerings for residents.

Most importantly, the project is consistent with Growth Management: Public Safety, Sanitation, and Social Services Objective 4:

Develop a permanent campus for the Volcano School of Arts and Sciences that blends into the community.

3.6.4 Consistency with HRS Chapter 302D

VSAS meets the definitions and adheres to HRS Chapter 302D, which would not change as a result of the proposed project.

PART 4: DETERMINATION

Based on the findings below, the VSAS is expected to determine that the project will not significantly alter the environment, as impacts will be minimal, and is expected therefore to issue a FONSI. A final determination will be made upon consideration of comments to the Draft EA.

PART 5: FINDINGS AND REASONS

Chapter 11-200-12, HAR, outlines those factors agencies must consider when determining whether an Action has significant effects:

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resources would be committed or lost. Archaeological sites have been inventoried, and no significant resources would be affected.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* The proposed school relocation expands and in no way curtails beneficial uses of the environment.
3. *The proposed project will not conflict with the State's long-term environmental policies*. The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is minor and does not conflict with policies to improve the environment. It is thus consistent with all elements of the State's long-term environmental policies.
4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project will not adversely affect the social welfare of the community and will contribute to education and social welfare.
5. *The proposed project does not substantially affect public health in any detrimental way.* The project will not affect public health in any way; wastewater and stormwater will be appropriately treated. Traffic impacts have been taken into careful consideration in project design.
6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities*. No adverse secondary effects are expected to result from the project.
7. *The proposed project will not involve a substantial degradation of environmental quality*. The project is minor, and would thus not contribute to environmental degradation.
8. *The proposed project will not substantially affect any rare, threatened, or endangered species of flora or fauna or habitat.* The ma‘o hau hele shrub, which was planted by the school, will be relocated to the front of the existing school building prior to construction and operation of the school.
9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The project is not related to other activities in the region in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.
10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* No adverse effects on air quality or noise would occur. The increase in noise levels on the site are acceptable and would be only a moderate increase in the existing levels.
11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the property is located in an area with volcanic and seismic risk, the entire Island of Hawai‘i shares this

risk, and the project is not imprudent to construct. The property is 12 miles from the shoreline and outside any flood zone.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas and viewplanes identified in the Hawai‘i County General Plan will be adversely affected by the project.
13. *The project will not require substantial energy consumption*. The campus will have solar electricity, solar hot water, radiant floor hydronic heating, effective use of natural light and ventilation, and the employment of local and renewable resources, as practical and possible.

PART 6: REFERENCES

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APPENDICES

APPENDIX 1

Comments in Response to Early Consultation Letter

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Hawaiian Volcano Observatory
Post Office Box 51
Hawaii National Park, Hawai'i 96718-0051

IN REPLY REFER TO:

February 28, 2017

Michele Lefebvre
Environmental Specialist
Stantec Consulting Services
1239 Moku Place
Hilo, HI 96720

Dear Ms. Lefebvre:

Regarding your letter of 12 December and the Environmental Assessment for the Volcano School of Arts and Sciences project, thank you for contacting HVO for comments on the evaluation process.

As you know, volcano and earthquake hazards are issues facing the entire island. Below I point you to sources of the best available information.

The school location now and in its consolidation plan is in Volcano Hazard Zone 3 as described in USGS publication Wright, T.L., Chu, J.Y., Esposo, J., Heliker, C., Hodge, J., Lockwood, J.P., and Vogt, S.M., 1992, Map showing lava-flow hazard zones, island of Hawaii: U.S. Geological Survey Miscellaneous Field Studies Map MF-2193, scale 1:250,000.

This information and an explanation of the lava hazard zones can be found online here:
https://pubs.usgs.gov/mf/1992/2193/
https://hvo.wr.usgs.gov/hazards/FAQ_LavaFlowHazardZone/

Additionally, there are tephra (fragmental explosive debris) hazards that are relevant for your area; information regarding these hazards (and other hazards of concern) can be found here in Chapter 10 of this recent USGS Professional Paper:
https://pubs.usgs.gov/pp/1801/

Vog is another important environmental hazard of concern, one that the school is already familiar with. I refer you to this site for information on vog that will be relevant to your analysis:
http://www.ivhhn.org/vog/

Earthquake hazards are addressed in these USGS ground motion hazard maps:
https://earthquake.usgs.gov/hazards/hazmaps/hi/1998/maps.php

I refer you as well to the State of Hawai'i building codes for information about seismic design appropriate for Hawai'i.

TAKE PRIDE IN AMERICA

Thank you for the opportunity to comment and best of luck in your work. If you have specific follow-up questions, I'll do my best to answer them.

Christina Neal
Scientist in Charge
USGS Hawaiian Volcano Observatory
808-967-8853

DEPARTMENT OF WATER SUPPLY · COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

January 3, 2017

Ms. Michele Lefebvre
Stantec Consulting Services Inc.
1239 Moku Place
Hilo, HI 96720

Dear Ms. Lefebvre:

Subject: Pre-Environmental Assessment Consultation
Volcano School of Arts & Sciences – Keakealani Development Project
Tax Map Key 1-9-004:019

We have reviewed your Pre-Environmental Assessment Consultation letter, dated December 2, 2016.

Please be informed that there are no Department of Water Supply facilities in the area. Therefore, we have no comments to offer at this time.

Should there be any questions, please contact Mr. Ryan Quitoriano of our Water Resources and Planning Branch at 961-8070, extension 256.

Sincerely yours,

Keith K. Okamoto, P.E.
Manager-Chief Engineer

RQ:dfg

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 5, 2017

Stantec Consulting Services, Inc.
Attention: Ms. Michele Lefebvre, Environmental Specialist
1239 Moku Place
Hilo, Hawaii 96720

Dear Ms. Lefebvre:

SUBJECT: Early Consultation for Environmental Assessment for Development of the Keakealani Campus for the Volcano School of Arts and Sciences

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division, (b) Land Division – Hawaii District, (c) Office of Conservation & Coastal Lands, and (d) Division of State Parks on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

'16 DEC 7 AM 10:41 ENGINEERING
RECEIVED
LAND DIVISION

2016 DEC 16 AM 11:00
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

December 7, 2016

MEMORANDUM

~~TO~~:

DLNR Agencies:
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
From: X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
___Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Hawaii District
X Historic Preservation

~~FROM~~: TO: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Development of the Keakealani Campus for the Volcano School of Arts and Sciences
LOCATION: Volcano Village, Island of Hawaii; TMK: (3) 1-9-004:019
APPLICANT: Volcano School of Arts and Sciences

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **January 4, 2017.**

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: _____

Print Name: Carty S. Chang, Chief Engineer
Date: 12/13/16

cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Early Consultation for Environmental Assessment for Development of the Keakealani Campus for the Volcano School of Arts and Sciences

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a designated Flood Hazard.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zone designations can be found using the Flood Insurance Rate Map (FIRM), which can be accessed through the Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may take precedence over the NFIP standards as local designations prove to be more restrictive. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4846.

The applicant should include water demands and infrastructure required to meet project needs. Please note that the projects within State lands requiring water service from their local Department/Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.

The applicant is required to provide water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update projections.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 12/13/16

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

2016 DEC -9 A 10:48
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LAND DIVISION
HILO, HAWAII

RECEIVED
LAND DIVISION
2016 DEC 23 AM 11:00
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 7, 2016

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
___Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Hawaii District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Development of the Keakealani Campus for the Volcano School of Arts and Sciences
LOCATION: Volcano Village, Island of Hawaii; TMK: (3) 1-9-004:019
APPLICANT: Volcano School of Arts and Sciences

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **January 4, 2017.**

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: _____

Print Name: GORDON C. HEIT
Date: 12/21/16

cc: Central Files

LY

HA-17-123

DAVID Y. IGE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION
2016 DEC 20 AM 10: 48
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

RECEIVED
OFFICE OF CONSERVATION
AND COASTAL LANDS
2016 DEC -7 A 10: 47
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 7, 2016

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
___Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Hawaii District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Development of the Keakealani Campus for the Volcano School of Arts and Sciences
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APPLICANT: Volcano School of Arts and Sciences

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Attachments

( ) We have no objections.
(✓) We have no comments. * NOT in conservation District
( ) Comments are attached.

Signed: [signature]

Print Name: Lauren Yasalar
Date: 12/19/16

cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
STATE PARKS
'16 DEC -8 P3:55
DEPT. OF LAND & NATURAL RESOURCES

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2016 DEC 13 AM 10:46
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

December 7, 2016

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
___Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Hawaii District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Development of the Keakealani Campus for the Volcano School of Arts and Sciences
LOCATION: Volcano Village, Island of Hawaii; TMK: (3) 1-9-004:019
APPLICANT: Volcano School of Arts and Sciences

Transmitted for your review and comment is information on the above-referenced project. We would appreciate your comments on this project. Please submit any comments by **January 4, 2017.**

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Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: _____

Print Name: CURT COTTRELL
Date: 12.9.16

cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

EPO 16-402

December 21, 2016

Ms. Michele Lefebvre
Stantec Consulting Services Inc.
239 Moku Place
Hilo, Hawaii 96720

Dear Ms. Lefebvre:

SUBJECT: Early Consultation for Environmental Assessment (EC EA) for Development of the Keakealani Campus for the Volcano School of Arts and Sciences, Volcano Village, Hawaii Santec Project Number 203703253

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your EC EA to our office on December 5, 2016

In the development and implementation of all projects, EPO strongly recommends regular review of State and Federal environmental health land use guidance. State standard comments and available strategies to support sustainable and healthy design are provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

EPO has recently updated the environmental Geographic Information System (GIS) website page. It now compiles various maps and viewers from our environmental health programs. The eGIS website page is continually updated so please visit it regularly at: http://health.hawaii.gov/epo/egis.

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.

In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www.epa.gov/ejscreen.

The Department of Health encourages the application of sustainability strategies and principles early in the planning, review and funding of projects. We also request that you consider conducting a Health Impact Assessment (HIA). More information is available on line at:

- World Health Organization (WHO) HIA information: http://www.who.int/hia/en
- U.S. Centers for Disease Control (CDC) HIA information: https://www.cdc.gov/healthyplaces/hia.htm

- U.S. Environmental Protection Agency (EPA) HIA information: https://www.epa.gov/healthresearch/health-impact-assessments

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design. Thank you for the opportunity to comment.

We request a written or electronic response confirming your receipt of this DOH EPO comment letter. You may mail your response directly to EPO at 919 Ala Moana Blvd., Suite 312, Honolulu, Hawaii 96814. However, we would prefer an electronic reply to DOH.EPO@doh.hawaii.gov. We expect that our letter(s) and your response(s) will be included in the final document. If you have any questions, please contact me by calling (808) 586-4337.

Mahalo nui loa,

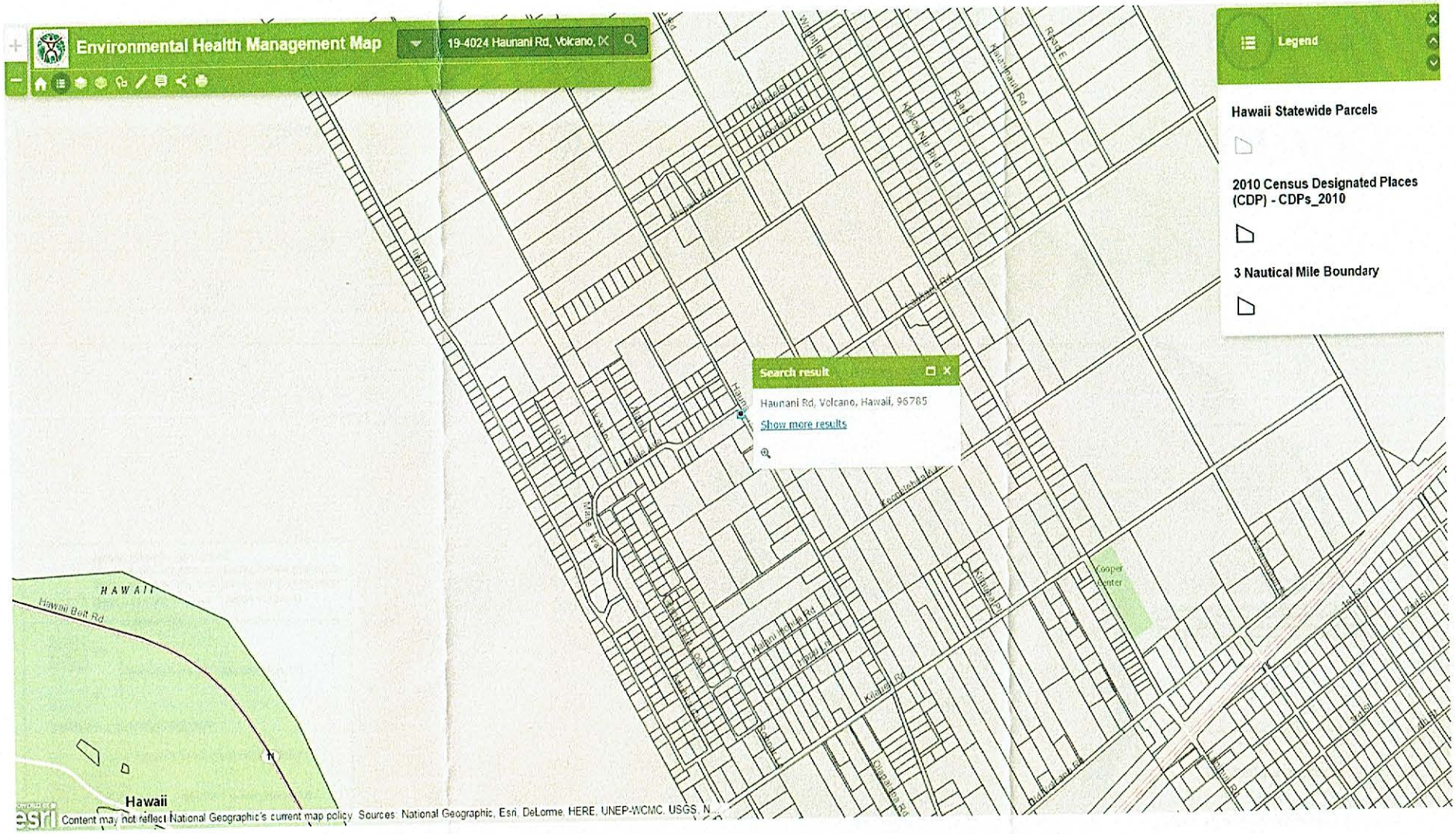
Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

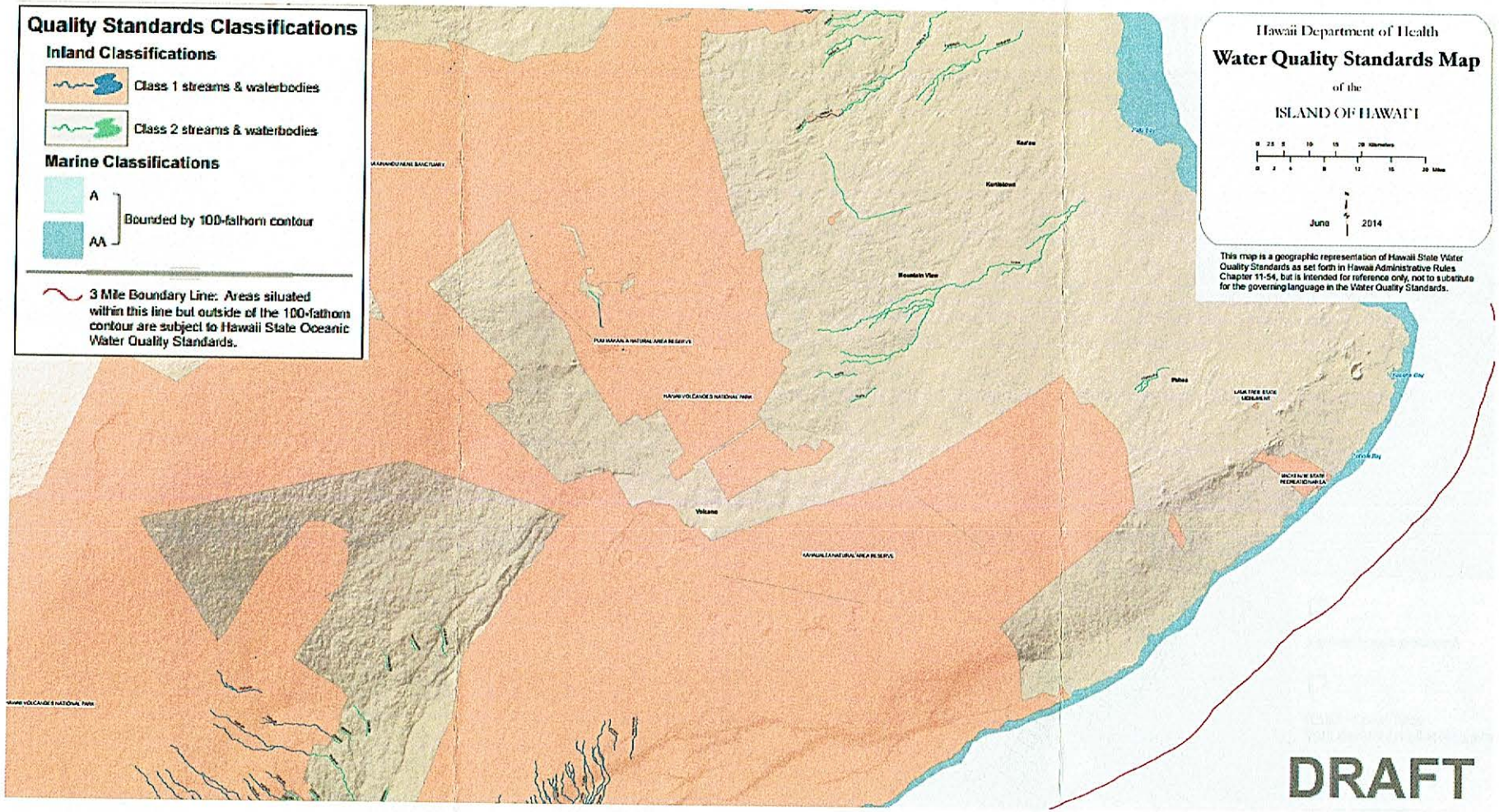
Attachment 1: Environmental Health Management Web App Snipit of Project Area: http://health.hawaii.gov/epo/egis
Attachment 2: Clean Water Branch: Water Quality Standards Map - Hawaii
Attachment 3: Wastewater Branch: Recycled Water Use Map of Project Area
Attachment 4: U.S. EPA EJSCREEN Report for Project Area

