NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY

An Authority of the State of Hawaii attached to the Department of Business, Economic Development & Tourism

June 20, 2018

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

Subject: **Final Environmental Assessment and Finding of No Significant Impact, Matsuyama Commercial Center on NELHA Land, TMK (3) 7-3-043:113, North Kona District, Hawaii Island, State of Hawaii**

Dear Mr. Glenn:

I am pleased to transmit the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the proposed Matsuyama Commercial Center on NELHA Land on the Island of Hawaii. I am requesting that this be published in the next available edition of your Environmental Notice.

I have attached the completed OEQC Publication Form; the FEA-FONSI; an Adobe Acrobat PDF file of the same; and, an electronic copy of the publication form in MS Word format.

If there are any questions, please telephone me at 327-9585, extension 225 or send me e-mail at gregory.p.barbour@hawaii.gov.

Very truly yours,

Gregory P. Barbour
Executive Director

Attachments: (4)

Cc (w/o attach): Michele Lefebvre, Stantec Consulting Inc.

18-691

73-4460 Queen Kaahumanu Hwy., #101, Kailua-Kona, Hawaii USA 96740-2637
Phone: (808) 327-9585 Fax: (808) 327-9586 Email: nelha@nelha.org Website: http://www.nelha.org

APPLICANT
PUBLICATION FORM

Project Name:	Matsuyama Commercial Center on NELHA Land
Project Short Name:	FEA Matsuyama Commercial Center
HRS §343-5 Trigger(s):	Use of State Land
Island(s):	Hawai'i
Judicial District(s):	North Kona
TMK(s):	(3) 7-3-043:113
Permit(s)/Approval(s):	County of Hawai'I Dept. of Public Works (DPW) Building Division Approval and Building Permit, Grading Permit, County of Hawai'i Planning Department Plan Approval, State Dept. of Health (DOH) National Pollutant Discharge Elimination System Permit, DOH Individual Wastewater System Approval
Approving Agency:	Natural Energy Laboratory of Hawai'i Authority (NELHA)
Contact Name, Email, Telephone, Address	Gregory Barbour, gb@nelha.org (808) 542-4622 73-4460 Queen Ka'ahumanu Hwy. #101 Kailua-Kona, HI 96740
Applicant:	Mats4 LLC
Contact Name, Email, Telephone, Address	Burke Matsuyama, burkemats@gmail.com (808) 987-1198 73-1206 Akamai Street Kailua-Kona, HI 96740
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**
____ DEA-AFNSI	Submit 1) the approving 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.
__X_ FEA-FONSI	Submit 1) the approving 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 approving 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 approving 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 approving agency, 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 approving agency, 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 approving agency simultaneously transmits to both the OEQC and the applicant 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	The approving agency simultaneously transmits to both the OEQC and the applicant a notice that it did not make a timely determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and therefore the applicant's FEIS is deemed accepted as a matter of law.
____ Supplemental EIS Determination	The approving agency simultaneously transmits its notice to both the applicant 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

Mats4 LLC proposes to construct and operate a commercial complex comprising the following: a filling station with six pumps; a convenience retail store of 2,450 square feet (sf) and 130 sf of restrooms; and a commercial kitchen and restaurant consisting of 2,500 sf interior, plus 600 sf of exterior covered seating area, and 600 sf of exterior (open) seating area. Two electric vehicle charging stations would be installed initially, with provisions for additional stations in the future. Space would also be provided for a future hydrogen fueling station. In addition to temporary and electric vehicle charging spaces, 37 permanent parking spaces would be provided, two of which would be meet Americans with Disability Act (ADA) accessibility standards. Road and drainage improvements would be conducted and an individual wastewater system would be built. Impacts include grading of the pahoehoe surface and associated 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 archaeological monitoring is proposed during construction. Required design and build features for the fuel storage and wastewater treatment would be implemented to avoid or minimize impacts to water quality.

FINAL ENVIRONMENTAL ASSESSMENT

Matsuyama Commercial Center on NELHA Land

TMK (3) 7-3-043:113
North Kona District, Hawai‘i Island, State of Hawai‘i

~~May~~June 2018

Prepared for:

Natural Energy Laboratory of Hawai‘i Authority (NELHA)
73-4460 Queen Ka‘ahumanu Hwy. #101
Kailua-Kona HI 96740-2637

FINAL ENVIRONMENTAL ASSESSMENT

Matsuyama Commercial Center on NELHA Land

TMK (3) 7-3-043:113
North Kona District, Hawai‘i Island, State of Hawai‘i

APPLICANT:

Mats4 LLC
73-1206 Akamai Street
Kailua-Kona, HI 96740

APPROVING AGENCY:

Natural Energy Laboratory of Hawai‘i Authority (NELHA)
73-4460 Queen Ka‘ahumanu Hwy. #101
Kailua-Kona, HI 96740-2637

CONSULTANT:

Stantec Consulting Inc.
PO Box 191
Hilo, HI 96721

CLASS OF ACTION:

Use of State Land

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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PART 1: PROJECT DESCRIPTION, LOCATION AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Location and Property Ownership

The Matsuyama Commercial Center is a project located on a 1.36-acre parcel in Kona and is under the control of the National Energy Laboratory of Hawai‘i Authority (NELHA) (see Figures 1 through 3 for maps and photos of area). Following a recently approved consolidation and subdivision action, the parcel is identified by Tax Map Key (TMK) (3) 7-3-043:113. NELHA leases this land from the Department of Land and Natural Resources pursuant to General Lease No. S-5619.

1.2 Purpose and Need

Consistent with the purpose of NELHA as defined in HRS Chapter 227-D, NELHA has the authority to facilitate research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawai‘i and engage in retail, commercial, or tourism activities that will support that research, development, and commercialization…”. The project is a business that supports the NELHA’s business and education facilities and would provide a much-needed gas station, electric charging station, and convenience store on the *makai* side of the Queen Ka‘ahumanu Highway. Specifically, the project is located in the Economic Driver zone identified in the NELHA Master Plan (NELHA 2011). The Economic Driver zone includes a commercial marketplace

The project meets the development objectives utilizing sustainable building design and energy efficient technologies, of which NELHA is a leader, and support products from other NELHA tenants or energy and ocean related items. Currently there are no other such facilities for traffic traveling southbound on this busy highway between Waikoloa and Kailua-Kona, a distance of approximately 28 miles. The closest fueling station to the Kona International Airport (KOA) is currently ~~3.2~~1.8 miles south and on the *mauka* side of the street, and does not include electric charging stations. This project would provide these services one mile south of the KOA.

With the 30-year lease from NELHA, Mats4 LLC would construct the commercial center including a convenience store and gas station, which would provide needed infrastructure to the *makai* side of the Queen Ka‘ahumanu Highway.

1.3 Project Description

The project, which is depicted in Figure 4, would construct and operate a commercial complex including the following:

- a filling station with six pumps;
- a convenience retail store of 2,450 square feet (sf) and 130 sf of restrooms;
- a commercial kitchen and restaurant consisting of 2,500 sf interior space;
- 600 sf of exterior covered seating area;

- 600 sf of exterior (open) seating area;
- two electric vehicle charging stations installed initially, with provisions for additional stations in the future; and
- 37 permanent parking spaces, two of which would meet ADA accessibility standards.

The buildings and restrooms would all meet ADA accessibility standards.

Space would also be provided for a future hydrogen fueling station. All building, fuel canopies roof drainage, and site drainage will be directed into underground storm system consisting of underground piping and three drywells. There will be drainage inlets in paved areas at low spots which will drain into an oil/water separator and then discharge to the three below grade drywells. There will be a separate oil/water separator in front of each drywell, and no water will enter a drywell from the paved surface without first going thru an oil/water separator. The building and canopy roof drainage will run underground via piping and discharge directly into the drywell(s) without running thru the oil/water separator. Fuel storage would occur in three underground fiberglass storage tanks; each tank would have approximately 15,000 gallons of storage capacity and would be installed per manufacturer's installation instructions and specifications.

The driveway, fuel islands, and parking spaces would have asphalt paving and concrete paving over the underground fuel pumps (i.e., six dual fuel pumps) and fuel storage. Wastewater from the convenience store and restaurant would pass through a grease interceptor before entering the wastewater treatment and disposal system, which will consist of a fiberglass wastewater collection and treatment tank and underground leach field. The Hawaii Department of Health (DOH) compliant individual wastewater treatment and disposal system would be installed under the parking/driveway areas and would be provided in the final design submittal package. Restrooms will discharge directly into the wastewater system, by-passing the grease interceptor. Photovoltaic panels would be mounted on the store. Designers are currently evaluating the whether to utilize deep ocean water for cooling the mechanical systems and will address this in the final design submittal. If utilization of deep seawater for cooling is determined to be feasible and available in the foreseeable future, the project would tie in to existing NELHA infrastructure to transport the water to the project site and seawater will be disposed of underground in accordance with NELHA established procedures and in conformance with DOH approved methods.

Design elements for the project incorporate water imagery. The design of the fuel canopies is inspired by ocean waves rolling on shore, and the convenience store will feature waves on its building face and a curved canopy entrance. Landscaping around the building would augment the natural feel of the development (Figure 5). The structures for the project were designed to conform with building height requirements and have been kept low enough to minimize the obstruction of ocean views from the highway and comply with airport building height restrictions. Construction would occur after the lease with NELHA is executed and permits are acquired and would be expected to be complete within one year.

Figure 1 Project Location Map

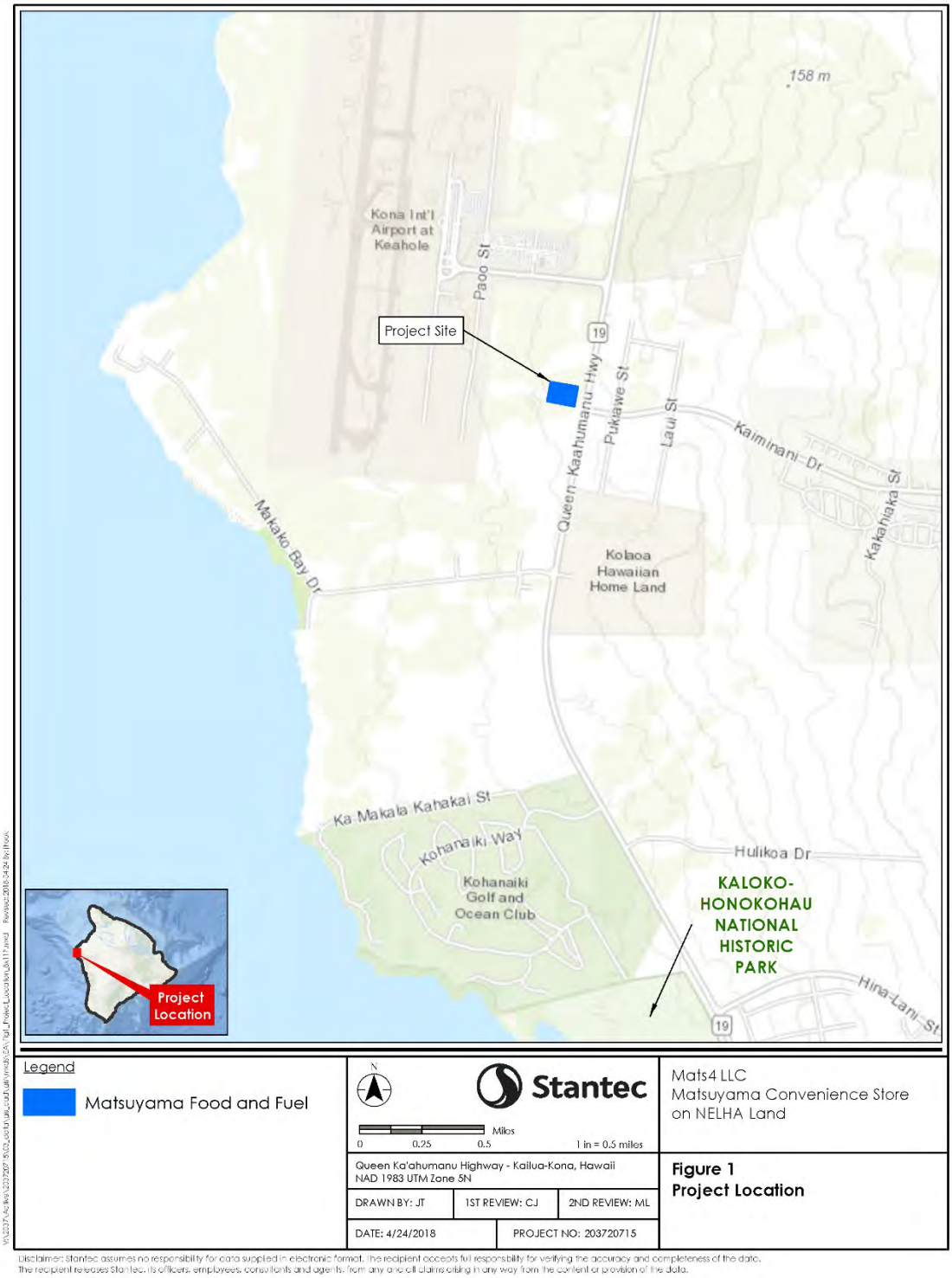

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Figure 2 Project Site Photos

▲ Existing Site Location (looking northwest from Kaiminani Dr.)

▼ Existing Site Location (looking northeast on Kaiminani Dr.)

Figure 3 Site Plan

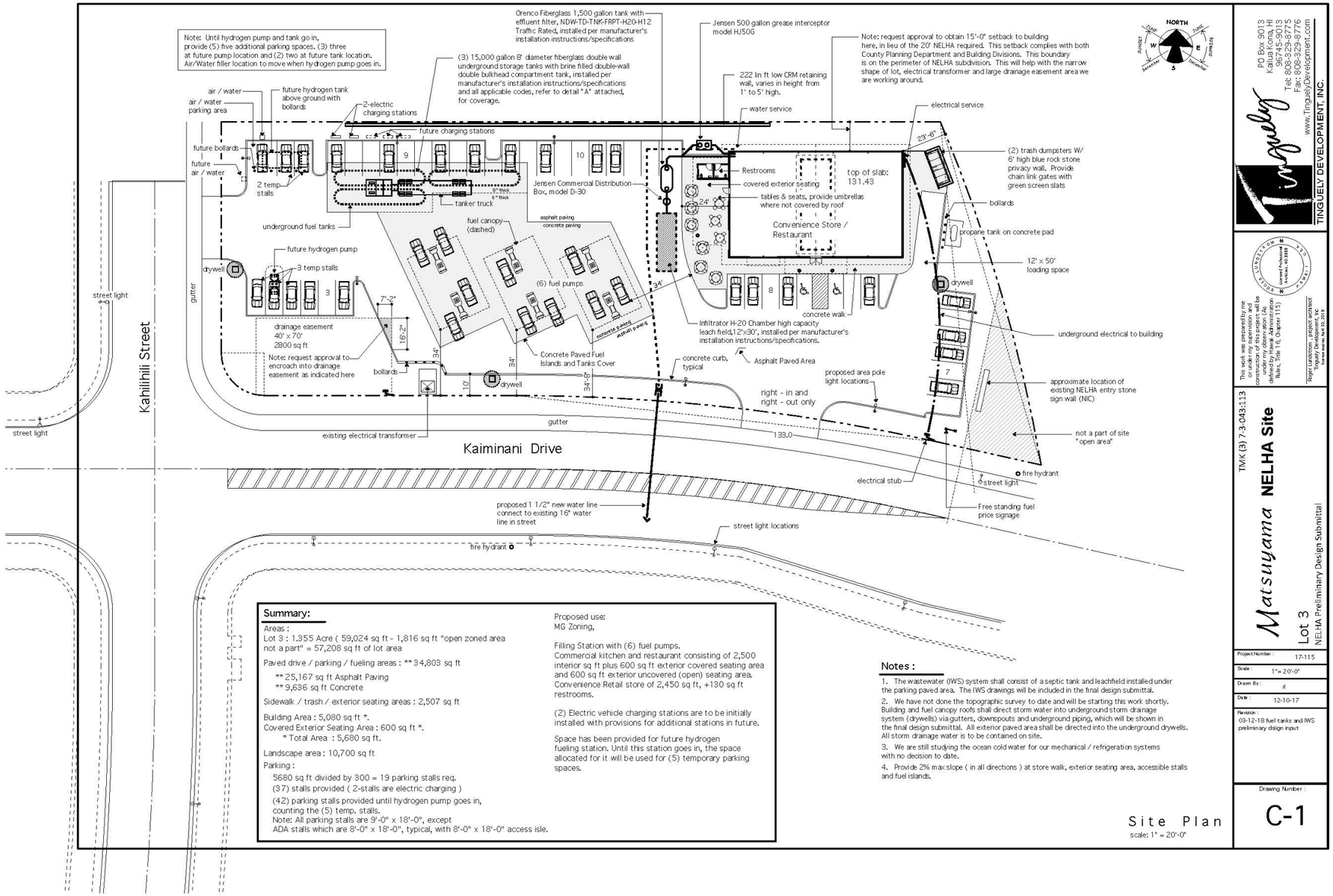
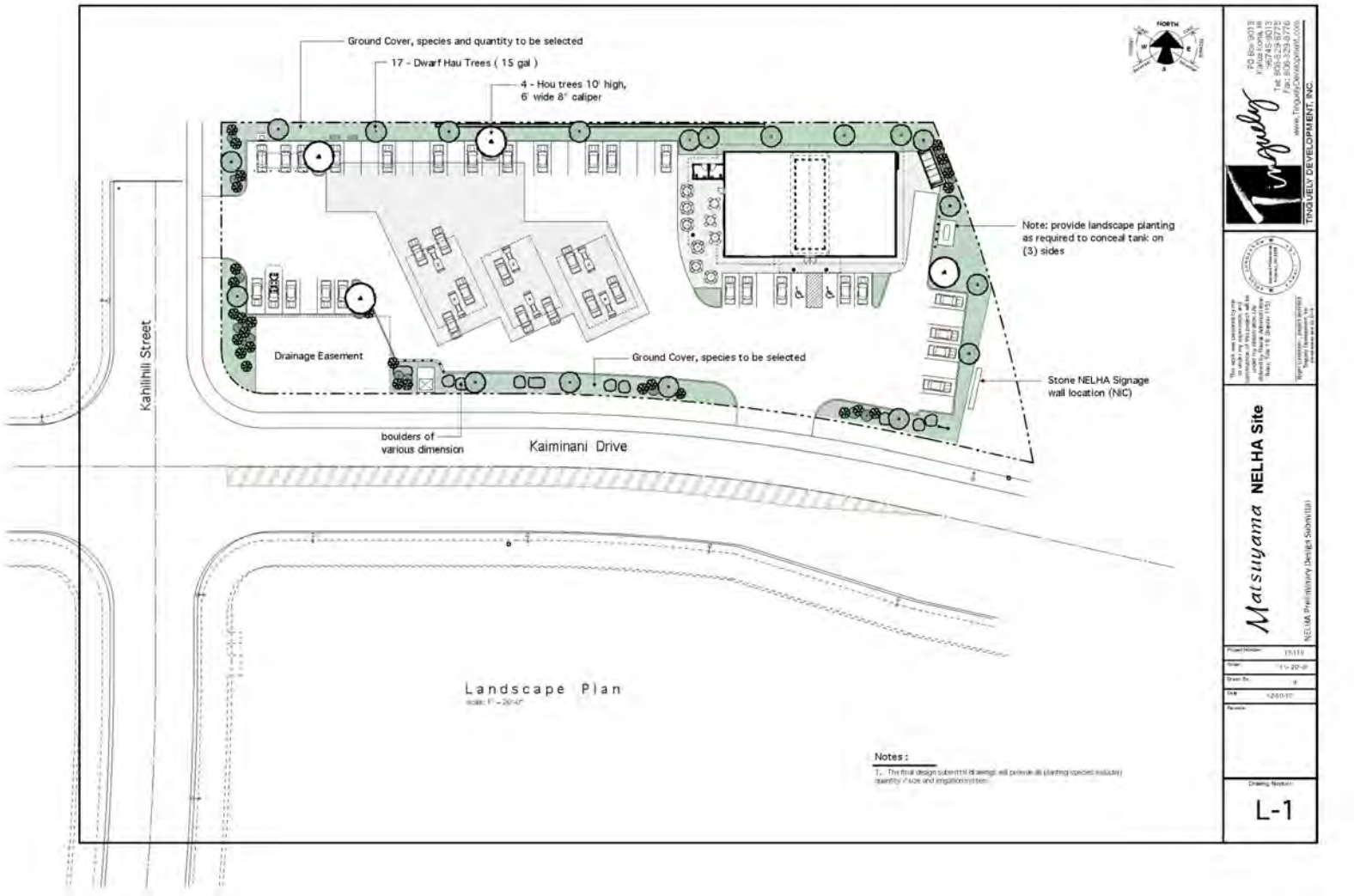