c: DOH: DHO HI, HEER {via email only}

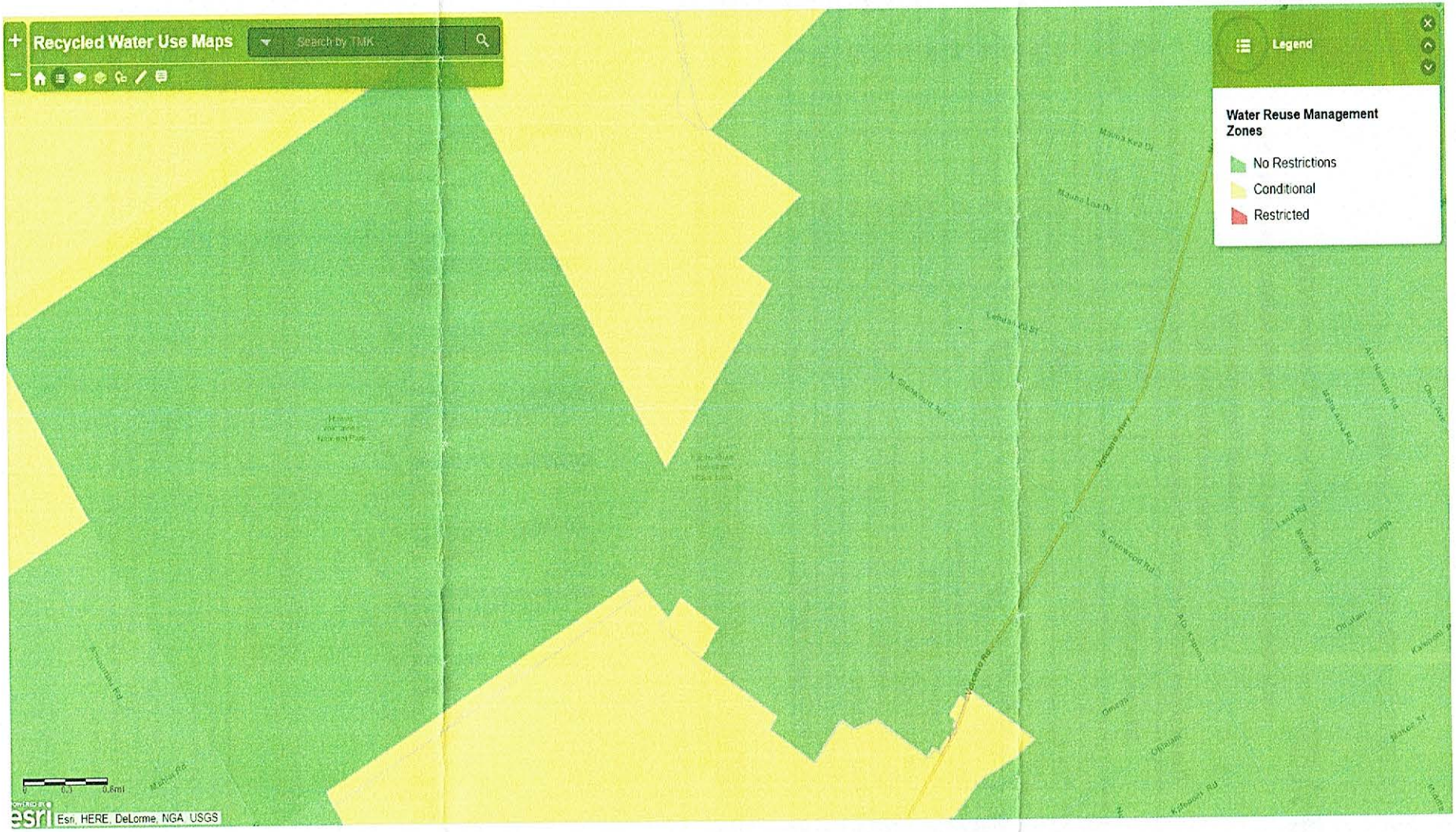
Attachment 1: Environmental Health Management Web App Snipit of Project Area: http://health.hawaii.gov/epo/egis



Attachment 2: Clean Water Branch: Water Quality Standards Map – Hawaii



Attachment 3: Wastewater Branch: Recycled Water Use Map of Project Area



Attachment 4: U.S. EPA EJSCREEN Report for Project Area

EJSCREEN Report (Version 2016)

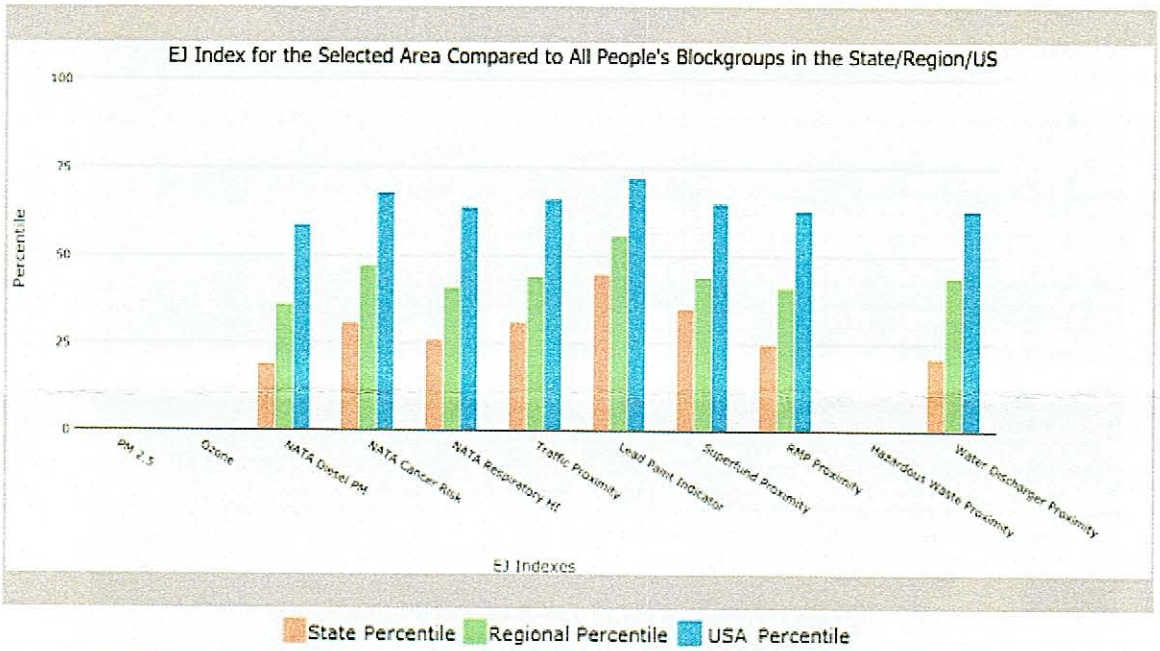
1 mile Ring Centered at 19.428944,-155.235072, HAWAII, EPA Region 9

Approximate Population: 639

Input Area (sq. miles): 3.14

Development of the Keakealani Campus for the Volcano School of Arts and Sciences

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	19	36	59
EJ Index for NATA* Air Toxics Cancer Risk	31	47	68
EJ Index for NATA* Respiratory Hazard Index	26	41	64
EJ Index for Traffic Proximity and Volume	31	44	66
EJ Index for Lead Paint Indicator	45	56	72
EJ Index for Superfund Proximity	35	44	65
EJ Index for RMP Proximity	25	41	63
EJ Index for Hazardous Waste Proximity+	N/A	N/A	N/A
EJ Index for Water Discharger Proximity	21	44	63



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report (Version 2016)

1 mile Ring Centered at 19.428944,-155.235072, HAWAII, EPA Region 9

Approximate Population: 639

Input Area (sq. miles): 3.14

Development of the Keakealani Campus for the Volcano School of Arts and Sciences

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.37	N/A	9.32	N/A
Ozone (ppb)	N/A	N/A	N/A	51	N/A	47.4	N/A
NATA* Diesel PM (µg/m³)	0.0144	0.149	9	0.978	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	25	34	8	43	<50th	40	<50th
NATA* Respiratory Hazard Index	0.5	1	9	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	19	990	26	1100	17	590	25
Lead Paint Indicator (% Pre-1960 Housing)	0.098	0.16	49	0.24	45	0.3	36
Superfund Proximity (site count/km distance)	0	0.098	29	0.15	13	0.13	16
RMP Proximity (facility count/km distance)	0.037	0.19	8	0.57	3	0.43	4
Hazardous Waste Proximity+ (facility count/km distance)	N/A	0.14	N/A	0.14	N/A	0.11	N/A
Water Discharger Proximity (facility count/km distance)	0.034	0.34	8	0.2	7	0.31	4
Demographic Indicators							
Demographic Index	46%	52%	31	47%	50	36%	70
Minority Population	46%	77%	8	58%	37	37%	65
Low Income Population	46%	26%	87	36%	67	35%	71
Linguistically Isolated Population	0%	6%	23	9%	19	5%	44
Population With Less Than High School Education	8%	9%	55	17%	36	14%	41
Population Under 5 years of age	4%	6%	31	7%	31	6%	33
Population over 64 years of age	14%	15%	47	13%	65	14%	56

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

+ The hazardous waste environmental indicator and the corresponding EJ index will appear as N/A if there are no hazardous waste facilities within 50 km of a selected location.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

Harry Kim
Mayor

Michael Yee
Director

Daryn Arai
Deputy Director

West Hawai'i Office
74-5044 Ane Keohokalole Hwy
Kailua-Kona, Hawai'i 96740
Phone (808) 323-4770
Fax (808) 327-3563

County of Hawai'i

PLANNING DEPARTMENT

East Hawai'i Office
101 Pauahi Street, Suite 3
Hilo, Hawai'i 96720
Phone (808) 961-8288
Fax (808) 961-8742

December 28, 2016

Ms. Michele Lefebvre
Stantec Consulting Services Inc.
1239 Moku Place
Hilo, HI 96720

Dear Ms. Lefebvre:

Pre-Consultation for Environmental Assessment
Applicant: Keakealani Campus for the Volcano School of Arts and Sciences
Request: Allow the Establishment of a K-8 and Related Activities
Tax Map Key: 1-9-004:019

This is sent in response to your request for information regarding the above referenced property and the proposed development and construction of the kindergarten through eighth grade campus for the Volcano School of Arts and Sciences on the historic Keakealani School property. The following information is provided for your assessment:

1. Subject Property: The subject property is owned by the State of Hawai'i and is approximately 3.15 acres in size. It is located within the State Land Use Urban district and the County's Single-Family Residential (RS-20) zoning district. The General Plan Land Use Pattern Allocation Guide (LUPAG) map designation for the property is medium density urban and low density urban. The property is located within the Coastal Zone Management Area (CZMA) but is not located within the Special Management Area (SMA). The Puna Community Development Plan covers the area of the subject property. Additionally, the Volcano community has created the Volcano Long Range Plan, which affects the subject property.

   As the property is located within the County's Single-Family Residential (RS-20) zoning district, the use of a school (or the increase of a non-conforming school) will require the approval of a Use Permit from the Planning Commission. The Environmental Assessment process needs to be complete prior to the submittal of the Use Permit application.

2. Archaeological Resources: As the subject property is the site of the Keakealani Campus that has been in operation for over 50 years, please provide information regarding the archaeological resources associated with the existing uses and property. Please consult with the Department of Land and Natural Resources-State Historic Preservation Division.

3. Traffic Impact Study and Information: Please provide a traffic impact study with the assessment along with proposed mitigation measures. The study should be reviewed and deemed acceptable by the Department of Public Works-Traffic Division.

If you have any questions, please feel free to contact Jeff Darrow at 961-8158.

Sincerely,

MICHAEL YEE
Planning Director

JWD:mad
P\wpwin60\Jeff\Letters\Pre-draft EA\ILefebvre-KeakealaniVolcanoCampus.doc

United States Department of the Interior

NATIONAL PARK SERVICE
Hawai'i Volcanoes National Park
Post Office Box 52
Hawaii National Park, Hawai'i 96718

IN REPLY REFER TO:
HAVO 1.D. (L7621)

December 29, 2016

Michele Lefebvre
Stantec Consulting Services Inc.
1239 Moku Place
Hilo, HI 96720

Dear Ms. Lefebvre,

Thank you for the letter we received 12/14/2016 requesting comments during early consultation for the Environmental Assessment for the Volcano School of Arts and Sciences Relocation and Expansion.

We recommend that the proposed action consider appropriate outdoor lighting for the project site. We would appreciate your consideration to protect threatened and endangered nocturnal seabirds that may be transiting the area, such as the endangered Hawaiian petrel, the endangered band-rumped storm-petrel, and the threatened Newell's shearwater. While these species may not occur on the project site, they do fly to and from nesting colonies after dark and could be disoriented by artificial lights that are not properly shielded. In order to protect night skies and night-flying birds, it is recommended that only full cut-off, amber, downward directional lighting be considered for this project.

An excellent resource for seabird friendly lighting can be found at the following website:
http://www.kauai-seabirdhcp.info/lighting-homes-businesses/
We look forward to working with you in the future on jointly shared resources of concern such as protection of the dark night skies.

In addition, to limit the spread of invasive species that threaten our shared ecosystems, we recommend the project consider Best Management Practices / Standard Operating Procedures (SOPs) for cleaning and inspecting equipment and materials prior to arrival on site. If you would like an example of the park's SOPs, please let us know.

If you have any questions on our comments, please contact Danielle Foster, Environmental Protection Specialist at (808) 985-6073 or danielle_foster@nps.gov.

Please include us on the mailing list for the Environmental Assessment.

Sincerely,

Cynthia L. Orlando
Superintendent

Harry Kim
Mayor

Darren J. Rosario
Fire Chief

Renwick J. Victorino
Deputy Fire Chief

County of Hawai'i

HAWAI'I FIRE DEPARTMENT

25 Aupuni Street • Suite 2501 • Hilo, Hawai'i 96720
(808) 932-2900 • Fax (808) 932-2928

December 19, 2016

Michele Lefebvre
Environmental Specialist
Stantec Consulting Services Inc.
1239 Moku Place
Hilo, Hawai'i 96720

Dear Ms Lefebvre,

SUBJECT: Early Consultation for Environmental Assessment for Developing of the Keākealani Campus for the Volcano School of Arts and Science, Volcano Village, Island of Hawai'i
Stantec Project Number 203703253

In regards to the above-referenced Early Consultation for Environmental Assessment, the following shall be in accordance:

Special comments: New Building would need a code analysis to address any possible building and Fire Code issues.

NFPA 1, UNIFORM FIRE CODE, 2006 EDITION

Note: Hawai'i State Fire Code, National Fire Protection Association 2006 version, with County of Hawaii amendments. County amendments are identified with a preceding "C~" of the reference code.

Chapter 18 Fire Department Access and Water Supply

18.1 General. Fire department access and water supplies shall comply with this chapter.

For occupancies of an especially hazardous nature, or where special hazards exist in addition to the normal hazard of the occupancy, or where access for fire apparatus is unduly difficult, or areas where there is an inadequate fire flow, or inadequate fire hydrant spacing, and the AHJ may require additional safeguards including, but not limited to, additional fire appliance units, more than one type of appliance, or special systems suitable for the protection of the hazard involved.

18.1.1 Plans.

18.1.1.1 Fire Apparatus Access. Plans for fire apparatus access roads shall be submitted to the fire department for review and approval prior to construction.

18.1.1.2 Fire Hydrant Systems. Plans and specifications for fire hydrant systems shall be submitted to the fire department for review and approval prior to construction.

C~ 18.1.1.2.1 Fire Hydrant use and Restrictions. No unauthorized person shall use or operate any Fire hydrant unless such person first secures permission or a permit from the owner or representative of the department, or company that owns or governs that water supply or system. Exception: Fire Department personnel conducting firefighting operations, hydrant testing, and/or maintenance, and the flushing and acceptance of hydrants witnessed by Fire Prevention Bureau personnel.

18.2 Fire Department Access.

18.2.1 Fire department access and fire department access roads shall be provided and maintained in accordance with Section 18.2.

18.2.2* Access to Structures or Areas.

18.2.2.1 Access Box(es). The AHJ shall have the authority to require an access box(es) to be installed in an accessible location where access to or within a structure or area is difficult because of security.

18.2.2.2 Access to Gated Subdivisions or Developments. The AHJ shall have the authority to require fire department access be provided to gated subdivisions or developments through the use of an approved device or system.

18.2.2.3 Access Maintenance. The owner or occupant of a structure or area, with required fire department access as specified in 18.2.2.1 or 18.2.2.2, shall notify the AHJ when the access is modified in a manner that could prevent fire department access.

18.2.3 Fire Department Access Roads. (*may be referred as FDAR)

18.2.3.1 Required Access.

18.2.3.1.1 Approved fire department access roads shall be provided for every facility, building, or portion of a building hereafter constructed or relocated.

18.2.3.1.2 Fire Department access roads shall consist of roadways, fire lanes, parking lots lanes, or a combination thereof.

18.2.3.1.3* When not more than two one- and two-family dwellings or private garages, carports, sheds, agricultural buildings, and detached buildings or structures 400ft^2 (37 m^2) or less are present, the requirements of 18.2.3.1 through 18.2.3.2.1 shall be permitted to be modified by the AHJ.

18.2.3.1.4 When fire department access roads cannot be installed due to location on property, topography, waterways, nonnegotiable grades, or other similar conditions, the AHJ shall be authorized to require additional fire protection features.