Figure 4 Landscape Plan



1.4 Environmental Assessment Process

NELHA Background

By Act 236 of the Hawai‘i Revised Statutes, 1974, the State of Hawai‘i established the Natural Energy Laboratory of Hawai‘i (NELH) on 322 acres at Keahole Point on the Island of Hawai‘i. The physical characteristics of the site were considered uniquely suited for several significant State and federal energy programs. NELH was mandated to provide a support facility for research on the ocean thermal energy conversion (OTEC) process and its related technologies. The success of these programs was envisioned as highly significant for the intensive, long-term development of energy source alternatives to fossil fuels.

In 1979, a barge dubbed “Mini-OTEC,” anchored offshore of Keahole Point, demonstrated the world’s first production of net electrical power via closed-cycle OTEC. A year later, the NELH facilities that draw deep seawater from 2,000 feet and surface seawater from the 45-foot depth were constructed at Keahole Point. By 1984 it had become apparent that the seawater being pumped up for OTEC research could also be channeled into many other profitable uses. New legislation in 1984 legalized commercialization on State property, allowing NELH to host new tenant business ventures. In 1985, the State Legislature created the Hawaii Ocean Science and Technology (HOST) Park on an adjacent 548 acres at Keahole in anticipation of expansion needs of NELH’s growing businesses. In 1990, HOST Park and NELH were melded into one agency, the NELH Authority (NELHA), attached to the Hawai‘i State Department of Business, Economic Development & Tourism. In 1998-99, the Legislature expanded the activities allowed at NELHA to include other business activities that could enhance economic development and generate additional revenues to support the growing park. Today, NELHA is “landlord” to nearly 40 enterprises that generate about $50 million per year in total economic impact, including tax revenues, as well as more than 390 jobs, construction activity and high value product exports. Three pipeline systems constantly pump deep and surface seawater to shore, including the world’s largest and deepest pipeline at 3,000 feet.

The cumulative impacts of long-term operation and expansion of NELHA operations were evaluated in four previously accepted environmental impact statements (EISs):

- Research Corporation of the University of Hawai‘i (RCUH). 1976. Environmental Impact Statement for the Natural Energy Laboratory of Hawaii at Keahole Point, Hawaii (Phase I). Prep. by R.M. Towill Corp. for RCUH.
- Hawai‘i State High Technology Development Corporation (HTCD). 1985. Final Environmental Impact Statement, Development Plan for the Hawaii Ocean Science and Technology Park and Expansion of the Natural Energy Laboratory of Hawaii, Keahole, North Kona, Hawaii.
- Natural Energy Laboratory of Hawai‘i. 1987. Final Environmental Impact Statement, Alternative Methods of Seawater Return Flow Disposal, Keahole, North Kona, Hawaii.
- Natural Energy Laboratory of Hawai‘i. 1992. Final Environmental Impact Statement, Development of Land Exchange Parcel, Natural Energy Laboratory of Hawaii. Prep. By GK & Associates for NELHA.

In addition, the following EIS addressed the impacts of land development and proposed aquaculture uses on an adjacent 83-acre parcel obtained by NELHA in a 1986 land exchange:

- Hawai‘i County Planning Department. 1986. Final Environmental Impact Statement, ‘O’oma II, North Kona, Hawaii. Prepared for Hawai‘i County Planning Department and Kahala Capital Corporation by Helber, Hastert, Van Horn & Kimura.

As discussed in Section 3.6.4, the proposed project is clearly of a type authorized by HRS Chapter 227D, which stated: “The purpose of the natural energy laboratory of Hawaii authority shall be to facilitate research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawaii.” This Environmental Assessment (EA) is being prepared to analyze the impacts from this specific project.

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 is one of these “triggers.” Since the project would be located on State lands for the commercial development, 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 NELHA, 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 lease agreement with the NELHA is contingent upon completion and acceptance of the EA, and duration of the lease would be for 30 years once executed.

1.5 Public Involvement and Agency Coordination

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

Federal:
- National Park Service, Kaloko-Honokōhau National Historic Park

State:
- Department of Land and Natural Resources
- Department of Transportation
- Office of Hawaiian Affairs
- Department of Health, Environmental Planning Office

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

Private:
- Puna Certified Nursery, Inc.
- Resort Management Group LLC
- Green Thumb Inc.

Individuals:
- Peter Fithian
- Joseph Roderick
- Genevieve Albert and Patricia Greene

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

Comments to the Draft EA and responses to these comments are contained in Appendix 1b. Various places in the EA have been modified to reflect input received in comment letters; additional or modified non-procedural text is denoted by double underlines, as in this paragraph.

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 commercial center would not be constructed or operated and there would continue to be no gas station and convenience store developed on this site. Currently there are extremely limited opportunities to get gas on the *makai* side of the highway between Waikoloa and Kailua-Kona which is a distance of approximately 28 miles, and this would provide a much-needed opportunity to get provisions and refuel and/or charging stations for electric vehicles. Without this project, residents and visitors would have to continue traveling further distances for fuel, convenience store items, and charging stations for their electric vehicles. The parcel would continue to be undeveloped by Mats4 LLC, but there would be the opportunity for another entity to enter a lease agreement with NELHA for that site in the future.

2.3 Alternate Sites

Mats4 LLC currently operates a number of commercial centers around Kona. Alternative site locations that would address the need for services for traffic traveling southbound on Queen Ka‘ahumanu have not been identified, and therefore none are carried forward for detailed analysis in this EA.

PART 3: ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

Basic Geographic Setting

The NELHA 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 North Kona.

Following a recently approved consolidation and subdivision action, the site includes all of TMK (3) 7-3-043:113. It is located at the intersection of Queen Kaʻahumanu Highway and the recently completed extension of Kaiminani Drive (see Figures 1 and 2). Adjacent land surrounding the site, on the *makai* side of Queen Kaʻahumanu, is managed by NELHA and is dedicated to research, technology, and industry. No facilities leasing land from NELHA are directly adjacent, but several facilities are within 5,000 feet to the south, including the NELHA Gateway Center, Koyo Water, Destiny Deep Sea Water, and the West Hawaʻi Explorations Academy Public Charter School. Approximately 3,800 feet west of the project site is the nearest runway of the KOA.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils, and Geologic Hazards

Environmental Setting

The climate in the area is warm and dry, with an average temperature of 74 degrees Fahrenheit and average annual rainfall of about 16 inches (Giambelluca et al. 2014). Geologically, the site is located at the foot of Hualālai volcano, and the surface consists of barely weathered pahoehoe basalt lava flows dated from 1,500 to 3,000 years ago (Wolfe and Morris 1996). In the dry climate, soil has not yet had time to develop (U.S. Soil Conservation Service 1973).