18.2.3.2 Access to Building.

18.2.3.2.1 A fire department access road shall extend to within in 50 ft (15 m) of at least one exterior door that can be opened from the outside that provides access to the interior of the building. Exception: 1 and 2 single-family dwellings.

18.2.3.2.1.1 When buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13D, or NFPA 13R, the distance in 18.2.3.2.1 shall be permitted to be increased to 300 feet.

18.2.3.2.2 Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 ft (46 m) from fire department access roads as measured by an approved route around the exterior of the building or facility.

18.2.3.2.2.1 When buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13D, or NFPA 13R, the distance in 18.2.3.2.2 shall be permitted to be increased to 450 ft (137 m).

18.2.3.3 Multiple Access Roads. More than one fire department access road shall be provided when it is determined by the AHJ that access by a single road could be impaired by vehicle congestion, condition of terrain, climatic conditions, or other factors that could limit access.

18.2.3.4 Specifications.

18.2.3.4.1 Dimensions.

C~ 18.2.3.4.1.1 FDAR shall have an unobstructed width of not less than 20ft with an approved turn around area if the FDAR exceeds 150 feet. **Exception:** FDAR for one and two family dwellings shall have an unobstructed width of not less than 15 feet, with an area of not less than 20 feet wide within 150 feet of the structure being protected. An approved turn around area shall be provided if the FDAR exceeds 250 feet.

C~ 18.2.3.4.1.2 FDAR shall have an unobstructed vertical clearance of not less then 13ft 6 in.

C~ 18.2.3.4.1.2.1 Vertical clearances may be increased or reduced by the AHJ, provided such increase or reduction does not impair access by the fire apparatus, and approved signs are installed and maintained indicating such approved changes.

18.2.3.4.1.2.2 Vertical clearances shall be increased when vertical clearances or widths are not adequate to accommodate fire apparatus.

C~ 18.2.3.4.2 Surface. Fire department access roads and bridges shall be designed and maintained to support the imposed loads (25 Tons) of the fire apparatus. Such FDAR and shall be comprised of an all-weather driving surface.

18.2.3.4.3 Turning Radius.

C~ 18.2.3.4.3.1 Fire department access roads shall have a minimum inside turning radius of 30 feet, and a minimum outside turning radius of 60 feet.

18.2.3.4.3.2 Turns in fire department access road shall maintain the minimum road width.

18.2.3.4.4 Dead Ends. Dead-end fire department access roads in excess of 150 ft (46 m) in length shall be provided with approved provisions for the fire apparatus to turn around.

18.2.3.4.5 Bridges.

18.2.3.4.5.1 When a bridge is required to be used as part of a fire department access road, it shall be constructed and maintained in accordance with county requirements.

18.2.3.4.5.2 The bridge shall be designed for a live load sufficient to carry the imposed loads of fire apparatus.

18.2.3.4.5.3 Vehicle load limits shall be posted at both entrances to bridges where required by the AHJ.

18.2.3.4.6 Grade.

C~ 18.2.3.4.6.1 The maximum gradient of a Fire department access road shall not exceed 12 percent for unpaved surfaces and 15 percent for paved surfaces. In areas of the FDAR where a Fire apparatus would connect to a Fire hydrant or Fire Department Connection, the maximum gradient of such area(s) shall not exceed 10 percent.

18.2.3.4.6.2* The angle of approach and departure for any means of fire department access road shall not exceed 1 ft drop in 20 ft (0.3 m drop in 6 m) or the design limitations of the fire apparatus of the fire department, and shall be subject to approval by the AHJ.

18.2.3.4.6.3 Fire department access roads connecting to roadways shall be provided with curb cuts extending at least 2 ft (0.61 m) beyond each edge of the fire lane.

18.2.3.4.7 Traffic Calming Devices. The design and use of traffic calming devices shall be approved the AHJ.

18.2.3.5 Marking of Fire Apparatus Access Road.

18.2.3.5.1 Where required by the AHJ, approved signs or other approved notices shall be provided and maintained to identify fire department access roads or to prohibit the obstruction thereof of both.

18.2.3.5.2 A marked fire apparatus access road shall also be known as a fire lane.

18.2.4* Obstruction and Control of Fire Department Access Road.

18.2.4.1 General.

18.2.4.1.1 The required width of a fire department access road shall not be obstructed in any manner, including by the parking of vehicles.

18.2.4.1.2 Minimum required widths and clearances established under 18.2.3.4 shall be maintained at all times.

18.2.4.1.3* Facilities and structures shall be maintained in a manner that does not impair or impede accessibility for fire department operations.

18.2.4.1.4 Entrances to fire departments access roads that have been closed with gates and barriers in accordance with 18.2.4.2.1 shall not be obstructed by parked vehicles.

18.2.4.2 Closure of Accessways.

18.2.4.2.1 The AHJ shall be authorized to require the installation and maintenance of gates or other approved barricades across roads, trails, or other accessways not including public streets, alleys, or highways.

18.2.4.2.2 Where required, gates and barricades shall be secured in an approved manner.

18.2.4.2.3 Roads, trails, and other access ways that have been closed and obstructed in the manner prescribed by 18.2.4.2.1 shall not be trespassed upon or used unless authorized by the owner and the AHJ.

18.2.4.2.4 Public officers acting within their scope of duty shall be permitted to access restricted property identified in 18.2.4.2.1.

18.2.4.2.5 Locks, gates, doors, barricades, chains, enclosures, signs, tags, or seals that have been installed by the fire department or by its order or under its control shall not be removed, unlocked, destroyed, tampered with, or otherwise vandalized in any manner.

18.3 Water Supplies and Fire Hydrants

18.3.1* A water supply approved by the county, capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ. For on-site fire hydrant requirements see section 18.3.3.

EXCEPTIONS:

1. When facilities or buildings, or portions thereof, are completely protected with an approved automatic fire sprinkler system the provisions of section 18.3.1 may be modified by the AHJ.
2. When water supply requirements cannot be installed due to topography or other conditions, the AHJ may require additional fire protection as specified in section 18.3.2 as amended in the code.
3. When there are not more than two dwellings, or two private garage, carports, sheds and agricultural. Occupancies, the requirements of section 18.3.1 may be modified by AHJ.

18.3.2* Where no adequate or reliable water distribution system exists, approved reservoirs, pressure tanks, elevated tanks, fire department tanker shuttles, or other approved systems capable of providing the required fire flow shall be permitted.

18.3.3* The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be provided on a fire apparatus access road on the site of the premises or both, in accordance with the appropriate county water requirements.

18.3.4 Fire Hydrants and connections to other approved water supplies shall be accessible to the fire department.

18.3.5 Private water supply systems shall be tested and maintained in accordance with NFPA 25 or county requirements as determined by the AHJ.

18.3.6 Where required by the AHJ, fire hydrants subject to vehicular damage shall be protected unless located within a public right of way.

18.3.7 The AHJ shall be notified whenever any fire hydrant is placed out of service or returned to service. Owners of private property required to have hydrants shall maintain hydrant records of approval, testing, and maintenance, in accordance with the respective county water requirements. Records shall be made available for review by the AHJ upon request.

C~ 18.3.8 Minimum water supply for buildings that do not meet the minimum County water standards:

Buildings up to 2000 square feet, shall have a minimum of 3,000 gallons of water available for Firefighting.

Buildings 2001- 3000 square feet, shall have a minimum of 6,000 gallons of water available for Firefighting.

Buildings, 3001- 6000 square feet, shall have a minimum of 12,000 gallons of water available for Firefighting.

Buildings, greater than 6000 square feet, shall meet the minimum County water and fire flow requirements.

Multiple story buildings shall multiply the square feet by the amount of stories when determining the minimum water supply.

Commercial buildings requiring a minimum fire flow of 2000gpm per the Department of Water standards shall double the minimum water supply reserved for firefighting.

Fire Department Connections (FDC) to alternative water supplies shall comply with 18.3.8 (1)-(6) of *this code.*

NOTE: In that water catchment systems are being used as a means of water supply for firefighting, such systems shall meet the following requirements:

1) In that a single water tank is used for both domestic and firefighting water, the water for domestic use shall not be capable of being drawn from the water reserved for firefighting;

2) Minimum pipe diameter sizes from the water supply to the Fire Department Connection (FDC) shall be as follows:
   a) 4" for C900 PVC pipe;
   b) 4" for C906 PE pipe;
   c) 3" for ductile Iron;
   d) 3' for galvanized steel.

3) The Fire Department Connection (FDC) shall:
   a) be made of galvanized steel;
   b) have a gated valve with 2-1/2 inch, National Standard Thread male fitting and cap;
   c) be located between 8 ft and 16 ft from the Fire department access. The location shall be approved by the AHJ;
   d) not be located less than 24 inches, and no higher than 36 inches from finish grade, as measured from the center of the FDC orifice;
   e) be secure and capable of withstanding drafting operations. Engineered stamped plans may be required;
   f) not be located more than 150 feet of the most remote part, but not less than 20 feet, of the structure being protected;
   g) also comply with section 13.1.3 and 18.2.3.4.6.1 of *this code.*

4) Commercial buildings requiring a fire flow of 2000gpm shall be provided with a second FDC. Each FDC shall be independent of each other, with each FDC being capable of flowing 500gpm by engineered design standards. The second FDC shall be located in an area approved by the AHJ with the idea of multiple Fire apparatus'conducting drafting operations at once, in mind.

5) Inspection and maintenance shall be in accordance to NFPA 25.

6) The owner or lessee of the property shall be responsible for maintaining the water level, quality, and appurtenances of the system.

EXCEPTIONS TO SECTION 18.3.8:

1) Agricultural buildings, storage sheds, and shade houses with no combustible or equipment storage.

2) Buildings less than 800 square feet in size that meets the minimum Fire Department Access Road requirements.

3) For one and two family dwellings, agricultural buildings, storage sheds, and detached garages 800 to 2000 square feet in size, and meets the minimum Fire Department Access Road requirements, the distance to the Fire Department Connection may be increased to 1000 feet.

4) For one and two family dwellings, agricultural buildings, and storage sheds greater than 2000square feet, but less than 3000 square feet and meets the minimum Fire Department Access Road requirements, the distance to the Fire Department Connection may be increased to 500 feet.

5) For buildings with an approved automatic sprinkler system, the minimum water supply required may be modified.

If there are any questions regarding these requirements, please contact the Fire Prevention Bureau at (808) 932-2911.

DARREN J. ROSARIO
Fire Chief

KV:ds

Harry Kim
Mayor

Harry S. Kubojiri
Police Chief

Paul K. Ferreira
Deputy Police Chief

County of Hawai`i

POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawai`i 96720-3998
(808) 935-3311 • Fax (808) 961-8865

December 14, 2016

Ms. Michele Lefebvre
Environmental Specialist
Stantec Consulting Services, Inc.
1239 Moku Place
Hilo, HI 96720

Dear Ms. Lefebvre:

Subject: Clarification for the Early Consultation for Environmental Assessment for Development of the Keakealani Campus of the Volcano School of Arts and Sciences, Volcano Village, Island of Hawai'i, Stantec Project Number 203703253

Staff, upon reviewing the provided documents, does not anticipate any significant impact to traffic and/or other public safety concerns.

Thank you for allowing us the opportunity to comment.

If you have any questions, please contact Captain Samuel Jelsma, Puna District Commander, at 966-2716.

Sincerely,

HENRY J. TAVARES, JR.
ASSISTANT POLICE CHIEF
AREA I OPERATIONS BUREAU

SJ:lli
160750

"Hawai`i County is an Equal Opportunity Provider and Employer"

APPENDIX 2

Cultural Impact Assessment

ASM affiliates
Archaeology • History • Ethnography • Architectural History

February 10, 2017

Michele Lefebvre, Ph.D.

Stantec Consulting Services, Inc

Email: michele.lefebvre@stantec.com

Subject: Cultural Impact Assessment for the preparation of an HRS Chapter 343 Environmental Assessment for Proposed Construction at the Volcano School for Arts and Sciences, ʻOlaʻa Ahupuaʻa, Puna District, Island of Hawaiʻi.

Dear Michele:

At the request of Stantec Consulting Services, Inc. on behalf of the Friends of the Volcano School for Arts and Sciences, ASM Affiliates (ASM) has prepared this limited Cultural Impact Assessment (CIA) for proposed construction at the Volcano School for Arts and Sciences (VSAS), ʻŌlaʻa Ahupuaʻa, Puna District, Island of Hawaiʻi (TMK: (3) 1-9-004:019) (Figures 1, and 2). The future plans for expansion and development involve site preparation and grading; construction of parking and driveway; installing infrastructure for power, water, and internet connectivity; and construction of the buildings and walkways. The campus design provides adequate teaching space, maximizes open play space, and preserves the existing historic Keakealani school house. Once completed, the Keakealani Campus will be able to accommodate up to 250 students and will consist of 16 classrooms to accommodate PreK-8th grade core, visual art, performing art, music, culture, and technology instruction; open, flexible spaces for students to work on projects; indoor and outdoor breakout spaces for small group instruction and student collaboration; STEAM labs; garden areas; covered walkways; a multi-purpose center for cafeteria services, all school assemblies, and community events; a commercial kitchen; an administrative building; staff and visitor parking; and a drop-off/pick-up roundabout. The campus design reflects the VSAS vision of a learning village surrounding a center *piko* courtyard for gathering, outdoor learning, and play. Hawaiian culture studies are already included in the school's curriculum, and will be continued at the new location.

This letter provides background information in support of an Environmental Assessment (EA) being conducted for the proposed project in compliance with HRS Chapter 343. The following cultural background information was prepared in compliance with Act 50, which, as proposed and passed as Hawaiʻi State House of Representatives Bill No. 2895 and signed into law by the Governor on April 26, 2000, states ". . . environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights . . . native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the 'aloha spirit' in Hawaiʻi. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on governmental agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups."

Below is a description of the general project area and the proposed development activities. Followed by a detailed cultural and historical background that includes a presentation of prior studies; all of which combine to provide a physical and cultural context for the project area. Finally, the consultation process is described, which includes a discussion of potential impacts to the cultural landscape and the historic and cultural properties therein as well as appropriate actions and strategies to mitigate any such impacts.

Cultural Practices and Sites

The current study area is located within Volcano Village in the southwestern corner of the traditional land division of ʻŌlaʻa in the District of Puna, near the boundary with the Keauhou in the District of Kaʻū. Tuggle and Tomonari-Tuggle (2008:32) note that the district of Puna had little distinction throughout its entire history, which was "bound up with the fortunes of the ruling families on either side" of the district

(i.e., Kaʻū and Hilo). They quote Mary Pukui's (in Barrère 1959:17) descriptions of Kaʻū as "Kaʻū Makaha" (Kaʻū-the-savage) and Puna as "Puna Kumakaha" (Puna-resembling-the savage) to indicate the ties between the two lands. By this spatial and historical association, the lands around Volcano Village are broadly linked to the vast body of legend and cultural practice associated with Pele and Kīlauea Volcano (see, for example, Kanahele 1989; Nimmo 1992). Tuggle and Tomonari-Tuggle (2008:69) describe one of these associations:

> The final reference to Pele in *The History of Kanalu* occurs in the time of Kalanuiohu (ca. late AD 1400s) and includes a chant to Pele by "Kamakauahi, one of the priests [kahuna] of Pele who lived by her yam mounds [*puʻu uhi*] of Laʻa. The guardian [*kahu*] of Pele used this appeal to worship the fire gods in accordance with the tradition of the many gods" (Nāmakaokeahi 2004:156, brackets added with words from the Hawaiian text). The reference to Laʻa may mean the voyager/demi-god Laʻa-mai-Kahiki or it may refer to a place (or to both). Pukui et al. (1974:126) indicate that Laʻa is an old name for ʻŌlaʻa, a "legendary area for collecting bird feathers." The name also shows up in the battle of Hiʻiaka with the demons of Panaʻewa where the "ohiʻa o Laʻa" is mentioned (Emerson 1993:34). This all suggests that this kahuna (a priestess) of Pele lived in or near HAVO [Hawaiʻi Volcanoes National Park] in the ʻŌlaʻa forest region.

The name ʻŌlaʻa connotes sacredness (its root being "*laʻa"* meaning sacred, holy, set apart or reserved as for sacred purposes; Pukui and Elbert 1986), and in native tradition it is a land famed for its sacred spaces, forests, birds, and *olonā* (*Touchardia latifolia*) resources (Maly and Maly 2004). Maly and Maly (2004:6) translate an ancient chant in the collection of Hoʻohila Kawelo that tells of the relationship between men and birds in the uplands of ʻŌlaʻa:

Ka Uka holo kia ahi manu ʻOlaʻa	The birds fly like flaming darts to the uplands of ʻOlaʻa,
I pa e noe ka uahi noe i ka nahele,	Where the mist and smoke darken the forest,
Nōhenohea ka makani ʻūhau pua,	Spread out by the breeze which lays out the blossoms,
He pua ʻoni ke kanaka, he mea laha ʻole...	Man is like a flower, roving about, something that is irreplaceable...

Although broadly associated with these two traditions, the current study area was developed beginning in the early twentieth century as a public school. As such, the parcel has been cleared of the surrounding forest (as has much of Volcano Village), and no traditions explicitly tie the parcel to events in various *moʻolelo* of Pele and her family. The following cultural impact assessment is based partially on other research performed by this and other authors in the Kīlauea region, and also on an informal interview with Mr. Kilona Moku Young, a Hawaiian cultural practitioner, crew member of *Hōkūleʻa*, and teacher of Hawaiian culture at Volcano School of Arts and Sciences.

A Generalized Model of Hawaiian Prehistory

Kirch (2011) and others (Athens et al. 2014; Duarte 2012; Wilmshurst et al. 2011) have convincingly argued that Polynesians may not have arrived in the Hawaiian Islands until at least A.D. 1000, but expanded rapidly thereafter, with colonists possibly from the southern Marquesas Islands. During an initial Settlement Period (A.D. 1000 to 1100), early Hawaiian farmers developed new subsistence strategies during this period, adapting familiar patterns and traditional tools for use in their new environment. Order was kept through adherence to their ancient and ingrained philosophy of life and through the principle of genealogical seniority. Hawaiians brought from their homeland a variety of Polynesian customs including the major gods

of Kane, Ku and Lono; the *kapu* system of law and order; *pu'uhonua* or places of refuge or asylum; the *'aumakua* concept of a family or ancestral spirit and the concept of *mana*.