The project site has some fissures and mounds in the pahoehoe lava and there has been major disturbance and excavation on the majority of the site. Portions of the project site were used for a borrow site during construction of the Queen Kaʻahamanu Highway. The site appears to be stable and 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 U.S. Geological Survey in this area of North Kona is Zone 4, on a scale of ascending risk from 9 to 1 (Heliker 1990:23). The hazard risk is based on the fact that Hualālai has steep slopes and is the third most historically active volcano on the island. Volcanic hazard Zone 4 areas have about 5 percent of their land area covered by lava or ash flows since the year 1800 and less than 15 percent of their land area covered by lava in the past 750 years. They are at lower risk than Zone 3 areas because the frequency of Hualālai eruptions is lower than those of Kilauea and Mauna Loa.

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

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the project site that would make the proposed commercial development within NELHA imprudent, as demonstrated by the deep commitment to ocean technology-related infrastructure represented by the NELHA development. Facility design will meet all appropriate seismic standards.

3.1.2 Flood Zones and Drainage

Existing Environment

The project site is about 1.3 miles from the ocean at an elevation of about 140 feet above sea level, outside the area affected by coastal flooding. The Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) 1551660706F (9/29/2017) shows that the project site is in Flood Zone X, outside the 100-year area of coastal flooding. The State of Hawai‘i, Department of Land and Natural Resources Flood Assessment Tool shows the project site outside the area that should be evacuated during a tsunami warning (http://gis.hawaiinfip.org/fhat/, accessed March 2018). No known areas of local (non-stream or ocean related) 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 Quality and Water Quantity

Existing Environment

Groundwater

Precipitation that is not lost through evapotranspiration or runoff into the ocean percolates into the ground to collect in aquifers before slowly making its way to the sea. As the few streams in Kona are flashy and ephemeral, underground water is the only reliable source of water supply. Most water is maintained in the basal freshwater lens that "floats" on the salt-water permeated rock below, but in some locations, such as on the slopes of the Hualālai and Mauna Loa volcanoes, substantial quantities of "high-level" water are known to occur.

The State Commission on Water Resource Management (CWRM) classification of aquifers locates this part of Kona as being in the Keauhou Aquifer System of the Hualālai Aquifer Sector. The sustainable yield of the aquifer has been estimated at 38 million gallons per day (mgd). The project site is not located above any of the nine Principal or Sole-Source aquifers identified in the U.S. EPA's Region 9 (https://archive.epa.gov/region9/water/archive/web/html/ssa.html, accessed March 2018).

The recharge area for the Keauhou Aquifer System is assumed to consist of essentially the surface area contained within the boundaries of the aquifer system. The Keauhou Aquifer System where the project is located has rainfall of less than 20 inches along the shoreline to about 125 inches in the Kahaluʻu Forest Reserve. As computed by the CWRM, groundwater recharge is limited to the contribution of rainfall within the unit. It does not include potential inflow from adjacent units, nor the contribution of fog drip in the upper forests, which studies have determined to be a considerable amount.

Surface Waters

The project site is approximately 1.5 miles from the Pacific Ocean and has no nearby surface water bodies or waters of the U.S. According to maps from the U.S. Fish and Wildlife Service confirmed by field inspection, no wetlands are present on the project site. (http://www.fws.gov/wetlands/Data/Mapper.html). Ponds and wetlands are present approximately 3 miles south at Kaloko-Honokōhau National Historical Park (NHP) (see Figure 1).

The National Park Service (NPS) has concerns about whether the sum of development in the surrounding area (which is the anchor area identified in the General Plan for most of the planned growth in North Kona, and which has a substantial number of new planned projects) could impact the ponds and coastal waters that form the NHP's resources (see March 23, 2018, NPS letter in Appendix 1). Regarding water resources, the letter highlights potential impacts from the project to groundwater quantity, polluted runoff, inadequately treated wastewater, and groundwater withdrawal.

Notable resources at the NHP include the following: Kaloko fishpond, which is being restored for traditional and productive aquaculture use for human consumption; ʻAiʻopio fishtrap, which is intensely utilized for fishing and traditional and customary cultural practices; ʻAimakapa fishpond and wetland, which is an important foraging and nesting habitat for the endangered Hawaiian Stilt and the endangered Hawaiian Coot, and overall important habitat for migratory waterfowl; and the general coastal waters, which are used by juvenile threatened green sea turtles and the endangered hawksbill sea turtle. The endangered Hawaiian monk seal is an occasional visitor to NPS waters and rests on the shoreline. Humpback whales are also seasonally seen. Brackish and saltwater ecosystems within and adjacent to the NPS are therefore important for the cultural landscape and cultural practices as well as habitat for native species, including endangered species.

Impacts and Mitigation Measures

For larger projects, NPS has concerns that its resources may be impacted in several ways. The ponds may experience increased salinity because of a development's use of water from the aquifer and thus reduction in the flow of fresh and brackish groundwater. Some municipal and private wells within the Keauhou Aquifer System utilize portions of the aquifer with a clear potential to affect groundwater flow to the NHP. As discussed below, the small scale of the proposed center and its water demand would not lead to appreciable water use, but cumulative impacts are still relevant. Of primary relevance to the discussion of water-related impacts are the NPS concerns about direct and cumulative impacts from storm water and wastewater.

Impacts to Salinity of Groundwater

An important goal of the project is minimizing water use. The project would install water efficient fixtures and implement water efficient practices both within structures and in landscaping irrigation. With these practices, the center can reduce its use to approximately 3,500 gallons per day, with about half going to landscaping irrigation. This use is the equivalent of six average single-family residences in North Kona (Hawai‘i County DWS 2010:809-29), in an aquifer being utilized by more than 10,000 homes and 1,000 commercial water accounts.

Several alternative pathways for supplying potable water to the center are available, including through NELHA's existing internal water system, which is supplied by a master meter from the Department of Water Supply. Water could also be supplied through a planned NELHA water connection at Kaiminani Drive, which is expected to be established within the next two years, or through some combination of existing and planned sources. Regardless of the pathway to the center, the water is likely to be derived from the Keauhou Aquifer System. At this point, it is not possible to determine what proportion of the water would be derived from wells that tap a portion of the aquifer that could reduce groundwater flow into the NHP. Because of the 3-mile distance of the center north of the NHP, at nearly the same elevation (see Figure 1), it is highly unlikely that any of the filtered return flow from irrigation or the septic system would recharge the groundwater feeding the NHP's ponds. In response to a comment received from the Commission on Water Resource Management on the Draft EA, any wells that would be developed by NELHA to provide water for its developments would comply with the State Water Code, Chapter 174C, HRS, and HAR Chapters 13-167 to 13-171.

There is very little potential for water use from this site to affect directly the salinity of water resources of the NHP. First, the reduction of inflow of some portion of 3,500 gallons per day needs to be considered in the context of a current average daily withdrawal for all uses in the aquifer, which totaled 14.86 mgd in 2015 (Hawai‘i County DWS 2015). Even under a "worst-case" scenario in which all 3,500 gallons of the water was derived from a well or wells that drew water from a portion of the aquifer that directly provide water to the NHP's ponds, this represents less than 0.023 percent of use. The direct effects of such withdrawal are essentially negligible. Considering the groundwater of the North Kona region as a whole, as much as half or

more of fresh water consumed by the project would return via remediated wastewater and irrigation return flow.

The use also needs to be considered from a cumulative perspective. The fast-growing North Kona District is the center of the visitor industry and real-estate development that powers the economy of the island. In this dynamic region, there are many public and private projects being planned. Each development has some potential to affect use of water in the Keauhou Aquifer System.

The guide to the effects of future developments on water use is the Hawai‘i County Water Use and Development Plan (WUDP), which projects future uses and the strategy of the County to satisfy them within the sustainable yield of the aquifer. As a result of discussions with the NPS, effects to the NHP has also become an important consideration. The County of Hawai‘i adopted by ordinance the WUPD Update dated August 2010 (2010 WUDP), and the Commission on Water Resource Management (CWRM) granted approval in December 2011. The 2010 WUDP update implemented a broad, uniform approach island-wide to conservatively evaluate the County’s land use policies set forth in the County General Plan and Zoning Code. The intent of the 2010 WUDP was to guide the County in prioritization and focus of future assessment efforts.

The 2010 WUDP identified two aquifers to be considered in an update for further evaluation and detailed assessment, including the Keauhou Aquifer Sector. The update consisted of two phases. The first phase involved the refinement of the water demand scenarios and projection. This was completed in 2015 (DWS 2015). The second phase (DWS 2016) focused on the development of source development strategies and scenarios, and also explored methods to identify traditional and customary native Hawaiian rights, cultural uses or other public trust purposes related to, affected or impacted by ground water development, and also dealt with how those impacts should be mitigated.

The 2010 WUPD forecast future demand to rise from 14.86 mgd to 27.87 mgd by 2025, at which point it would be 73.34% of the currently estimated sustainable yield of the aquifer. At some point, particularly without monitoring and mitigation, the cumulative impact of water development could be manifested in markedly reduced flows of groundwater and salinity changes of a magnitude that might affect natural resources and cultural practices. Some form of monitoring and mitigation is thus clearly necessary. The great majority of development associated with the anticipated demand scenario is expected to be supplied by the DWS system; hence, source development will principally involve DWS and its partnerships with private entities and State agencies. DWS will also be responsible for continually coordinating with the NHP and other traditional and customary uses during source development to ensure that water development and use do not impact natural and cultural resources. Throughout the WUDP planning process, DWS has envisioned a number of source development strategies to focus on meeting the anticipated demand scenario. The implementation strategies provided guidance for further integration and planning coordination of water resource management with the development of land use policies to ensure sustainable management of water resources. Strategies include requiring extensive water conservation measures of all new projects,

monitoring wells for signs of increasing salinity, and utilizing water from wells located in areas of the aquifer, or adjacent aquifers, that do not have the potential to reduce groundwater flow to the NHP. Involvement of Native Hawaiian individuals and organizations during major water project planning is also a key component (Hawai‘i County DWS 2015). At some point in the future, new development projects may be foreclosed, or alternative ways of providing water will need to occur, because of impacts to water resources that will be calculated using the latest information as each project goes through the approval process. That point has not yet arrived, and the cumulative impact of the potential withdrawal of all of the center's needed 3,500 gallons per day combined with the existing uses and reasonably foreseeable uses does not at this time require mitigation in addition to that already occurring through DWS planning and monitoring. Safeguards in place can prevent and/or mitigate impacts in the foreseeable future.

Impacts to Coastal Water Quality from Wastewater and Stormwater

Wastewater from the convenience store~~,~~ and restaurant~~, and restroom~~ would be treated with a grease interceptor before entering the wastewater treatment and disposal system in conformance with applicable provisions (HAR, Chapter 11-62, "Wastewater Systems"). The grease interceptor (also referred to as a grease trap or grease recovery device) would capture greases, oils, and solids to prevent large quantities of solidified grease from entering the wastewater treatment system. Wastewater would then pass to a fiberglass collection and treatment tank with an effluent filter which would collect and digest organic matter, provide primary wastewater treatment, and reduce wastewater contaminants including nutrients. From the collection and treatment tank, wastewater would flow into a high capacity underground leach field, consisting of leaching chambers installed in trenches and connected to the treatment tank via pipe. The lava bedrock would provide the final treatment and disposal of the treated wastewater effluent. After the effluent has passed into the bedrock, most of it would percolate downward and outward, eventually entering the shallow groundwater. This system would ensure that effluent quality would meet local, state, and federal requirements. To ensure optimal function, the grease interceptor, collection and treatment tank, and leach field would be installed per manufacturer's directions and in compliance with appropriate regulations.

Construction would involve grading of the entire site. The project would conform to Chapter 10 of the Hawai‘i County Code, which requires projects that disturb the ground prevent erosion and sedimentation and obtain grubbing/grading permits from the County Department of Public Works. Since the project will disturb an acre or more, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained by the contractor before the project commences. This permit requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff during construction, the SWPPP will describe the emplacement of a number of erosion and pollution control Best Management Practices (BMPs) for the project. These BMPs may include, but will not be limited to, the following for use during project construction:

- Minimization of soil loss and erosion by revegetation and stabilization of slopes and disturbed areas of soil, possibly using 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 leave 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.

These BMPs would ensure that construction-phase, offsite run-off sedimentation, and erosion impacts would be minimized to negligible levels.

During operation of any commercial facility, there is also the potential for storm water to impact the quality of nearby surface waters or groundwater. There are no surface waters such as gullies, streams or ponds at or near the project site, and all storm water drainage will be disposed of via drywells. Any pollutants on the parking lot have the potential, if not mitigated, to flow into groundwater. It is important to prevent spills and isolate, treat and/or remove pollutants from any residual spills prior to allowing storm water to enter drywells and undergo the natural process of slow infiltration and remediation before reaching the groundwater.

The project will have an oil-water separator to treat incidental fuel spillage associated with fueling from the site as well as the residue that accumulates on any parking lot where vehicles drive or park (see drawing in Figure 3). The capacity of the separator will be sized based on the paved area and site conditions. Drainage inlets will be placed throughout paved areas in low spots, and they will drain into the oil-water separator and then discharge to a below-grade drywell. Three drywells, each with its own separator, are currently planned. No paved ground surface water will enter a drywell without first going thru an oil-water separator. Building and canopy roof drainage will run underground via piping and discharge directly into drywells without running thru the oil-water separator.

The special case of potential impacts from fuel spills related to the fuel tanks and the extensive mitigation measures that will be utilized to prevent them are discussed in Section 3.1.7.

Given the scale of the project and the extensive, state of the art design measures to avoid or remediate water pollution at its source, meeting or exceed all regulations, no appreciable

pollution of surface water or groundwater should occur from either construction or operation of the center.

Cumulative impacts from other developments in the Keauhou Aquifer also require consideration. As discussed previously, this area was long ago designated as the growth region for Kona (Hawai‘i County Planning Department 1991). Added to the airport, housing subdivisions and Kaloko Industrial Area that existed 20 years ago have been dozens of new housing subdivisions, new industrial and commercial areas, and government facilities such as the West Hawai‘i Civic Center. The contribution of the center to the cumulative water pollution load of these uses is truly insignificant, but the point remains that in total, there is potential to adversely affect not only the groundwater but also the coastal waters and the resources they support. The mechanism to address these cumulative impacts is outside the power of the center to address, and rests with government agencies charged with establishing requirements for wastewater treatment for homes that have septic tanks and cesspools; enforcing water pollution ordinances and ensuring that Best Management Practices are conducted correctly during construction and operation of facilities; and monitoring water quality to determine if additional attention or actions are required.

3.1.4 Flora, Fauna, and Ecosystems

Existing Environment

The project site is entirely contained on very lightly vegetated pahoehoe lava, as shown in photos in Figure 2. An inspection in February 2018 by Dr. Ron Terry found the vegetation to be typical of that found by other studies on coastal Kona lava flows (Geometrician Associates 2006), consisting of the species listed in Table 1 below. The most abundant species are the non-native fountain grass (*Cenchrus setaceus*) along with the common indigenous herb ‘uhaloa (*Waltheria indica*). No threatened or endangered plant species were present or would be expected on the project site.

Table 1 Plant Species Detected on Project Site

Scientific Name	Family	Common Name	Life Form	Status*
Amaranthus spinosus	Amaranthaceae	Spiny amaranth	Herb	A
Asclepias physiocapra	Asclepiadaceae	Balloon plant	Herb	A
Cenchrus setaceus	Poaceae	Fountain grass	Grass	A
Nephrolepis sp.	Lomariopsidaceae	kupukupu	Fern	I
Reichardia brasiliensis	Rubiaceae	Mexican clover	Herb	A
Tridax procumbens	Asteraceae	Coatbuttons	Herb	A
Waltheria indica	Malvaceae	‘Uhaloa	Shrub	I

*A = alien, E = endemic, I = indigenous

No birds were observed during reconnaissance of the site, which contains very little habitat or food attractive to birds. Nevertheless, common non-native birds such as common myna (*Acridotheres tristis*) and spotted dove (*Streptopelia chinensis*) may occasionally be found on the site on occasion. No threatened or endangered birds would likely be present on the site. Although

not detected during the survey, it is possible that small numbers of the federally-listed bird species could fly or stop over in the project site: Hawaiian petrel (*Pterodroma sandwichensis*); Newell's shearwater (*Puffinus auricularis newelli*); band-rumped storm petrel (*Oceanodroma castro*); Hawaiian duck (*Anas wyvilliana*); Hawaiian stilt (*Himantopus mexicanus knudseni*); Hawaiian coot (*Fulica alai*); Hawaiian goose or nēnē (*Branta sandvicensis*); or Hawaiian moorhen (*Gallinula chloropus sandvicensis*).

No mammals were observed on the property. With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), which might forage in the general area but would not roost on the project site because of the lack of appropriate trees, 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*), feral goats (*Capra hircus*), and some species of rats and mice, such as roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), Polynesian rats (*Rattus exulans hawaiiensis*), and European house mice (*Mus musculus domesticus*), probably make occasional use of the project site, as they are common in Kona.

The Blackburn's sphinx moth (*Manduca blackburni*) has a historic range that encompasses the project area, and larvae of Blackburn's sphinx moth feed on some nonnative host plants, including tree tobacco (*Nicotiana glauca*), which grows in disturbed soil. However, no tree tobacco or other potential moth hosts were located during the biological survey of the project site.