The subsequent Developmental Period (A.D. 1100 to 1350) brought changes that included an evolution of traditional tools as well as some distinctly Hawaiian inventions. The evolution of the adze was an example of the former, while the latter included the two-piece fishhook and the octopus-lure breadloaf sinker. Another invention was the lei niho palaoa, an item worn by those of high rank and symbolized a trend toward greater status differentiation

The Expansion Period (A.D. 1350 to 1650) is characterized by the greatest social stratification, major socioeconomic changes, and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands were settled and the more marginal leeward areas were being developed. The greatest population growth occurred during the Expansion Period. It was during the Expansion Period that a second major migration settled in Hawai'i, this time from Tahiti in the Society Islands. According to Kamakau (1976), the *kahuna* Pā'ao settled in the islands during the 13th century, arriving first in Puna before settling in Kohala.

The concept of the *ahupua'a* was established sometime during the A.D. 1400s, adding another component to a then well-stratified society (Kirch 1985). *Ahupua'a* were usually wedge or pie-shaped, incorporating all of the eco-zones from the mountains to the sea and for several hundred yards beyond the shore, assuring a diverse subsistence resource base (Hommon 1986). This land unit became the equivalent of a local community with its own social, economic and political significance. The *ahupua'a* were further divided into smaller sections such as the *'ili, mo'o'aina, pauku'aina, kihapai, koele, hakuone,* and *kuakua* (Hommon 1986; Pogue 1978). The chiefs of these land units gave their allegiance to a territorial chief or *mō'ī* (king). 'Ōla'a, in which the current study area is located, was traditionally administered as a *kalana*, a discrete land unit larger than an *ahupua'a* but smaller than a district (*moku o loko*) and comprised of several other land divisions that contributed to its wealth. As Maly and Maly (2004:6) explain, "the land of 'Ōla'a stood alone, almost independent of the other lands adjoining it in Puna, though it had no ocean frontage — being cut off by Kea'au and Waiākea." 'Ōla'a was reserved for the reigning monarch, as the forest resources were exploited for the birds of the area, whose feathers made fabulous cloaks "reserved exclusively for the king of a whole island" as his battle or ceremonial cloak (Takamoto 1976). Sandalwood as well as cordage made from *mamaki* and *olonā* were also prized forest resources of the area.

An increase in war marked the Proto-Historic Period (A.D. 1650-1795), both locally and between islands. Hawai'i's history took a sharp turn on January 18, 1778 with the arrival of British Captain James Cook in the islands. On a return trip to Hawai'i ten months later, with the Maui turmoil still raging, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawai'i Island. Cook exchanged gifts with Kalaniopu'u at Kealakekua Bay the following January, and Cook left Hawai'i in February. However, Cook's ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealakekua, setting the stage for his death on the shores of the bay.

The following year, in 1780, Kalaniopu'u designated his son, Kiwalao, to be his successor, and granted Kamehameha guardianship of the war god Kuka'ilimoku. When it appeared Kiwalao was not honoring his land claims, Kamehameha usurped Kiwalao's authority with a sacrificial ritual and retreated to his district of Kohala where he farmed the land, growing taro and sweet potatoes. Civil war broke out when Kalaniopu'u died in 1782 and Kiwalao was killed. The wars between Maui and Hawai'i Island would continue until 1795.

By 1796, Kamehameha had conquered every island kingdom except Kauai, but it wasn't until 1810, after Kaumuali'i of Kauai pledged his allegiance to Kamehameha, that all of the Hawaiian Islands were unified under a single ruler. Subsequently there was a continuation of the trend toward intensification of agriculture, *ali'i*-controlled aquaculture, settling of upland areas and development of traditional of oral history. However, the western influence was being felt in the introduction of trade for profit and a market-system economy. By 1810, the sandalwood trade established by Europeans and Americans twenty years earlier

was flourishing. That contributed to the breakdown of the traditional subsidence system, as farmers and fishermen were required to toil at logging which resulted in food shortages and a decline in population.

Following the death of Kamehameha I in 1819, the relaxing of customary *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. The family worship of *'aumakua* images was allowed to continue. The Protestant missionaries who arrived from Boston in 1820 soon were rewarded with land and government positions as many of the *ali'i* were eager to assimilate western-style dress and culture. But at the same time, the continuing sandalwood trade was becoming a heavier burden on commoners. The rampant sandalwood trade resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of Western ways continued with the short-lived whaling industry to the production of sugarcane, which was more lucrative but carried a heavy environmental price.

Upland 'Ōla'a and Puna-Ka'ū Region

Theodore Kelsey, a historian born in Hilo in the late 1800s, recorded that 'Ōla'a was a land of bird catchers (Maly and Maly 2004). In 1921, many of the traditional bird catching techniques specific to 'Ōla'a and the Hilo area were related to him by an elder Hawaiian man named Rev. Henry B. Nālimu, who was born in Hilo in 1835. The feathers were used to make lei, cloaks, and other emblems of Hawaiian royalty. The 'ō'ō, 'i'iwi, 'ō'ū and 'akakane were the specific birds mentioned in the accounts of Rev. Nālimu. Bird catching also figures in the tradition of Pikoiaka'alalā, written by S. M. Kaui and printed in the Hawaiian language newspaper Ku Okoa between December 16, 1865 and March 10, 1866 (translated by Kepā Maly), provides detailed narratives describing customary practices in the upland forests of 'Ōla'a (see Maly and Maly 2004:8–19).

The collection and cultivation of olonā and māmaki (Pipturus sp.) within the forested regions of 'Ōla'a was practiced in more traditional times. According to Ellis (1963) the people of 'Ōla'a were famed for their fine māmaki. which could be processed to make a durable barkcloth and highly valuable cordage. Native Hawaiians would obtain wood from 'ōhi'a and koa trees from 'Ōla'a's forests (Ellis 1963), and later they exploited it for sandalwood (Santalum paniculatum) during the early decades of the nineteenth century (Stewart 1833). Handy et al. (1991) also describe the practice planting banana, ti and taro as well as yams along streams and trails in the forest to provide a supplemental food source in times of drought or crop failure.

Written accounts describing lands in the vicinity of 'Ōla'a contained in the journals, letters, and articles of many of the early European visitors to Hawai'i Island (see Maly and Maly 2004) typically describe the trailside lands as the visitors passed through the area on their way between Hilo and Kīlauea or Mauna Loa. The most traveled route between Hilo and Kīlauea was the Volcano Trail. McEldowney (1979), citing several historical sources (Bloxam 1925; Douglas 1914; Ellis 1963; Macrae 1922; Pickering 1840; Stewart 1833), describes this trail sparsely populated during the first part of the nineteenth century, with the occasional small village located along the trail. The historic accounts do not mention any such village in the current location of Volcano Village During the *Māhele 'Aina* of 1848, all lands were divided among three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. As a result of the *Māhele* of 1848, the *kalana* of 'Ōla'a was distributed to Kaunuohua, who relinquished the land to the king (Soehren 2005), who then retained 'Ōla'a as Crown Land. All lands awarded during the *Māhele* were subject to the rights of the native tenants therein, who could could claim, and acquire title to, *kuleana* parcels that they actively lived on or farmed. In Puna, however, very few claims for *kuleana* were submitted. Only one Land Commission claim was made for a *kuleana* within 'Ōla'a, but it was not awarded (Maly and Maly 2004). In conjunction with the *Māhele* of 1848, the King authorized the issuance of Royal Patent Grants to applicants for tracts of land, larger than those generally available through the

Land Commission. The process for applications was clarified by the "Enabling Act," which was ratified on August 6, 1850. The Act resolved that portions of the Government Lands established during the *Māhele* should be set aside and sold as grants. Despite the stated goal this program to enable native tenants to purchase lands of their own, in reality many of the Government Lands were sold or leased to foreigners. The Enabling Act set a precedence for the legal framework within which ʻŌlaʻa would be divided into homestead lots and sold as grants after the overthrow of the monarchy.

In the decades following the *Māhele*, economic interests in the region swiftly changed from traditional Hawaiian subsistence farming and regional trading networks to the gathering or growing of export cash crops such as the short-lived *hapuʻu pulu* boom in the 1860s. More successful ventures included coffee, tobacco, sugar, timber, and pineapple, and also dairy farming and cattle ranching. A critical step toward developing agriculture in ʻŌlaʻa was the creation of a modern road between Hilo and Kīlauea located *mauka* of the Volcano Trail. Although Kīlauea had become a viable tourist destination by the 1860s, poor roads to the volcano were thought to deter visitors from staying longer. In 1888, the government appropriated $30,000 for a new carriage road between Hilo and Volcano that became today's Volcano Highway (Duensing 2015). Work on the road began in 1890 using mainly prison labor, and in September of 1894 the entire road was completed. The Volcano House Company, which had been formed in 1891, acquired the Volcano House at the rim of Kīlauea crater, and had a new and larger hotel constructed. The Company also purchased the Punaluʻu Hotel and made its previous owner, Peter Lee, manager of both the Punaluʻu Hotel and the Volcano House. Lee would remain as manager of the Volcano House until 1898.

Peter Lee established a home on land near the center of the ʻŌlaʻa Summer Lots 29-Mile subdivision, which later become Volcano Village. Paul Lee, a descendant of Peter Lee, recalled that Haunani Street, which borders the parcel, was named for one of Peter Lee's daughters (Reeve and Cleghorn 2014). Lee purchased the parcel from the Government in 1912 as Land Grant 5461. In 1914, Lee donated a one-acre portion of this Volcano property to the Territorial Board of Education so that a school could be established for the children of Volcano. Constructed around 1915, the original school building was a one-room school house. The school (Keakealani School Lot Executive Order No. 1040) was named for Keakealani Lee, another of Lee's daughters. Other structures built about this time included an outbuilding and a residence for teachers who came up from Hilo by horse and stayed overnight. The Keakealani School was established as a Public Education School in 1920, teaching grades Kindergarten through 8th grade. Expansion of the school around 1933 included the construction of the present school building and the addition of land from the adjacent lot (Figure 3). The school continued to operate until 1974, when it was closed, and the Volcano area children were sent to the larger school at Mountain View. In 1975, the campus was put back into use as an educational center, and in 1979 the Keakealani Outdoor Education Center (KOEC) was established to serve as an environmental residential camp for sixth graders from schools throughout the state (Wilkinson et al. 2009). KOEC was closed in 2009 due to funding restrictions, and the State considered converting the school building into an office (Reeve and Cleghorn 2014).

Cultural Resources and Practices Related to the Keakealani Campus site

Before the establishment of Volcano Village, the site of the VSAS's Keakealani Campus was located in dense rainforest where few people traditionally lived, but would visit to obtain materials needed for many things such as voyaging, housing, spiritual and medicinal practices, clothing, adornments resources. The settlement of Volcano Village beginning in the eighteenth century, however, altered this forested landscape. The creation of houselots, the construction of Peter Lee's house, and the use of the subject parcel as a school in the twentieth century removed these native resources, leaving what is now a grass-covered field (see Figure 2).

An informal interview regarding the project's impacts to cultural resources and practices was conducted on January 18, 2017, at ASM's offices in Hilo with Mr. Kilona Moku Young, a Hawaiian cultural practitioner, *Hōkūleʻa* crew member, and the *ʻike Hawaiʻi Kumu* (teacher of Hawaiian knowledge) at the VSAS. Mr. Young began the interview by stating that while he was unaware of traditional cultural resources, practices, or beliefs associated with the Keakealani Campus parcel, the construction of the campus would in fact "add

culture to an empty area." The new campus, he stated, would provide a permanent venue for the perpetuation of Hawaiian culture through elements of the VSAS curriculum as well as community activities that could be held at the campus. He offered as an example the VSAS's current practice of digging an *imu* for school functions. The current campus does not have a permanent location for the *imu*, nor is the school able to store materials for the *imu*. Mr. Young has been asked by the project's architect to provide input regarding a permanent *imu* location at the school. Mr. Young has also been asked for input regarding vegetation and a school garden, which he intends to be focused on native species and to provide a means of teaching students about native plants and their uses. He also noted that the increased parking capacity of the new campus would allow make it easier for the school to host their *makahiki* celebration, which he describes as an opportunity for the school and the community to interact. Mr. Young notes that what is currently missing from the VSAS is a place to come together, where, for example, his culture class can invite kūpuna in to share Hawaiian knowledge with his students. The new campus, in his opinion, will create such a center.

Impacts and Mitigation Measures

The positive impacts of the proposed action on traditional Hawaiian cultural practices, resources, and beliefs are best summarized by Mr. Young's statement that building the new Keakealani Campus will add culture to an essentially empty area. The plans for the new campus will create a permanent venue where Hawaiian traditional practices can be perpetuated and shared with the Volcano community. Other plans include the installation of a school garden to grow native Hawaiian plants, passing on traditional knowledge of their cultivation and use. Thus, valued natural, cultural and historical resources still present in the Kīlauea region will be honored and utilized by the Volcano School of Arts and Science, which represents a significant cultural benefit. No adverse impacts have been identified. No caves, springs, *pu'u*, gathering resources, archaeological sites, burial sites for *'iwi kūpuna*, or other features that might be adversely affected are present on or near the project site; therefore no mitigation measures are necessary.

Sincerely,

Benjamin Barna, Ph.D.

Senior Archaeologist

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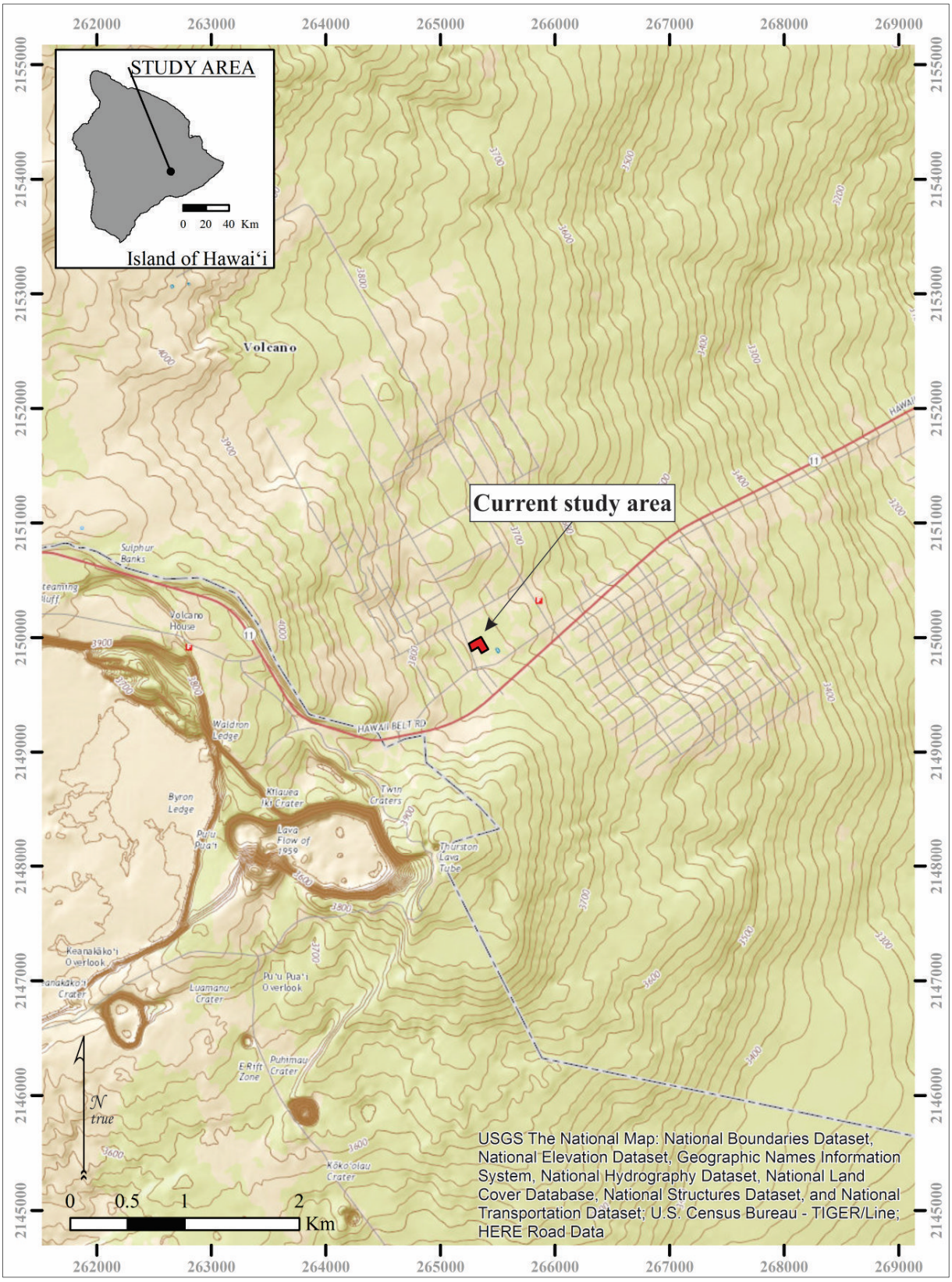

Figure 1. Current study area location.