Impacts and Mitigation Measures

No substantial adverse effects to flora and fauna would occur. The project would not involve any unshielded lighting for either construction or operation, in conformance with Hawai'i County Code § 14 – 50 et seq, which would avoid impacts to nocturnally flying Hawaiian petrels and Newell's shearwaters. Additionally, during operation the site would use lighting only where and when it is needed for safety purposes. The use of outdoor lamps with warmer colors (less blue light) and energy efficient maps and fixtures would be considered when the building is being constructed.

No impacts to federally-listed waterbirds are anticipated; however, if nests for the Hawaiian duck, Hawaii stilt, or Hawaiian coot are discovered at any point, the project's proponent would contact DOFAW staff. If one of these endangered birds were present during ongoing construction activities, then all activities within 100 feet (30 m) of the bird would cease, and the bird would also not be approached. Work may continue after the bird leaves the area of its own accord.

No impacts to Hawaiian hoary bat are expected since no potential roost sites would be impacted. The project would avoid use of barbed wire, as bat mortalities have been documented as a result of becoming ensnared by barbed wire during flight.

No impacts to the Blackburn's sphinx moth are expected, since there are no potential host plants that would attract that species of moth to the project site.

Factors that might impair urban Kona's coastal water quality and potentially affect threatened or endangered marine species are wastewater, chemical contaminants from industrial and commercial uses, and polluted runoff from streets and parking lots. As there are no surface streams in the project area and runoff directly into the ocean is generally not observed, the only potential pathway for pollutants to reach the ocean is via groundwater. Potential impacts to water quality would be minimized through wastewater and stormwater treatments described in Section 3.1.3.

The facility would not increase runoff from the project site into the ocean and would treat all wastewater in conformance with strict permit requirements in order to avoid pollution. No marked effect to water quality or other marine conditions is expected to occur as a result of the project, and no adverse effect of any sort to any species of marine life is expected.

The generation of food waste on site may attract vectors (such as flies, mosquitoes, and/or rodents). The project site will be constructed and maintained consistent with Title 11, HAR, Chapter 11-26, "Vector Control." Mats4 LLC will ensure that solid waste is picked up on a weekly basis to minimize attracting vectors. Also, Mats4 LLC would monitor and treat for vectors if detected at the site.

3.1.5 Noise

Environmental Setting

Noise on the project site is moderate to high based on its proximity to the KOA. Aside from air traffic, the main source of noise at the site is traffic traveling on the Queen Kaʻahumanu Highway and on the Kaʻiminani Drive extension, which is has been recently built.

The noise descriptor used to assess environmental noise by many federal and State of Hawaiʻi agencies, including Department of Housing and Urban Development (HUD), the Federal Aviation Administration (FAA) and the Hawaiʻi Department of Transportation (DOT), is the Day-Night Average Sound Level (DNL). DNL is a representation of the average noise during a typical day of the year. DNL levels of 55 or less are typical of quiet rural or suburban areas. DNL exposure levels of 55 to 65 are typical of urbanized areas with medium to high levels of activity and street traffic. DNL exposure levels above 65 are representative of dense urban sites and areas near large highways or airports.

Various agencies have different standards of noise compatibility. As a reference point, HUD standards are as follows:

- Acceptable. (DNL not exceeding 65 decibels) The noise exposure may be of some concern but common building constructions will make the indoor environment acceptable and the outdoor environment will be reasonably pleasant for recreation and play.

- Normally Unacceptable. (DNL above 65 but not exceeding 75 decibels) The noise exposure is significantly more severe; barriers may be necessary between the site and prominent noise sources to make the outdoor environment acceptable; special building constructions may be necessary to ensure that people indoors are sufficiently protected from outdoor noise.
- Unacceptable. (DNL above 75 decibels). The noise exposure at the site is so severe that the construction cost to make the indoor noise environment acceptable may be prohibitive and the outdoor environment would still be unacceptable.

The KOA completed 14 CFR Part 150 Noise Compatibility Program (NCP) update in April 2011, which is available online at: https://www.faa.gov/airports/environmental/airport_noise/part_150/states/hi/media/roaHawaiiKOA20110420.pdf.

Table 3 of the NCP provides recommendations for local land use compatibility with DNL sound levels. Its standards consider noise levels above 60 DNL generally incompatible with residential land uses without noise level reduction measures that reduce interior noise levels to 45 DNL or less. Commercial and government uses, as well as government services and office buildings serving the public, are considered compatible with noise levels that exceed 65 DNL only if noise reduction measures are incorporated into areas of the facility in which the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

The 14 CFR Part 150 NCP for KOA also included aircraft noise contour maps for then-current conditions (2008) as well as projections for the year 2013 and "long-range" (date undefined). These maps were developed using operational forecasts, existing aircraft flight tracks for the existing runway, and assumed flight tracks for a proposed new runway. Potential noise impacts from additional military operations at KOA were also investigated. Several relevant maps are duplicated in full in Appendix 3 of this EA. **Under all scenarios, noise at the project site is modeled to be between 55 and 60 DNL, in other words, well within the acceptable range.**

The updated 14 CFR Part 150 NCP for KOA includes measures to abate aircraft noise through pilot education, controlling land development, monitoring the impacts of noise on noncompatible land uses, and implementing and updating the program. As part of the program, DOT seeks to foster coordination between DOT Airports Division, Hawai'i County, and the State Land Use Commission regarding development, land reclassifications, and rezoning proposals near the airport so that DOT Airports Division can have the opportunity to comment on projects and their potential impact on compatible land use development.

The project would comply with Hawai'i Administrative Rules for the Department of Health, Chapter 11-46, Community Noise Control.

Impacts and Mitigation Measures

During construction of the commercial center, there would be moderate levels of noise from the operation of heavy equipment during grading and construction. In cases where construction noise is expected to exceed the State DOH "maximum permissible" property-line noise levels, builders must obtain a permit per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction. DOH reviews the proposed activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers. Mats4 LLC and/or its construction contractor will consult with DOH to determine if a permit will be required and what, if any, noise reduction measures are necessary. Mats4 LLC would also coordinate with NELHA to minimize inconvenience to activities occurring at the NELHA Gateway Center.

The gas station would generate the moderate levels of noise during operation, which would be consistent with the level of noise from traffic on Queen Kaʻahumanu Highway. No sensitive noise receptors are nearby, and there would be no operational noise impacts.

3.1.6 Air Quality and Scenic Resources

Environmental Setting

Air quality in Hawaiʻi is generally good, below criteria levels for most pollutants in most locations at almost all times. There are no State Department of Health (DOH) air monitoring stations in the immediate vicinity of the project site. The nearest DOH monitoring station is located on Konawaena School road, approximately 18 miles south of the project site. Air pollution in West Hawaiʻi is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic haze (vog) that persistently blankets North and South Kona. Minor levels of air pollution also come from urban uses including traffic and other nearby industrial activities.

Neither the project site nor any surrounding areas are mentioned in the County of Hawaiʻi General Plan as being notable for their natural beauty (County of Hawaiʻi 2005). The nearest site is the Kaloko Pond (TMK 7-3-09:2), located approximately 3.5 miles south of the project site and is not visible from the project site.

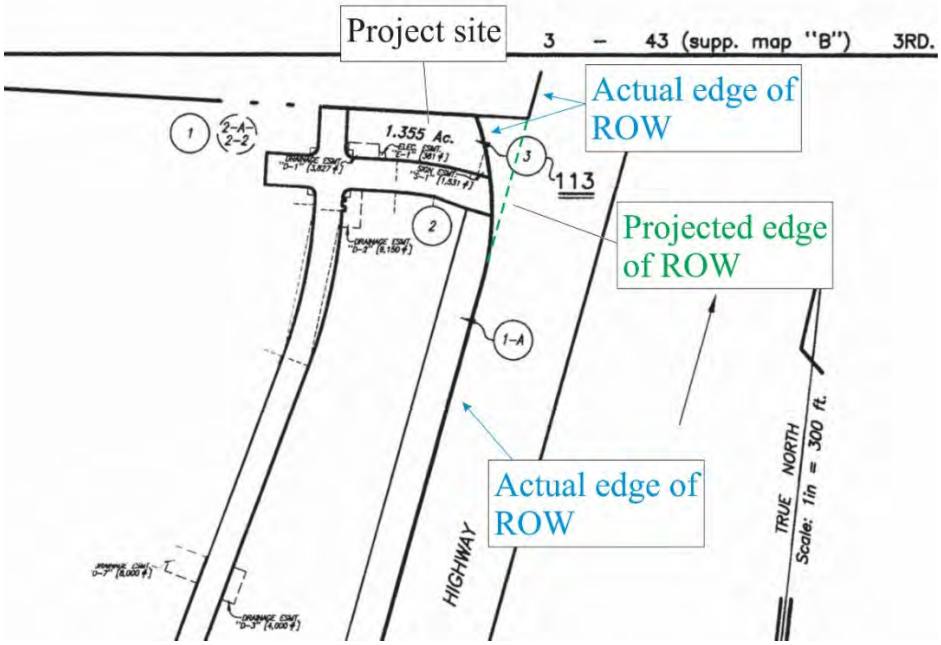
In a letter in response to early consultation (see Appendix 1), Hawaiʻi County Planning Department requested, consistent with the CDP's desire to retain open spaces, that Mats4 LLC consider a 100-foot landscaping buffer along the project parcel's Queen Kaʻahumanu Highway frontage to minimize the visual impact along the entry corridor to Kailua-Kona.