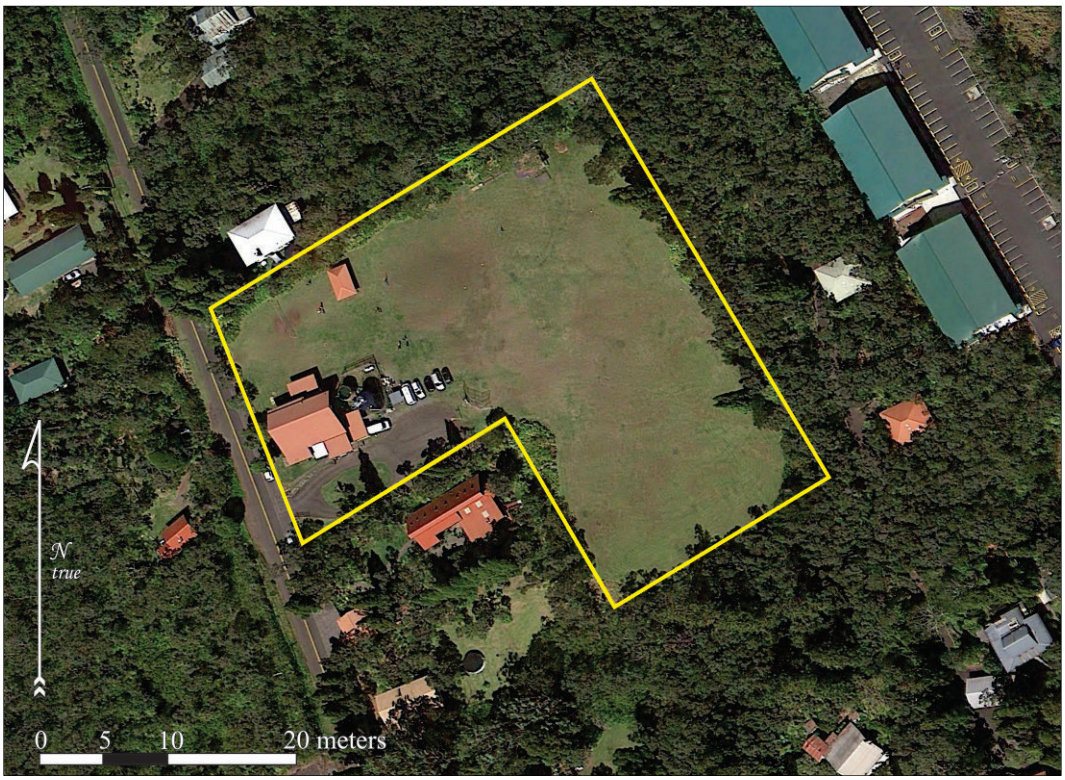

Figure 2. GoogleEarth™ image of the current study area.

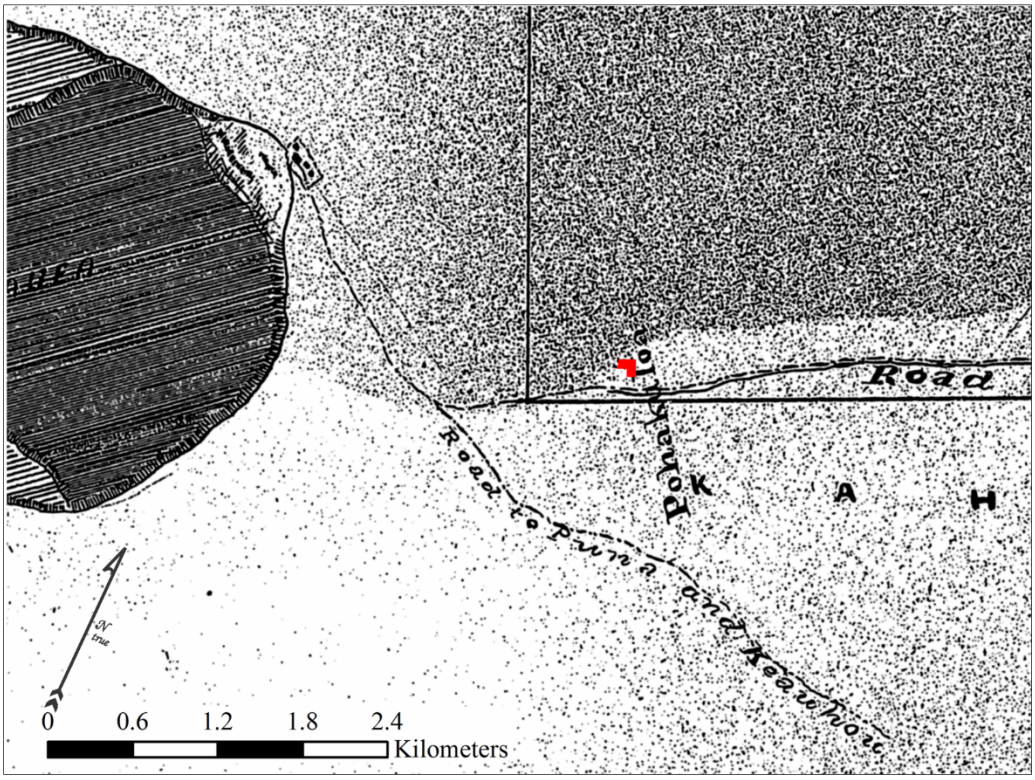

Figure 3. Portion of Registered Map 42 (current study area shaded red.)

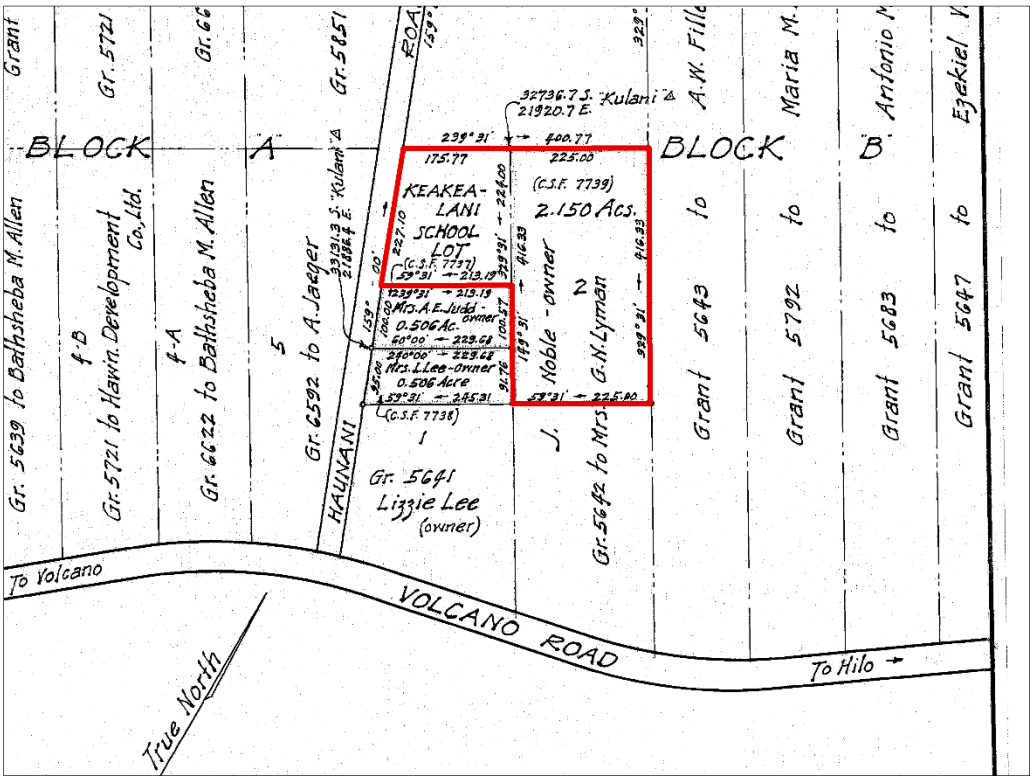

Figure 4. Portion of a map accompanying C.S.F. 7737, 7738, and 7739 for the expansion of the Keakealani School Lot prepared in 1936 (current lot boundaries outlined in red.)

APPENDIX 3

Traffic Impact Assessment Report

A I N A E N G I N E E R S I N C.

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County of Hawaii Planning Department
101 Pauahi Street, Suite 3 (Attn: Jeff Darrow)
Hilo, HI 96720

SUBJECT: Traffic Impact Assessment Report (TIAR) short form
LOCATION: 19-4024 Haunani Road, Volcano, HI 96785
PARCEL TAX MAP KEY (TMK): (3) 1 – 9 - 004 : 019 (portion)
OWNER: State of Hawaii
TENANT: Volcano School of Arts & Sciences
SPECIAL PERMIT NO.:_____

Aina Engineers Inc. has prepared the following traffic study for a proposed charter school (Volcano School of Arts & Sciences (VSAS) the "project") to operate on the subject TMK.

This report is presented in the following format:

A. Project Location and Description
B. Purpose and Objective of Study
C. Methodology
D. Description of Existing Streets and Intersection Controls
E. Existing Peak Hour Traffic Volumes
F. Level-of-Service Concept
G. Existing Levels-of-Service
H. Project Trip Generation
I. Impact Analysis of Existing Conditions
J. Mitigation
K. Summary and Conclusions

A. Project Location and Description

The project is located within the town of Volcano, Hawaii. Volcano is a census-designated place. The approximate location is shown on an Island and Tax Map, provided as Attachments 1 and 2, respectively. The project is located off Haunani Road. See Attachment 3 for the project map. The Lee Family donated the land (subject parcel of this study) in 1914 as a school for the children of Volcano. The Keakealani School was closed in 1974 and subsequently converted into a Hawaii Department of Education (HIDOE) Outdoor Education Center which closed in 2009 due

to funding restrictions. In June 2010, VSAS entered into a lease agreement with the HIDOE for the facility.

Typical project generated traffic will be discussed in part E of this report.

The project is a charter school, with a past State Public Charter School Contract of 2013-2014, and a current contract of 2014-2017. Grades served are K-8, with a acknowledged enrollment of 174 and 28 staff.)[1]. The project vision is "learning through Volcano's unique and cultural resources today to become creative global citizens tomorrow." For additional information about the project, visit http://volcanoschool.com/.

B. Purpose and Objective of Study

Quantify and describe the traffic related characteristics of the proposed project.

Identify potential deficiencies adjacent to the project that will impact traffic operations in the vicinity of the proposed project.

C. Methodology

1. Define the Study Area

The study area includes the anticipated traffic routes, which would involve Highway 11 (Mamalahoa Hwy), Volcano Road, and Haunani Road. The intersection of Volcano Road and Haunani Road will be the specific study area; see Attachment 4.

VSAS is proposing to move the remaining students and faculty from their present location (Volcano Road Campus) at 99-128 Old Volcano Road, to a campus on Haunani Road (Keakealani Campus) at 19-4024 Haunani Road where approximately 33% of the entire student body is already located.

2. Analyze Existing Traffic Conditions

The intersection configuration and right-of-way controls were determined from a field reconnaissance of the project area. The intersection of Old Volcano Road and Haunani Road is not signalized. Existing traffic operating conditions of the study intersection were determined using the methodology described in the 2000 *Highway Capacity Manual* (HCM)[2].

Haunani Road is 40-ft right of way, featuring a paved 20-ft wide two lane road, which is approximately two miles long and dead ends into the woods. Shoulders are graded earth. A paved one car wide parking strip fronts the subject parcel at

[1] http://www.chartercommission.hawaii.gov/#!volcano-school-of-arts--sciences-pcs/c13ze

[2] Institute of Transportation Engineers, Highway Capacity Manual, Washington D.C., 2000

Haunani Road. It is used to load and unload students at the facility. There are 35 full-time occupied and 17 part-time occupied residences located along the road.

3. Estimate Project-Related Traffic Characteristics

Typically, the number of peak-hour trips that the proposed project will generate is estimated using standard trip generation procedures outlined in the *Trip Generation Manual*[3] and data provided in *Trip Generation*. This method is used in part H and summarized in Table 1, below.

4. Analyze Project-Related Traffic Conditions

The project area, entrance, and associated parking are existing.

VSAS currently has an enrollment of 174 students and 28 staff split between the two campuses identified above. Enrollment is not projected to change. The project proposes to move approximately 125 students presently using the Volcano Road Campus and their faculty to a newly built campus augmenting the historic Keakealani school located on the subject parcel.

The HCM methodology should be used to conduct a level-of-service analysis of the proposed project following the start of project operations and associated traffic conditions during times of operation. The engineer should be called upon by either the Owner/Principal or Planning Director to provide such real-time analysis of conditions.

D. Description of Existing Streets and Intersection

The intersection control and focus of this study is that of Haunani Road and Old Volcano Road. The intersection is a two (2) way stop, with Haunani Road being stop controlled.

E. Existing Peak Hour Traffic Volumes

Peak Hours are defined as 7:00-8:00am (drop-off) and 2:00-2:45pm (pick-up). Manual traffic counts were accomplished between the hours of 6:00-8:15am and 2:00-2:45pm on the dates of 5-8 May, 2015 of all movements occurring at the study intersection. This data is presented in Attachment 4. Manual counts were also conducted of traffic passing the existing campus entrance driveways, presented on the next page: Table 1. Anticipated counts factor in the trip generation (calculated in part H.).

[3] Institute of Transportation Engineers, Trip Generation Manual, Washington D.C., 2012

Table 1 – Traffic Count at Driveway Entrances				
Entrance/Campus	Old Volcano Road		Keakealani	
	AM	PM	AM	PM
Existing Counts	19	37	29	23
Anticipated Counts	NA	NA	63	57

The associated Level-of-Service and project impact is presented in the following sections.

F. Level-of-Service Concept

Level-of-service (LOS) is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. LOS is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively.

The method for determining LOS for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgment in selecting gaps through which to execute a desired maneuver. The criteria for LOS at an unsignalized intersection is therefore based on delay of each turning movement. Table 2 (from the Highway Capacity Manual, 2000)[4] summarizes the definitions for LOS and the corresponding delay. See next page.

In general, LOS-A represents free-flow conditions with no congestion. LOS-F, on the other hand, represents severe congestion with stop-and-go conditions. LOS-D is typically considered acceptable for peak hour conditions in urban areas.

[4] Institute of Transportation Engineers, Highway Capacity Manual, Washington D.C., 2000

Table 2 Level-of-Service Definitions for Unsignalized Intersections[1]

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

G. Existing Levels-of-Service

The existing levels-of-service were estimated using the methodology described in the *Highway Capacity Manual* and based upon the data collected from traffic counts conducted 5-8 May, 2015. The results of the LOS analysis are summarized in Table 3. All movements currently operate at LOS-A.

Table 3 - Existing Levels of Service

Intersection and Movement	AM Peak Hour		PM Peak Hour	
	Delay[1]	LOS[2]	Delay[1]	LOS[2]
Haunani Road and Old Volcano Road				
Eastbound (Left)	0-5 seconds	A	0-10 seconds	A
Westbound (Right)	0-5 seconds	A	0-5 seconds	A
North/Southbound (Straight)	0-5 seconds	A	0-10 seconds	A

NOTES:
(1) Delay in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. LOS is based on delay.

H. Project Trip Generation

Traffic volumes generated by the project can be estimated using the procedures described in the *Trip Generation Manual* and data provided in *Trip Generation*. This uses trip generation rates to estimate the number of trips that the project will generate during the peak hours of the project.

The following variables were used for the trip generation analysis: Total project area is 3.15 acres, which will be home to approximately 11,760-square feet of school facilities. Per the Trip Generation Manual – Institute of Transportation Engineers (ITE) Trip Generation Rates – 9th edition, and for the proposed use (Kindergarten through 8th grade) Land Use (LU) Codes 520, 522, or 536 could be applied. For example, projecting LU 536, (174 students+28 staff=202) * 0.17 (trips/unit) = 34.34 = 34 trips. Comparing that to LU 520 (1.21 trips per 1000-square feet) yields 14 trips. The higher projection will be used and is summarized in Table 1 (see part E., top of previous page).

I. Impact Analysis of the Project generated traffic

The impacts of the project should be assessed by performing a LOS analysis of the study and approach intersections following project opening and operations as stated in part C.4. The anticipated impacts of the project generated traffic should not decrease the existing LOS experienced at the intersection of Haunani Road and Old Volcano Road.

J. Mitigation

The project operators shall be responsible to obey and enforce all traffic laws and to promote a safe, pedestrian friendly environment. Project drivers shall have a Commercial Driver's License (CDL). Crossing guards, signage and other safety precautions shall be provided as necessary or instructed by designated officials. The Engineer reserves the right to make changes to the traffic study and recommendations as the project progresses. No mitigation is warranted for existing conditions.