Impacts and Mitigation Measures

Short term direct and indirect impacts on air quality could potentially occur due to project construction, principally through fugitive dust from vehicle movement and soil excavation, and exhaust emissions from onsite construction equipment. Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep bare dirt surfaces in construction areas from becoming significant sources of dust. In dust prone or dust sensitive areas, other control measures such as limiting the area that can be disturbed at any given time, applying chemical soil stabilizers, mulching and/or using wind screens may be necessary. Onsite mobile and stationary construction equipment also would emit air pollutants from engine exhausts, but no sensitive receptors are present. The contractor will be required to prepare a dust control plan during construction compliant with provisions of HAR, Chapter 11-60.1, "Air Pollution Control," and Section 11-60.1-33, "Fugitive Dust."

There is a 100-foot open zoning parcel (Lot 1) that runs along the edge of the NELHA boundary with Queen Kaʻahumanu Highway (ending at Kaiminani Drive) creating an open space between NELHA land and the highway (Figure 5). The 100-foot wide lot would have extended to northern edge of the project site; however, there is a northwesterly jog in the Queen Kaʻahumanu Highway ROW that cuts off the northeastern corner of the open space. The highway does not follow this northwesterly jog (which may be a relic from an old plan), and instead continues northeast. If one projects the Queen Kaʻahumanu Highway ROW south to north across this jog, the 100-foot open buffer is partially contained in the unused portion of the Queen Kaʻahumanu Highway ROW. Since the highway is not located in the jog and NELHA would not develop in the open space lot, then the intent of the open space can be met.

Figure 5 Open Zoning Between Project Site and Queen Kaʻahumanu Highway



Also, the project includes proposed landscaping on the project parcel as shown on Figure 4 which would augment the natural feel of the development and is consistent with the NELHA Master Plan that states "the buildings in the Economic Driver zone will be of sustainable design and be attractive to tenants, visitors, and passers by." A rendering of the site is shown below as Figure 6. Therefore, impacts to scenic resources are not expected to occur.

Figure 6 Rendering of the Project Site from Queen Ka'ahumanu

3.1.7 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. There is evidence that a portion of the project site has been previously used as a borrow site for highway construction, but 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, NELHA may require a systematic assessment of the area in question to determine if further evaluation and remediation are required.

Impacts and Mitigation Measure

Potential impacts from hazardous materials from the installation and operation of underground storage tanks would be avoided through the project's compliance with HAR Title 11 Chapter 281 regulations. Impacts from potential fuel spills would be avoided through site design including oil/water separators, which is described in detail in Section 3.1.3 under "Impacts to Coastal Water Quality from Wastewater and Stormwater." Wastewater from the convenience store~~,~~ and restaurant~~, and restroom~~ would be treated with a grease interceptor before entering the wastewater treatment and disposal system in conformance with applicable provisions (HAR,

Chapter 11-62, "Wastewater Systems"). The grease interceptor would capture greases, oils, and solids to prevent large quantities of solidified grease from entering the wastewater treatment system. Wastewater would then pass to a fiberglass collection and treatment tank with an effluent filter which would collect and digest organic matter, provide primary wastewater treatment, and reduce wastewater contaminants including nutrients. From the collection and treatment tank, wastewater would flow into a high capacity underground leach field, consisting of leaching chambers installed in trenches and connected to the treatment tank via pipe. The lava bedrock would provide the final treatment and disposal of the treated wastewater effluent. After the effluent has passed into the bedrock, most of it would percolate downward and outward, eventually entering the shallow groundwater. This system would ensure that effluent quality would meet local, state, and federal requirements. To ensure optimal function, the grease interceptor, collection and treatment tank, and leach field would be installed per manufacturer's directions and in compliance with appropriate regulations.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics and Land Use Compatibility

The project would provide much-needed services for the residents of North Kona and vicinity, commuters that travel to Kona from the northern part of the island, travelers to and from the airport, and other drivers traveling along the Queen Kaʻahumanu Highway. Population as measured in the 2010 U.S. Census (the most recent U.S. census) for North Kona, a Census County Division (CCD), was 18,642 (U.S. Census Bureau 2010a). Table 2 provides information on the socioeconomic characteristics of the State of Hawaiʻi, the County of Hawaiʻi, and North Kona CCD, from the U.S. Census Bureau.

Table 2 Selected Socioeconomic Characteristics

Description	State of Hawaiʻi	County of Hawaiʻi	North Kona CCD
Total Population	1,360,301	185,079	37,875
Median age (years)	37.2	40.9	41.4
Total housing units	519,508	82,324	18,642
Median Household Income[2]	$71,977	$53,936	$65,682*
Individuals below poverty level[2]	10.8%	18.7%	13.7%*
Race and Hispanic Origin			
White alone	24.7%	33.7%	45.6%
Black or African American	1.6%	0.6%	0.5%
American Indian or Alaska Native	0.3%	0.5%	0.5%
Asian alone	38.6%	22.2%	15.3%
Native Hawaiian	5.9%	8.5%	11.2%
Two or More Races	23.6%	29.5%	23.8%
Hispanic or Latino (of any race)	8.9%	11.6%	11.3%

Source: U.S. Census Bureau 2010a, 2010b, and 2010c

[2]Source: U.S. Census Bureau 2016

*Estimates for CCDs have a high margin of error due to small population and sample size.

As discussed in Section 3.6.2, the project conforms with all land use designations. The project would also conform to the State of Hawai‘i, Office of Planning, Technical Assistance Memorandum per Federal Aviation Administration (FAA) Order 5190.6B, TAM-2016-1 issued on August 1, 2016 (http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf). If tall equipment is required on site for construction, Mats4 LLC (in coordination with NELHA) would review the criteria of FAA Form 7460-1, Notice of Proposed Construction or Alteration and submit the form, if required per guidance located on the following FAA website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

In relation to the compatibility with other aspects of airport operations, an early consultation letter from the Hawai‘i Department of Transportation (HDOT) stated that a glint and glare analysis must be submitted to review by the FAA if photovoltaic panels would be utilized in the commercial center.

Impacts and Mitigation Measure

The project is not expected to affect population size or demographics. The primary impact on socioeconomic conditions would be to provide much-needed service of a fueling station and electric vehicle charging stations, as well as a convenience store and commercial kitchen for the residents and visitors in North Kona. The photovoltaic panels that are proposed to be utilized for the project would be coated with anti-glare; therefore, no glint and glare analysis would be required. If through coordination with FAA the anti-glare coating is not sufficient to dismiss a glint/glare analysis, then this analysis would be conducted. Mats4 LLC and NELHA would ensure that all required FAA forms would be completed as part of coordination with the FAA prior to onsite construction.

3.2.2 Cultural Practices and Sites

The current study area is located in the Kekaha region within North Kona, in the *ahupua‘a* of ‘O‘oma and Kalaoa. These *ahupua‘a* were known to cross several environmental zones that are generally called *wao* in the Hawaiian language. These environmental zones include the near-shore fisheries and shoreline strand (*kahakai*) and the *kula kai*/*kula uka* (shoreward/inland plains). These regional zones were greatly desired as places of residence by the natives of the land. The following text is quoted from the Archaeological Inventory Summary (AIS) prepared for a 210-acre parcel encompassing the proposed project site (Clark et al. 2017).

Hawaiian Land Use and Resource Management Practices

“Over the generations, the ancient Hawaiians developed a sophisticated system of land and resources management. By the time ‘Umi-a-Līloa rose to rule the island of Hawai‘i in ca. 1525, the island (*moku-puni*) was divided into six districts or *moku-o-loko*. On Hawai‘i, the district of Kona is one of six major *moku-o-loko* within the island. The district of Kona itself, extends from the shore across the entire volcanic mountain of Hualālai, and continues to the summit of Mauna

Loa, where Kona is joined by the districts of Kaʻū, Hilo, and Hāmākua. One traditional reference to the northern and southern-most coastal boundaries of Kona tells us of the district's extent:

> *Mai Ke-ahu-a-Lono i ke ʻā o Kani-kū, a hōʻea i ka ʻūlei kolo o Manukā i Kaulanamauna e pili aku i Kaʻū!*—From Keahualono [the Kona-Kohala boundary] on the rocky flats of Kanikū, to Kaulanamauna next to the crawling (tangled growth of) ʻūlei bushes at Manukā, where Kona clings to Kaʻū!"

"Kona, like other large districts on Hawaiʻi, was further divided into *ʻokana* or *kalana* (regions of land smaller than the *moku-o-loko*, yet comprising a number of smaller units of land). In the region now known as Kona ʻakau (North Kona), there are several ancient regions (*kalana*) as well. The southern portion of North Kona was known as "Kona kai ʻōpua" (interpretively translated as: Kona of the distant horizon clouds above the ocean), and included the area extending from Lanihau (the present-day vicinity of Kailua Town) to Puʻuohau (now known as Red Hill). The northern-most portion of North Kona was called "Kekaha" (descriptive of an arid coastal place). Native residents of the region affectionately referred to their home as *Kekaha-wai-ʻole o nā Kona* (Waterless Kekaha of the Kona District), or simply as the *āina kaha*. It is within this region of Kekaha, that the lands of ʻOʻoma and Kalaoa are found."