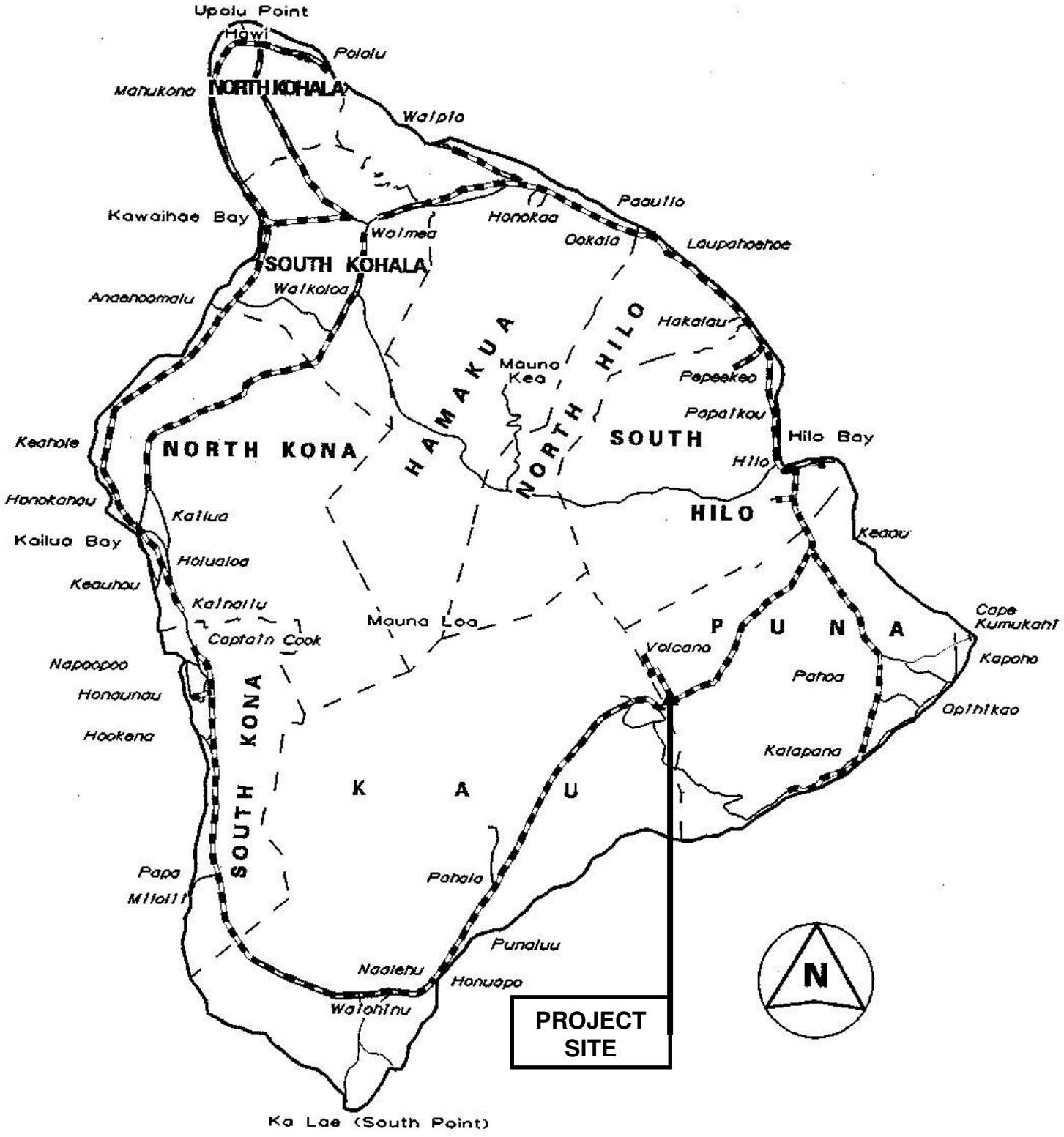
K. Summary and Conclusions

The conclusions of this short form TIAR:

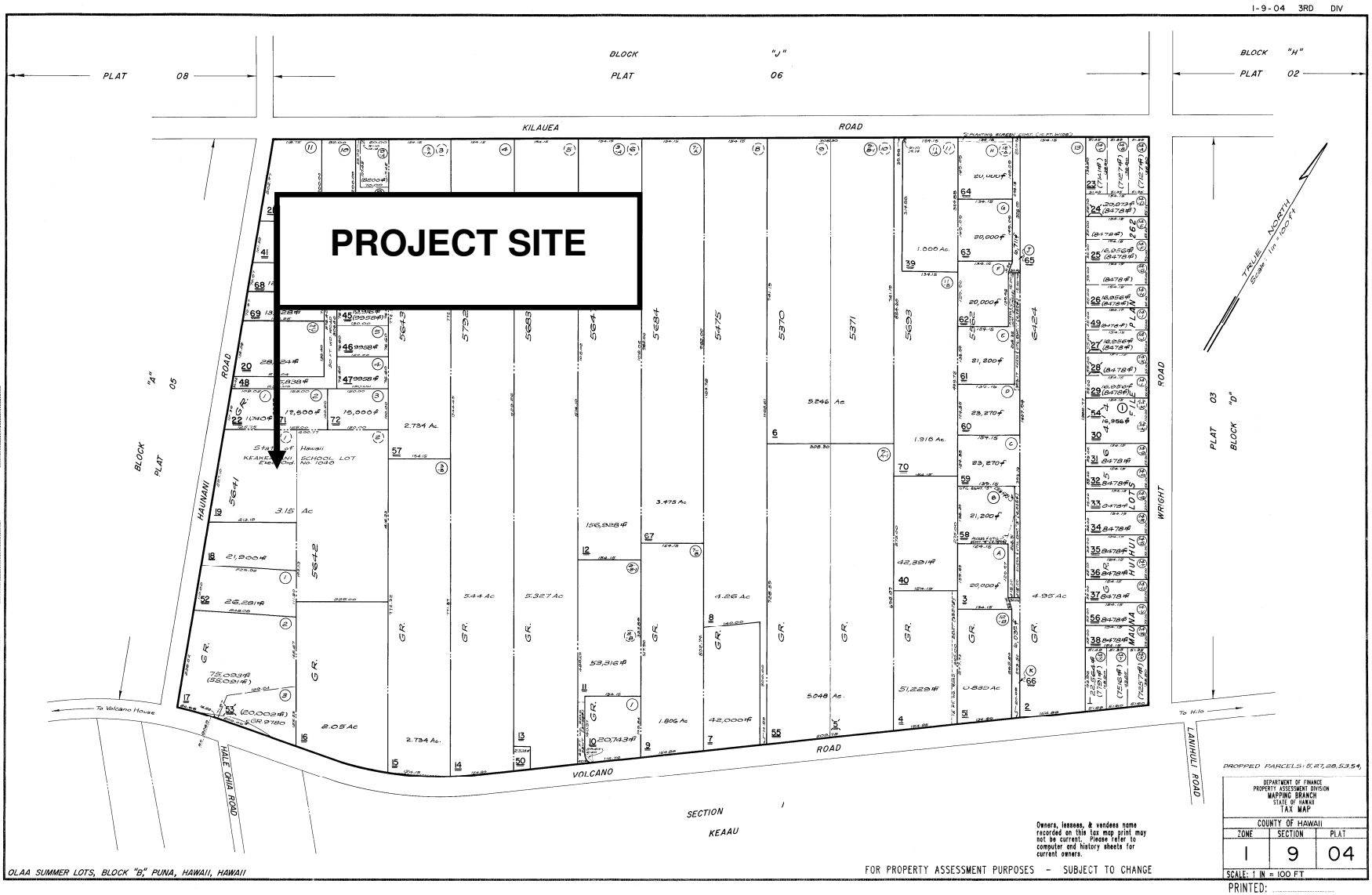
1. As provided in parts E and H, the anticipated traffic generation increase is 34 trips to and from the project from surrounding areas. Historic Traffic Data Station maps and counts are provided as Attachment 5.

2. The study and approach intersections should continue to operate at LOS-A. Accordingly, no mitigation is required or recommended. There are no anticipated deficiencies adjacent to the project that will impact traffic operations in the vicinity of the proposed project.

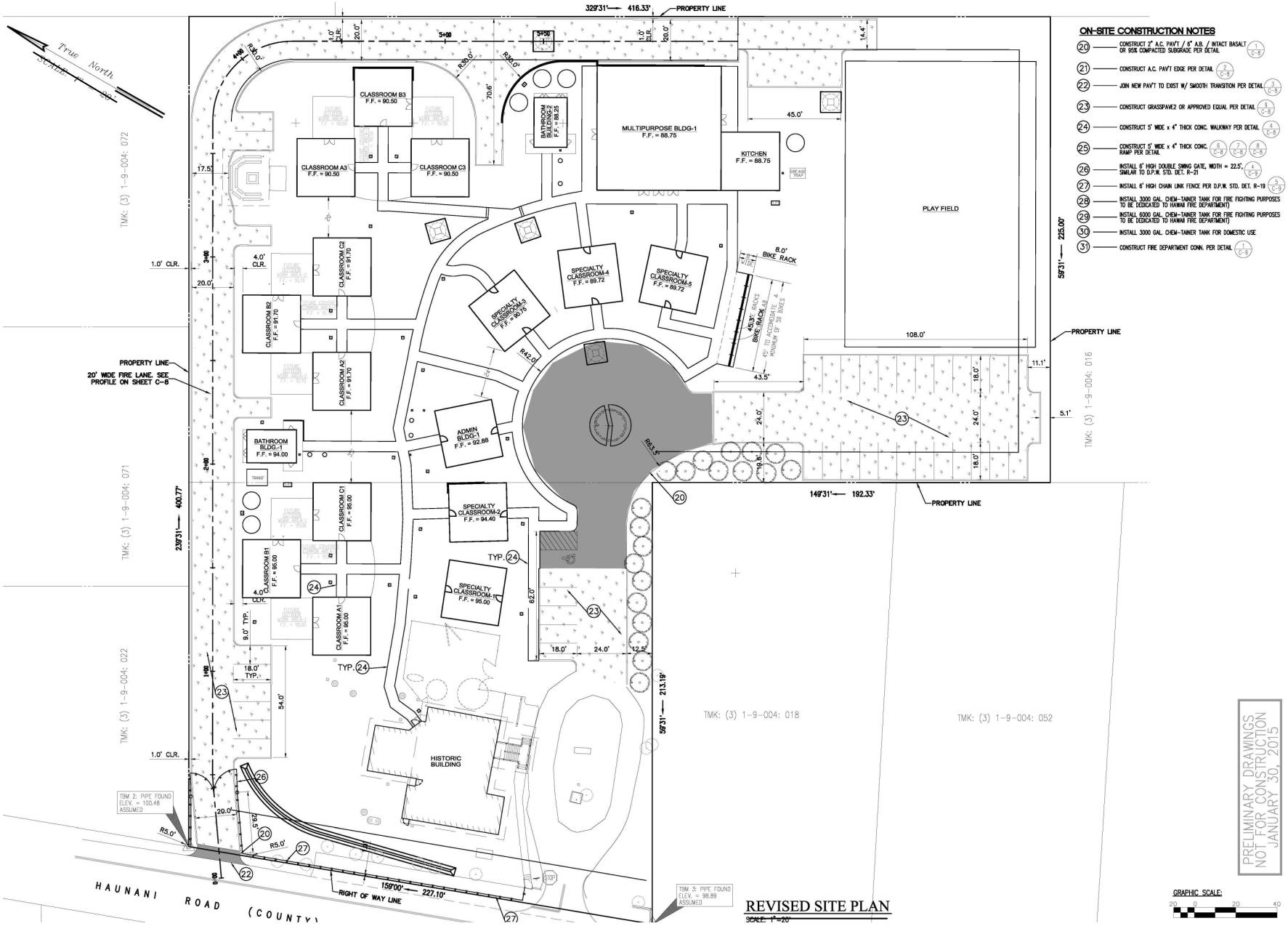
3. The project's civil engineer has confirmed that adequate sight distances are provided along the anticipated traffic routes. The engineer should be retained and consulted following the start of project operations to observe traffic impacts and to recommend any mitigation, if necessary.



PETER J.K. DAHLBERG, P.E. PDAHLBERG@HAWAII.RR.COM (808) 895-6173	ISLAND MAP Volcano School of Arts & Sciences 19-4024 Haunani Road Volcano, HI 96785	1



PETER J.K. DAHLBERG, P.E.	LOCATION MAP	2
PDAHLBERG@HAWAII.RR.COM (808) 895-6173	Volcano School of Arts & Sciences (3) 1 – 9 – 004 : 019	



PETER J.K. DAHLBERG, P.E.

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PROJECT MAP

Volcano School of Arts & Sciences

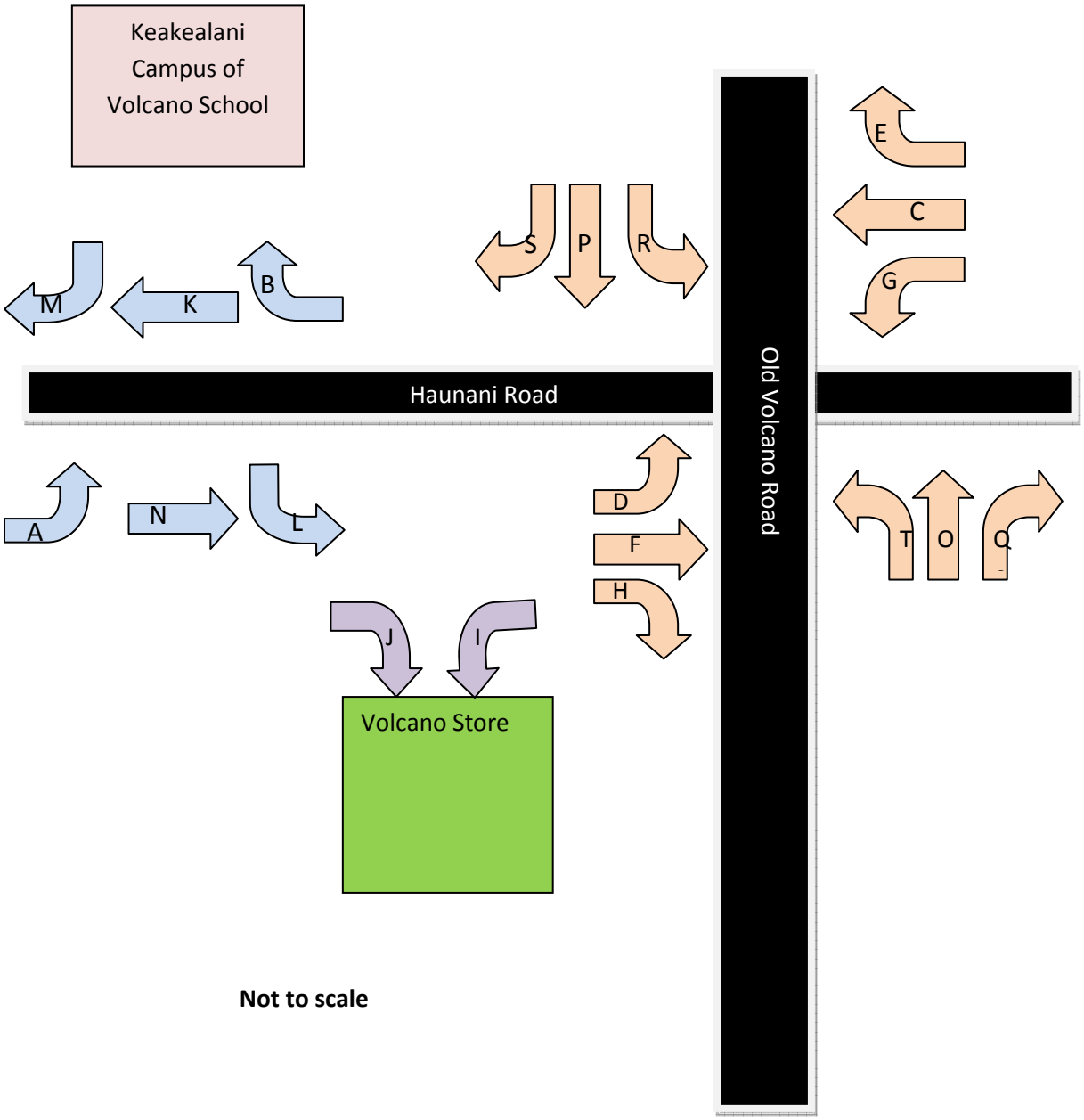
(3) 1 – 9 – 004 : 019

Friends of Volcano School of Arts & Sciences

Traffic Study

May 6-8, 2015

Old Volcano Road and Haunani Road Intersection



Not to scale

PETER J.K. DAHLBERG, P.E. PDAHLBERG@HAWAII.RR.COM (808) 895-6173	STUDY MAP Volcano School of Arts & Sciences 19-4024 Haunani Road Volcano, HI 96785	4

Haunani to Keakealani Campus 5/6/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
6:00 AM	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	
6:15 AM	1	4	0	0	5	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	
6:30 AM	0	3	0	0	3	0	0	0	0	0	0	5	1	0	6	2	0	0	0	2	
6:45 AM	0	5	0	0	5	0	0	0	0	0	0	1	1	1	3	0	0	1	0	1	
Total	1	18	0	0	19	0	0	0	0	0	0	13	3	1	17	2	0	1	0	3	
7:00 AM	1	4	0	0	5	0	0	0	0	0	0	0	2	0	2	1	0	1	0	2	
7:15 AM	1	5	0	0	6	0	0	0	0	0	0	3	8	0	11	5	0	0	0	5	
7:30 AM	1	10	0	0	11	0	0	0	0	0	0	4	4	2	10	5	0	2	0	7	
7:45 AM	1	5	0	0	6	0	0	0	0	0	0	1	4	1	6	3	0	1	0	4	
Total	4	24	0	0	28	0	0	0	0	0	0	8	4	3	15	14	0	4	0	18	
8:00 AM	1	5	0	0	6	0	0	0	0	0	0	3	2	0	5	2	0	1	0	3	
8:15 AM	0	5	0	0	5	0	0	0	0	0	0	3	3	3	9	1	0	1	0	2	
Total	1	10	0	0	11	0	0	0	0	0	0	6	5	3	14	3	0	2	0	5	
Grand Total	6	52	0	0	58	0	0	0	0	0	0	27	12	7	46	17	0	6	0	0	104
Apprch %	10%	90%	0%	0%		0%	0%	0%	0%		0%	59%	26%	15%		16%	0%	6%	0%		
Total %	6%	50%	0%	0%	56%	0%	0%	0%	0%	0%	0%	26%	12%	7%	44%	16%	0%	6%	0%	0%	

Haunani to Keakealani Campus 5/7/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
6:00 AM	0	4	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6:15 AM	0	8	0	0	8	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	
6:30 AM	3	7	0	0	10	0	0	0	0	0	0	1	3	0	4	2	0	0	0	2	
6:45 AM	2	6	0	0	8	0	0	0	0	0	0	1	2	1	4	0	0	0	0	0	
Total	5	25	0	1	31	0	0	0	0	0	0	3	5	1	9	2	0	0	0	2	
7:00 AM	0	8	0	0	8	0	0	0	0	0	0	1	4	0	5	1	0	0	0	1	
7:15 AM	3	7	0	0	10	0	0	0	0	0	0	3	6	0	9	5	0	0	0	5	
7:30 AM	1	10	0	0	11	0	0	0	0	0	0	5	9	2	16	5	0	0	0	5	
7:45 AM	2	6	0	2	10	0	0	0	0	0	0	5	6	1	12	3	0	3	0	6	
Total	6	31	0	2	39	0	0	0	0	0	0	14	4	3	21	14	0	3	0	17	
8:00 AM	1	2	0	0	3	0	0	0	0	0	0	5	2	0	7	2	0	3	0	5	
8:15 AM	1	1	0	0	2	0	0	0	0	0	0	1	2	3	6	1	0	1	0	2	
Total	2	3	0	0	5	0	0	0	0	0	0	6	4	3	13	3	0	4	0	7	
Grand Total	13	59	0	2	75	0	0	0	0	0	0	23	13	7	43	17	0	7	0	0	118
Apprch %	17%	79%	0%	3%		0%	0%	0%	0%		0%	53%	30%	16%		14%	0%	6%	0%		
Total %	11%	50%	0%	2%	64%	0%	0%	0%	0%	0%	0%	19%	11%	6%	36%	14%	0%	6%	0%	0%	

Haunani to Keakealani Campus 5/8/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
6:00 AM	0	9	0	1	10	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	
6:15 AM	0	5	0	0	5	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	
6:30 AM	0	14	0	0	14	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	
6:45 AM	0	5	0	0	5	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	
Total	0	33	0	1	34	0	0	0	0	0	0	6	3	0	9	0	0	0	0	0	
7:00 AM	0	9	0	1	10	0	0	0	0	0	0	2	4	0	6	0	0	0	0	0	
7:15 AM	2	6	0	0	8	0	0	0	0	0	0	6	10	1	17	7	0	2	0	9	
7:30 AM	2	10	0	0	12	0	0	0	0	0	0	8	11	0	19	8	0	1	0	9	
7:45 AM	1	4	0	0	5	0	0	0	0	0	0	2	13	0	15	7	0	2	0	9	
Total	5	29	0	1	35	0	0	0	0	0	0	18	38	1	57	22	0	5	0	27	
8:00 AM	2	6	0	1	9	0	0	0	0	0	0	5	4	4	13	6	0	3	0	9	
8:15 AM	0	10	0	0	10	0	0	0	0	0	0	1	2	0	3	3	0	1	0	4	
Total	2	16	0	1	19	0	0	0	0	0	0	6	6	4	16	9	0	4	0	13	
Grand Total	7	78	0	3	88	0	0	0	0	0	0	30	47	5	82	31	0	9	0	0	170
Apprch %	8%	89%	0%	3%		0%	0%	0%	0%		0%	37%	57%	6%		18%	0%	5%	0%		
Total %	4%	46%	0%	2%	52%	0%	0%	0%	0%	0%	0%	18%	28%	3%	48%	18%	0%	5%	0%	0%	

ALL DAYS	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
Peak Hour Analysis from 6:00 AM to 8:30 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 7:00 AM																					
6:00 AM	0	19	0	2	21	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	
6:15 AM	1	17	0	0	18	0	0	0	0	0	0	4	2	0	6	0	0	0	0	0	
6:30 AM	3	24	0	0	27	0	0	0	0	0	0	8	4	0	12	4	0	0	0	4	
6:45 AM	2	16	0	0	18	0	0	0	0	0	0	3	5	2	10	0	0	1	0	1	
Total	6	76	0	2	84	0	0	0	0	0	0	23	11	2	36	4	0	1	0	5	125
7:00 AM	1	21	0	1	23	0	0	0	0	0	0	3	10	0	13	2	0	1	0	3	
7:15 AM	6	18	0	0	24	0	0	0	0	0	0	12	24	1	37	17	0	2	0	19	
7:30 AM	4	30	0	0	34	0	0	0	0	0	0	17	24	4	45	18	0	3	0	21	
7:45 AM	4	15	0	2	21	0	0	0	0	0	0	8	23	2	33	13	0	6	0	19	
Total	15	84	0	3	102	0	0	0	0	0	0	40	81	7	128	50	0	12	0	62	292
8:00 AM	4	13	0	1	18	0	0	0	0	0	0	13	8	4	25	10	0	7	0	17	
8:15 AM	1	16	0	0	17	0	0	0	0	0	0	5	7	6	18	5	0	3	0	8	
Total	5	29	0	1	35	0	0	0	0	0	0	18	15	10	43	15	0	10	0	25	103
Total Volume	**26**	**189**	**0**	**6**	**221**	**0**	**0**	**0**	**0**	**0**	**0**	**81**	**107**	**19**	**207**	**69**	**0**	**23**	**0**	**92**	**520**
% App. Total	**12%**	**86%**	**0%**	**3%**		**0%**	**0%**	**0%**	**0%**		**0%**	**39%**	**52%**	**9%**		**75%**	**0%**	**25%**	**0%**		
% of Total	**5%**	**36%**	**0%**	**1%**	**43%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**16%**	**21%**	**4%**	**40%**	**13%**	**0%**	**4%**	**0%**	**18%**	
PHF																					

Haunani to Keakealani Campus 5/6/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
2:00 PM	0	11	0	2	13	0	0	0	0	0	0	6	2	0	8	2	0	0	0	2	
2:15 PM	0	9	0	0	9	0	0	0	0	0	0	6	0	2	8	2	0	0	5	7	
2:30 PM	0	13	0	0	13	0	0	0	0	0	0	6	1	3	10	2	0	0	0	2	
2:45 PM	0	8	0	0	8	0	0	0	0	0	0	4	1	1	6	1	0	0	0	1	
Total	0	41	0	2	43	0	0	0	0	0	0	22	4	6	32	7	0	0	5	12	
Grand Total	0	41	0	2	43	0	0	0	0	0	0	22	4	6	32	7	0	0	5	12	87
Apprch %	0%	95%	0%	5%		0%	0%	0%	0%		0%	69%	13%	19%		8%	0%	0%	0%		
Total %	0%	47%	0%	2%	49%	0%	0%	0%	0%	0%	0%	25%	5%	7%	37%	8%	0%	0%	6%	14%	

Haunani to Keakealani Campus 5/7/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
2:00 PM	0	6	0	1	7	0	0	0	0	0	0	8	2	0	10	1	0	0	0	1	
2:15 PM	0	14	0	0	14	0	0	0	0	0	0	6	3	0	9	2	0	0	0	2	
2:30 PM	0	8	0	2	10	0	0	0	0	0	0	8	4	0	12	3	0	0	0	3	
2:45 PM	0	5	0	0	5	0	0	0	0	0	0	5	2	0	7	0	0	0	0	0	
Total	0	33	0	3	36	0	0	0	0	0	0	27	11	0	38	6	0	0	0	6	
Grand Total	0	33	0	3	36	0	0	0	0	0	0	27	11	0	38	6	0	0	0	6	80
Apprch %	0%	92%	0%	8%		0%	0%	0%	0%		0%	71%	29%	0%		8%	0%	0%	0%		
Total %	0%	41%	0%	4%	45%	0%	0%	0%	0%	0%	0%	34%	14%	0%	48%	8%	0%	0%	0%	8%	

Haunani to Keakealani Campus 5/8/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (A)	Thru (N)	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru (K)	Right (B)	Peds	App. Total	Left (L)	Thru	Right (M)	Peds	App. Total	Int. Total
2:00 PM	0	6	0	0	6	0	0	0	0	0	0	5	1	0	6	2	0	0	0	2	
2:15 PM	0	4	0	0	4	0	0	0	0	0	0	10	0	0	10	6	0	1	2	9	
2:30 PM	0	7	0	1	8	0	0	0	0	0	0	8	1	0	9	1	0	2	0	3	
2:45 PM	0	7	0	0	7	0	0	0	0	0	0	7	0	0	7	3	0	1	0	4	
Total	0	24	0	1	25	0	0	0	0	0	0	30	2	0	32	12	0	4	2	18	
Grand Total	0	24	0	1	25	0	0	0	0	0	0	30	2	0	32	12	0	4	2	18	75
Apprch %	0%	96%	0%	4%		0%	0%	0%	0%		0%	94%	6%	0%		16%	0%	5%	0%		
Total %	0%	32%	0%	1%	33%	0%	0%	0%	0%	0%	0%	40%	3%	0%	43%	16%	0%	5%	3%	24%	

Haunani and Old Volcano Hwy SD 5/6/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left R	Thru (P)	Right (S)	Peds	App. Total	Left (G)	Thru C	Right E	Peds	App. Total	Left (T)	Thru (O)	Right (Q)	Peds	App. Total	Int. Total
6:00 AM	2	3	0	0	5	0	0	1	0	1	1	3	2	0	6	0	0	0	0	0	
6:15 AM	0	3	2	0	5	0	3	0	0	3	4	1	6	0	11	0	3	2	0	5	
6:30 AM	1	0	0	0	1	0	0	1	0	1	0	2	2	0	4	1	3	1	0	5	
6:45 AM	1	0	1	0	2	0	1	0	0	1	5	1	5	0	11	0	1	2	0	3	
Total	4	6	3	0	13	0	4	2	0	6	10	7	15	0	32	1	7	5	0	13	
7:00 AM	1	0	2	0	3	0	0	0	0	0	1	4	1	0	6	0	0	3	0	3	
7:15 AM	0	0	4	0	4	0	5	1	0	6	5	4	5	0	14	5	4	2	1	12	
7:30 AM	2	7	9	0	18	0	10	3	0	13	5	7	0	0	12	4	11	5	0	20	
7:45 AM	0	3	2	0	5	1	3	4	0	8	2	5	0	0	7	4	0	1	0	5	
Total	3	10	17	0	30	1	18	8	0	27	13	20	6	0	39	13	15	11	1	40	
8:00 AM	1	2	3	0	6	0	8	1	0	9	3	3	0	0	6	1	5	2	0	8	
8:15 AM	1	2	3	0	6	0	5	2	0	7	2	2	0	0	4	1	2	1	0	4	
Total	2	4	0	0	6	0	13	3	0	16	5	5	0	0	10	2	7	3	0	12	
Grand Total	9	20	17	0	49	1	35	13	0	49	28	32	21	0	81	16	29	19	1	65	244
Apprch %	18%	41%	35%	0%		2%	71%	27%	0%		0%	40%	26%	0%		7%	0%	8%	0%		
Total %	4%	8%	7%	0%	20%	0%	14%	5%	0%	20%	0%	13%	9%	0%	33%	7%	12%	8%	0%	27%	

Haunani and Old Volcano Hwy SD 5/7/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left R	Thru (P)	Right (S)	Peds	App. Total	Left (G)	Thru C	Right E	Peds	App. Total	Left (T)	Thru (O)	Right (Q)	Peds	App. Total	Int. Total
6:00 AM	2	0	0	0	2	0	3	0	0	3	4	2	0	0	6	0	1	0	0	1	
6:15 AM	0	1	0	0	1	0	2	1	0	3	3	0	0	0	3	0	0	2	0	2	
6:30 AM	0	4	0	0	4	0	2	0	0	2	2	1	0	0	3	1	4	0	1	6	
6:45 AM	1	3	1	0	5	0	2	0	0	2	0	1	0	0	1	0	5	0	1	6	
Total	3	8	1	0	12	0	9	1	0	10	9	4	0	0	13	1	10	2	2	15	
7:00 AM	0	5	3	0	8	0	3	4	0	7	0	3	0	0	3	0	3	0	0	3	
7:15 AM	0	11	2	0	13	0	4	2	0	6	12	2	0	0	14	5	5	0	0	10	
7:30 AM	0	10	0	0	10	2	6	1	0	9	9	6	3	0	18	7	7	3	3	20	
7:45 AM	1	3	2	0	6	0	6	3	0	9	5	5	3	0	13	1	10	4	0	15	
Total	1	29	7	0	37	2	19	10	0	31	26	16	6	0	48	13	25	7	3	48	
8:00 AM	0	9	3	0	12	0	7	0	0	7	3	6	0	0	9	1	5	4	0	10	
8:15 AM	1	5	3	0	9	0	3	0	0	3	3	1	0	0	4	1	8	4	3	16	
Total	1	14	6	0	21	0	10	0	0	10	6	7	0	0	13	2	13	8	3	26	
Grand Total	5	51	13	0	70	2	38	11	0	51	41	27	6	0	74	16	48	17	8	89	284
Apprch %	7%	73%	19%	0%		4%	75%	22%	0%		0%	36%	8%	0%		6%	0%	6%	0%		
Total %	2%	18%	5%	0%	25%	1%	13%	4%	0%	18%	0%	10%	2%	0%	26%	6%	17%	6%	3%	31%	

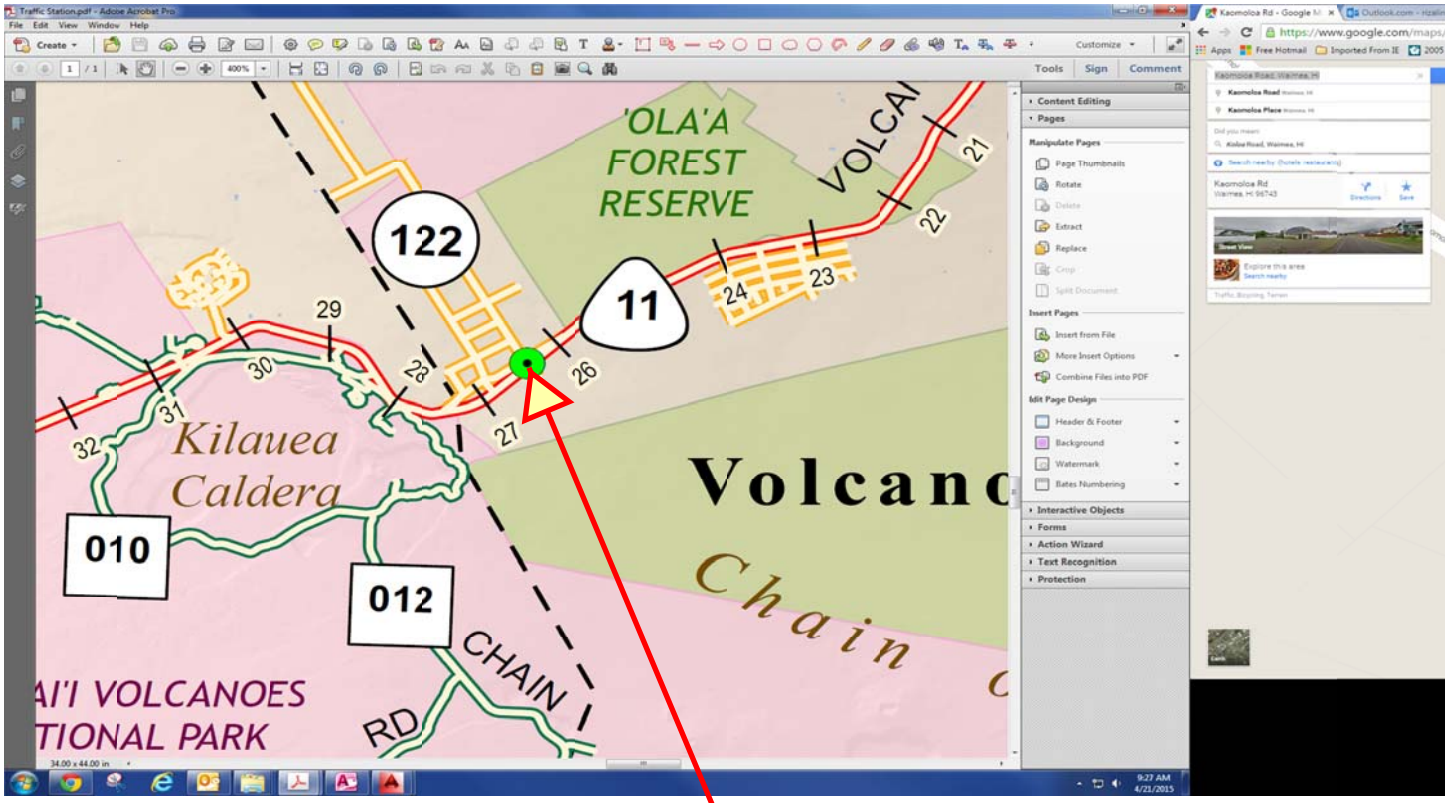
Haunani and Old Volcano Hwy SD 5/8/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left R	Thru (P)	Right (S)	Peds	App. Total	Left (G)	Thru C	Right E	Peds	App. Total	Left (T)	Thru (O)	Right (Q)	Peds	App. Total	Int. Total
6:00 AM	0	2	1	0	3	0	2	1	0	3	1	6	0	0	7	0	3	0	0	3	
6:15 AM	0	2	1	0	3	0	3	0	0	3	6	3	0	0	9	0	2	0	0	2	
6:30 AM	1	6	3	0	10	0	0	1	0	1	6	2	1	0	9	1	3	0	1	5	
6:45 AM	0	5	1	0	6	0	2	0	0	2	5	3	0	0	8	0	5	0	1	6	
Total	1	15	6	0	22	0	7	2	0	9	18	14	1	0	33	1	13	0	2	16	
7:00 AM	1	5	6	0	12	0	0	0	0	0	6	3	0	0	9	2	3	0	0	5	
7:15 AM	2	5	3	0	10	0	2	1	0	3	3	5	0	0	8	5	3	0	0	8	
7:30 AM	5	5	6	0	16	0	8	2	0	10	10	12	0	0	22	5	6	3	0	14	
7:45 AM	1	5	1	0	7	1	7	4	0	12	6	6	0	0	12	4	1	7	0	12	
Total	9	20	16	0	45	1	17	7	0	25	25	26	0	0	51	16	13	10	0	39	
8:00 AM	1	10	2	0	13	0	8	1	0	9	4	7	1	0	12	2	7	4	0	13	
8:15 AM	1	4	4	0	9	0	7	1	0	8	2	2	0	0	4	2	4	2	0	8	
Total	2	14	6	0	22	0	15	2	0	17	6	9	1	0	16	4	11	6	0	21	
Grand Total	12	49	28	0	89	1	39	11	0	51	49	49	2	0	100	21	37	16	2	76	316
Apprch %	13%	55%	31%	0%		2%	76%	22%	0%		0%	49%	2%	0%		7%	0%	5%	0%		
Total %	4%	16%	9%	0%	28%	0%	12%	3%	0%	16%	0%	16%	1%	0%	32%	7%	12%	5%	1%	24%	

ALL DAYS	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis from 6:00 AM to 8:30 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 7:00 AM																					
6:00 AM	4	5	1	0	10	0	5	2	0	7	6	11	2	0	19	0	4	0	0	4	
6:15 AM	0	6	3	0	9	0	8	1	0	9	13	4	6	0	23	0	5	4	0	9	
6:30 AM	2	10	3	0	15	0	2	2	0	4	8	5	3	0	16	3	10	1	2	16	
6:45 AM	2	8	3	0	13	0	5	0	0	5	10	5	5	0	20	0	11	2	2	15	
Total	8	29	10	0	47	0	20	5	0	25	37	25	16	0	78	3	30	7	4	44	194
7:00 AM	2	10	11	0	23	0	3	4	0	7	7	10	1	0	18	2	6	3	0	11	
7:15 AM	2	16	9	0	27	0	11	4	0	15	20	11	5	0	36	15	12	2	1	15	
7:30 AM	7	22	15	0	44	2	24	6	0	32	24	25	3	0	52	16	24	11	3	54	
7:45 AM	2	11	5	0	18	2	16	11	0	29	13	16	3	0	32	9	11	12	0	32	
Total	13	59	40	0	112	4	54	25	0	83	64	62	12	0	138	42	53	28	4	127	460
8:00 AM	2	21	8	0	31	0	23	2	0	25	10	16	1	0	27	4	17	10	0	31	
8:15 AM	3	11	10	0	24	0	15	3	0	18	7	5	0	0	12	4	14	7	3	28	
Total	5	32	18	0	55	0	38	5	0	43	17	21	1	0	39	8	31	17	3	59	196
Total Volume	**26**	**120**	**68**	**0**	**214**	**4**	**112**	**35**	**0**	**151**	**118**	**108**	**29**	**0**	**255**	**53**	**114**	**52**	**11**	**230**	**850**
% App. Total	**12%**	**56%**	**32%**	**0%**		**3%**	**74%**	**23%**	**0%**		**46%**	**42%**	**11%**	**0%**		**23%**	**50%**	**23%**	**5%**		
% of Total	**3%**	**14%**	**8%**	**0%**	**25%**	**0%**	**13%**	**4%**	**0%**	**18%**	**14%**	**13%**	**3%**	**0%**	**30%**	**6%**	**13%**	**6%**	**1%**	**27%**	
PHF																					

Haunani and Old Volcano Hwy 5/6/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left R	Thru (P)	Right (S)	Peds	App. Total	Left (G)	Thru C	Right E	Peds	App. Total	Left (T)	Thru (O)	Right (Q)	Peds	App. Total	Int. Total
2:00 PM	4	8	5	0	17	3	19	7	0	29	7	3	2	0	12	5	17	3	0	25	
2:15 PM	1	1	6	0	8	1	9	3	0	13	8	3	1	0	12	5	19	4	1	29	
2:30 PM	2	3	9	0	14	1	18	2	0	21	7	4	1	0	12	4	20	10	1	35	
2:45 PM	2	2	6	0	10	3	9	6	0	18	10	2	1	0	13	2	22	12	0	36	
Total	9	14	26	0	49	8	55	18	0	81	32	12	5	0	49	16	78	29	2	125	
Grand Total	9	14	26	0	49	8	55	18	0	81	32	12	5	0	49	16	78	29	2	125	304
Apprch %	18%	29%	53%	0%		10%	68%	22%	0%		65%	24%	10%	0%		5%	62%	10%	2%		
Total %	3%	5%	9%	0%	16%	3%	18%	6%	0%	27%	11%	4%	2%	0%	16%	5%	26%	10%	1%	41%	

Haunani and Old Volcano Hwy 5/7/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left R	Thru (P)	Right (S)	Peds	App. Total	Left (G)	Thru C	Right E	Peds	App. Total	Left (T)	Thru (O)	Right (Q)	Peds	App. Total	Int. Total
2:00 PM	5	3	6	0	14	1	15	5	0	21	14	3	1	0	18	5	12	4	0	21	
2:15 PM	3	4	3	0	10	2	17	0	0	19	8	6	0	0	14	6	19	7	0	32	
2:30 PM	1	5	2	0	8	2	8	5	0	15	9	2	3	0	14	8	16	8	7	39	
2:45 PM	2	3	3	0	8	2	17	4	0	23	13	4	3	0	20	4	20	13	0	37	
Total	11	15	14	0	40	7	57	14	0	78	44	15	7	0	66	23	67	32	7	129	
Grand Total	11	15	14	0	40	7	57	14	0	78	44	15	7	0	66	23	67	32	7	129	313
Apprch %	28%	38%	35%	0%		9%	73%	18%	0%		67%	23%	11%	0%		7%	52%	10%	5%		
Total %	4%	5%	4%	0%	13%	2%	18%	4%	0%	25%	14%	5%	2%	0%	21%	7%	21%	10%	2%	41%	

Haunani and Old Volcano Hwy 5/8/2015	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left (D)	Thru (F)	Right (H)	Peds	App. Total	Left R	Thru (P)	Right (S)	Peds	App. Total	Left (G)	Thru C	Right E	Peds	App. Total	Left (T)	Thru (O)	Right (Q)	Peds	App. Total	Int. Total
2:00 PM	5	2	3	0	10	0	9	1	1	11	5	0	0	0	5	8	8	3	0	19	
2:15 PM	1	3	5	0	9	1	21	0	0	22	7	0	0	0	7	0	13	9	0	22	
2:30 PM	2	2	7	0	11	1	13	3	0	17	8	2	4	0	14	1	3	8	5	17	
2:45 PM	2	5	2	0	9	1	11	5	0	17	6	4	2	0	12	0	6	9	0	15	
Total	10	12	17	0	39	3	54	9	1	67	26	6	6	0	38	9	30	0	5	44	
Grand Total	10	12	17	0	39	3	54	9	1	67	26	6	6	0	38	9	30	0	5	44	188
Apprch %	26%	31%	44%	0%		4%	81%	13%	1%		0%	16%	16%	0%		5%	0%	0%	0%		
Total %	5%	6%	9%	0%	21%	2%	29%	5%	1%	36%	0%	3%	3%	0%	20%	5%	16%	0%	3%	23%	



Traffic Station

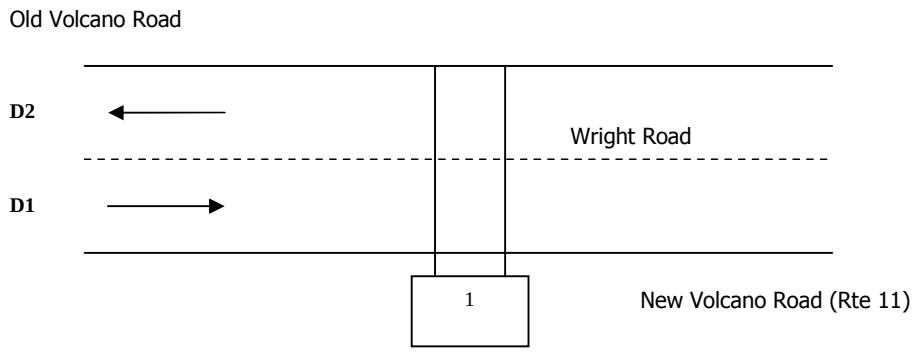
Traffic Data Service

Traffic Station Sketch

N

Island: Hawaii	
Area: Hilo	

Section ID/Station #: B71012200000



Meter #	File Name	GPS
1. t049	D0809005_B71012200000 D0809006_B71012200000	19.43114, -155.22858

Station Description:

Wright Road: Old Volcano Road to New Volcano Road (Rte 11)

Survey Beginning Date/Time: 8/9/2011 @ 0000		Survey Ending Date/Time: 8/10/2011 @ 2400

Survey Method:	Road Tube	Data Type:	Class
Survey Crew:	LM		C1B
Sketch Updated:		By:	SR
Remarks:			

FACILITY NAME	JURI	FUNC CLASS	AREA TYPE	ROUTE NO.	ROUTE MILE
Wright Road		8		0122	

D1= Direction to End	D1: New Volcano Road (Rte 11) / Volcano Road (Rte 11)
D2= Direction to Begin	D2: Old Volcano Road / Kilinoe Road

Run Date: 2012/04/30

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2011 Program Count - Summary

Site ID: B71012200000 **Town:** Hawaii **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 0
Functional Class: RURAL:MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 122
Location: Wright Rd. between Kilauea Rd. _Old Vol

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 08/09/2011															
12:00-12:15	0	0	0	06:00-06:15	15	27	42	12:00-12:15	32	43	75	06:00-06:15	35	34	69
12:15-12:30	0	0	0	06:15-06:30	22	22	44	12:15-12:30	42	37	79	06:15-06:30	29	25	54
12:30-12:45	0	2	2	06:30-06:45	31	42	73	12:30-12:45	26	56	82	06:30-06:45	22	17	39
12:45-01:00	0	0	0	06:45-07:00	22	46	68	12:45-01:00	33	35	68	06:45-07:00	14	17	31
01:00-01:15	0	0	0	07:00-07:15	13	43	56	01:00-01:15	32	35	67	07:00-07:15	22	18	40
01:15-01:30	0	1	1	07:15-07:30	29	38	67	01:15-01:30	26	40	66	07:15-07:30	16	20	36
01:30-01:45	0	0	0	07:30-07:45	33	61	94	01:30-01:45	47	28	75	07:30-07:45	32	22	54
01:45-02:00	0	0	0	07:45-08:00	50	49	99	01:45-02:00	40	38	78	07:45-08:00	30	14	44
02:00-02:15	1	1	2	08:00-08:15	31	37	68	02:00-02:15	50	54	104	08:00-08:15	30	11	41
02:15-02:30	1	1	2	08:15-08:30	22	37	59	02:15-02:30	66	45	111	08:15-08:30	18	13	31
02:30-02:45	0	1	1	08:30-08:45	30	32	62	02:30-02:45	54	27	81	08:30-08:45	16	14	30
02:45-03:00	0	1	1	08:45-09:00	21	32	53	02:45-03:00	50	27	77	08:45-09:00	18	12	30
03:00-03:15	1	1	2	09:00-09:15	25	39	64	03:00-03:15	59	35	94	09:00-09:15	11	8	19
03:15-03:30	1	1	2	09:15-09:30	26	45	71	03:15-03:30	58	33	91	09:15-09:30	9	12	21
03:30-03:45	1	1	2	09:30-09:45	29	30	59	03:30-03:45	62	45	107	09:30-09:45	11	11	22
03:45-04:00	1	0	1	09:45-10:00	24	50	74	03:45-04:00	54	29	83	09:45-10:00	5	9	14
04:00-04:15	4	2	6	10:00-10:15	36	41	77	04:00-04:15	59	27	86	10:00-10:15	9	12	21
04:15-04:30	1	2	3	10:15-10:30	29	45	74	04:15-04:30	56	34	90	10:15-10:30	11	8	19
04:30-04:45	4	4	8	10:30-10:45	26	58	84	04:30-04:45	72	26	98	10:30-10:45	3	1	4
04:45-05:00	7	5	12	10:45-11:00	30	47	77	04:45-05:00	53	36	89	10:45-11:00	3	2	5
05:00-05:15	4	3	7	11:00-11:15	23	52	75	05:00-05:15	64	38	102	11:00-11:15	2	2	4
05:15-05:30	4	7	11	11:15-11:30	30	47	77	05:15-05:30	57	28	85	11:15-11:30	0	1	1
05:30-05:45	6	17	23	11:30-11:45	32	43	75	05:30-05:45	44	30	74	11:30-11:45	3	0	3
05:45-06:00	15	39	54	11:45-12:00	35	58	93	05:45-06:00	43	29	72	11:45-12:00	2	1	3

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	143	185	328
AM - K FACTOR (%)			7.30
AM - D (%)	43.60	56.40	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM	07:00 AM to 08:00 AM	
AM - PEAK HR VOLUME	143	191	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:15 PM to 05:15 PM		
PM - PEAK HR VOLUME	245	134	379
PM - K FACTOR (%)			8.43
PM - D (%)	64.64	35.36	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:30 PM to 05:30 PM	03:00 PM to 04:00 PM	
PM - PEAK HR VOLUME	246	142	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	143	185	328
AM - K FACTOR (%)			7.30
AM - D (%)	43.60	56.40	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	04:15 PM to 05:15 PM		
PM - PEAK HR VOLUME	245	134	379
PM - K FACTOR (%)			8.43
PM - D (%)	64.64	35.36	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	01:45 PM to 02:45 PM		
PEAK HR VOLUME	210	164	374
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	10:30 AM to 11:30 AM	
PEAK HR VOLUME	220	204	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	664	1,021	1,685
AM 12-HR PERIOD (00:00-12:00)	715	1,110	1,825
PM 6-HR PERIOD (12:00-18:00)	1,179	855	2,034
PM 12-HR PERIOD (12:00-24:00)	1,530	1,139	2,669
24 HOUR PERIOD	2,245	2,249	4,494
D (%)	49.96	50.04	100.00

Run Date: 2012/04/30

Hawaii Department of Transportation
Highways Division — Highways Planning Survey Section
2011 Program Count - Summary

Site ID: B71012200000 **Town:** Hawaii **DIR 1:** +MP **DIR 2:** -MP **Final AADT:** 0
Functional Class: RURAL:MINOR COLLECTOR **Count Type:** CLASS **Counter Type:** Tube **Route No:** 122
Location: Wright Rd. between Kilauea Rd. _Old Vol

TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 08/10/2011															
12:00-12:15	1	0	1	06:00-06:15	19	22	41	12:00-12:15	32	32	64	06:00-06:15	31	24	55
12:15-12:30	0	0	0	06:15-06:30	18	20	38	12:15-12:30	37	47	84	06:15-06:30	21	20	41
12:30-12:45	0	0	0	06:30-06:45	27	43	70	12:30-12:45	30	33	63	06:30-06:45	14	25	39
12:45-01:00	0	0	0	06:45-07:00	25	39	64	12:45-01:00	19	43	62	06:45-07:00	22	24	46
01:00-01:15	1	2	3	07:00-07:15	14	41	55	01:00-01:15	26	43	69	07:00-07:15	21	16	37
01:15-01:30	0	2	2	07:15-07:30	14	56	70	01:15-01:30	31	31	62	07:15-07:30	13	10	23
01:30-01:45	0	0	0	07:30-07:45	29	52	81	01:30-01:45	38	38	76	07:30-07:45	24	18	42
01:45-02:00	0	0	0	07:45-08:00	41	48	89	01:45-02:00	33	41	74	07:45-08:00	41	26	67
02:00-02:15	0	1	1	08:00-08:15	33	26	59	02:00-02:15	37	37	74	08:00-08:15	10	12	22
02:15-02:30	0	1	1	08:15-08:30	26	29	55	02:15-02:30	54	48	102	08:15-08:30	21	24	45
02:30-02:45	1	1	2	08:30-08:45	20	22	42	02:30-02:45	63	33	96	08:30-08:45	22	9	31
02:45-03:00	0	0	0	08:45-09:00	31	38	69	02:45-03:00	42	27	69	08:45-09:00	12	8	20
03:00-03:15	0	2	2	09:00-09:15	18	35	53	03:00-03:15	55	34	89	09:00-09:15	14	9	23
03:15-03:30	1	0	1	09:15-09:30	25	29	54	03:15-03:30	56	33	89	09:15-09:30	8	9	17
03:30-03:45	2	2	4	09:30-09:45	23	28	51	03:30-03:45	61	44	105	09:30-09:45	14	9	23
03:45-04:00	3	2	5	09:45-10:00	28	34	62	03:45-04:00	64	38	102	09:45-10:00	8	8	16
04:00-04:15	2	3	5	10:00-10:15	18	35	53	04:00-04:15	64	40	104	10:00-10:15	8	4	12
04:15-04:30	1	4	5	10:15-10:30	26	32	58	04:15-04:30	54	28	82	10:15-10:30	7	6	13
04:30-04:45	7	4	11	10:30-10:45	31	29	60	04:30-04:45	53	41	94	10:30-10:45	6	6	12
04:45-05:00	4	9	13	10:45-11:00	23	36	59	04:45-05:00	45	36	81	10:45-11:00	4	3	7
05:00-05:15	2	7	9	11:00-11:15	33	24	57	05:00-05:15	48	44	92	11:00-11:15	3	3	6
05:15-05:30	5	16	21	11:15-11:30	38	29	67	05:15-05:30	42	26	68	11:15-11:30	4	1	5
05:30-05:45	9	12	21	11:30-11:45	24	41	65	05:30-05:45	35	33	68	11:30-11:45	2	0	2
05:45-06:00	9	43	52	11:45-12:00	34	37	71	05:45-06:00	34	37	71	11:45-12:00	3	2	5

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	117	182	299
AM - K FACTOR (%)			7.20
AM - D (%)	39.13	60.87	100.00
DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:30 AM to 08:30 AM	07:00 AM to 08:00 AM	
AM - PEAK HR VOLUME	129	197	

PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2	
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:15 PM to 04:15 PM		
PM - PEAK HR VOLUME	245	155	400
PM - K FACTOR (%)			9.64
PM - D (%)	61.25	38.75	100.00
DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:15 PM to 04:15 PM	03:15 PM to 04:15 PM	
PM - PEAK HR VOLUME	245	155	

AM PERIOD (00:00-12:00)			
TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME	07:15 AM to 08:15 AM		
AM - PEAK HR VOLUME	117	182	299
AM - K FACTOR (%)			7.20
AM - D (%)	39.13	60.87	100.00

PM PERIOD (12:00-24:00)			
TWO DIRECTIONAL PEAK			
PM - PEAK HR TIME	03:15 PM to 04:15 PM		
PM - PEAK HR VOLUME	245	155	400
PM - K FACTOR (%)			9.64
PM - D (%)	61.25	38.75	100.00

NON-COMMUTER PERIOD (09:00-15:00)			
TWO DIRECTIONAL PEAK			
PEAK HR TIME	01:45 PM to 02:45 PM		
PEAK HR VOLUME	187	159	346
DIRECTIONAL PEAK			
PEAK HR TIME	02:00 PM to 03:00 PM	12:15 PM to 01:15 PM	
PEAK HR VOLUME	196	166	

6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total
AM 6-HR PERIOD (06:00-12:00)	618	825	1,443
AM 12-HR PERIOD (00:00-12:00)	666	936	1,602
PM 6-HR PERIOD (12:00-18:00)	1,053	887	1,940
PM 12-HR PERIOD (12:00-24:00)	1,386	1,163	2,549
24 HOUR PERIOD	2,052	2,099	4,151
D (%)	49.43	50.57	100.00