"The *ahupuaʻa* were also divided into smaller individual parcels of land (such as the *ʻili*, *kōʻele*, *māla*, and *kīhāpai*, etc.), generally oriented in a *mauka-makai* direction, and often marked by stone alignments (*kuaiwi*). In these smaller land parcels the native tenants tended fields and cultivated crops necessary to sustain their families, and the chiefly communities with which they were associated. As long as sufficient tribute was offered and *kapu* (restrictions) were observed, the common people, who lived in a given ahupuaʻa had access to most of the resources from mountain slopes to the ocean. These access rights were almost uniformly tied to residency on a particular land, and earned as a result of taking responsibility for stewardship of the natural environment, and supplying the needs of the *aliʻi*."

"Entire *ahupuaʻa*, or portions of the land were generally under the jurisdiction of appointed *konohiki* or lesser chief-landlords, who answered to an *aliʻi-ʻai-ahupuaʻa* (chief who controlled the *ahupuaʻa* resources). The *aliʻi-ʻai-ahupuaʻa* in turn answered to an aliʻi ʻai moku (chief who claimed the abundance of the entire district). Thus, *ahupuaʻa* resources supported not only the *makaʻāinana* and *ʻohana* who lived on the land, but also contributed to the support of the royal community of regional and/or island kingdoms. This form of district subdividing was integral to Hawaiian life and was the product of strictly adhered to resources management planning. In this system, the land provided fruits and vegetables and some meat in the diet, and the ocean provided a wealth of protein resources. Also, in communities with long-term royal residents, divisions of labor (with specialists in various occupations on land and in procurement of marine resources) came to be strictly adhered to. It is in this cultural setting that we find the present study area."

"The *ahupuaʻa* of ʻOʻoma (historically, ʻOʻoma 1st and 2nd) and Kalaoa (historically, Kalaoa 1st – 5th) are two of some twenty ancient *ahupuaʻa* within the *ʻokana* of Kekaha-wai-ʻole. The place name ʻOʻoma can be literally translated as concave. The place name Kalaoa can be literally

translated as "the choker (as a stick for catching eels)". To date, no tradition explaining the source of the place names has been located. A few place names within ʻOʻoma were discussed in traditional accounts, thus we have some indication of the histories associated with that land."

"While there are only limited native accounts that have been recorded about ʻOʻoma, we do know that the land was so esteemed, that during the youth of Kauikeaouli (later known as Kamehameha III), the young prince—son of Kamehameha I and his sacred wife Keōpūolani—was taken to be raised near the shore of ʻOʻoma under the care of his stewards from infancy until he was five years old (Kamakau 1961:263-264). Again, this is a significant part of the history of this land, as great consideration went into all aspects of the young king's upbringing."

Native Traditions and Historical Accounts of ʻOʻoma, Kalaoa and the Kekaha Region

"This section of the study presents *moʻolelo* - native traditions and historical accounts (some translated from the original Hawaiian by Kepā Maly) - of the Kekaha region that span several centuries. There are very few accounts that have been found to date, that specifically mention ʻOʻoma and Kalaoa. Thus, narratives that describe neighboring lands within the Kekaha region help provide an understanding of the history of these *ahupuaʻa*, describing features and the use of resources that were encountered on the land."

"It may be that the reason there are so few accounts for ʻOʻoma, and Kalaoa is that those *ahupuaʻa* may have been considered marginal settlement areas, occupied only after the better situated lands of Kekaha—those lands with the sheltered bays, and where fresh water could be easily obtained—were populated. As the island population grew, so too did the need to expand to more remote or marginal lands. This thought is found in some of the native traditions and early historic accounts below. However, as people populated the Kekaha lands, they came to value its fisheries—those of the deep sea, near shore, and inland fishponds."

Punia: A Tale of Sharks and Ghosts of Kekaha

"The native account of Punia (also written Puniaiki – cf. Kamakau 1964), is perhaps among the earliest accounts of the Kekaha area, and in it is found a native explanation for the late settlement of Kekaha. The following narratives are paraphrased from Fornander's Hawaiian Antiquities and Folklore (Fornander 1959):

> Punia was born in the district of Kohala, and was one of the children of Hina. One day, Punia desired to get lobster for his mother to eat, but she warned him of Kaiʻaleʻale and his hordes of sharks who guarded the caves in which lobster were found. These sharks were greatly feared by all who lived along, and fished the shores of Kohala for many people had been killed by the sharks. Heeding his mother's warning, Punia observed the habits of the sharks and devised a plan by which to kill each of the sharks. Setting his plan in motion, Punia brought about the deaths of all the subordinate sharks, leaving only Kaiʻaleʻale behind. Punia tricked Kaiʻaleʻale into swallowing him whole. Once inside Kaiʻaleʻale, Punia rubbed two sticks together to make a fire to cook the sweet potatoes he had brought

with him. He also scraped the insides of Kai‘ale‘ale, causing great pain to the shark. In his weakened state, Kai‘ale‘ale swam along the coast of Kekaha, and finally beached himself at Alula, near the point of Maliu in the land of Kealakehe. The people of Alula, cut open the shark and Punia was released.

At that time Alula was the only place in all of Kekaha where people could live, for all the rest of the area was inhabited by ghosts. When Punia was released from the shark, he began walking along the trail, to return to Kohala. While on this walk, he saw several ghosts with nets all busy tying stones for sinkers to the bottom of the nets, and Punia called out in a chant trying to deceive the ghosts and save himself:

Auwe no hoi kuu makuakane o keia kaha e!	Alas, O my father of these coasts!
Elua wale no maua lawaia o keia wahi.	We were the only two fishermen of this
Owau no o ko‘u makuakane,	place (Kaha).
E hoowili aku ai maua i ka ia o ianei,	Myself and my father,
O kala, o ka uhu, o ka palani,	Where we used to twist the fish up in the
O ka ia ku o ua wahi nei la,	nets,
Ua hele wale ia no e maua keia kai la!	The kala, the uhu, the palani,
Pau na kuuna, na lua, na puka ia.	The transient fish of this place.
Make ko‘u makuakane, koe au.	We have traveled over all these seas,
	All the different place, the holes, the runs.
	Since you are dead, father, I am the only
	one left.”

“Hearing Punia’s wailing, the ghosts said among themselves, “Our nets will be of some use now, since here comes a man who is acquainted with this place and we will not be letting down our nets in the wrong place.” They then called out to Punia, “Come here.” When Punia went to the ghosts, he explained to them, the reason for his lamenting; “I am crying because of my father, this is the place where we used to fish. When I saw the lava rocks, I thought of him.” Thinking to trick Punia and learn where all the ku‘una (net fishing grounds) were, the ghosts told Punia that they would work under him. Punia went into the ocean, and one-by-one and two-by-two, he called the ghosts into the water with him, instructing them to dive below the surface. As each ghost dove into the water, Punia twisted the net entangling the ghosts. This was done until all but one of the ghosts had been killed. That ghost fled and Kekaha became safe for human habitation.”

“One of the earliest datable accounts that describes the importance of the Kekaha region fisheries comes from the mid-sixteenth century, following ‘Umi-a-Līloa’s unification of the island of Hawai‘i under his rule. Writing in the 1860s, native historian, Samuel Mānaiakalani Kamakau told readers about the reign of ‘Umi, and his visits to Kekaha:

> ‘Umi-a-Liloa did two things with his own hands, farming and fishing...and farming was done on all the lands. Much of this was done in Kona. He was noted for his skill in fishing and was called Pu‘ipu‘i a ka lawai‘a (a stalwart fisherman). Aku fishing was his

> favorite occupation, and it often took him to the beaches (Ke-kaha) from Kalahuipua‘a to Makaula[1]. He also fished for ‘ahi and kala. He was accompanied by famed fishermen such as Pae, Kahuna, and all of the chiefs of his kingdom. He set apart fishing, farming and other practices.”

“In his accounts of events at the end of ‘Umi’s life, Kamakau (1961) references Kekaha once again. He records that Ko‘i, one of the faithful supporters and a foster son of ‘Umi, sailed to Kekaha, where he killed a man who resembled ‘Umi. Ko‘i then took the body and sailed to Maka‘eo in the ahupua‘a of Keahuolu. Landing at Maka‘eo in the night, Ko‘i took the body to the cave where ‘Umi’s body lay. Replacing ‘Umi’s body with that of the other man, Ko‘i then crossed the lava beds, returning to his canoe at Maka‘eo. From there, ‘Umi’s body was taken to its’ final resting place… (Kamakau 1961:32-33).”

“As a child in ca. 1812, Hawaiian historian John Papa I‘i passed along the shores of Kekaha in a sailing ship, as a part of the procession by which Kamehameha I returned to Kailua-Kona from his residency on O‘ahu. In his narratives, I‘i described the shiny lava flows and fishing canoe fleets of the “Kaha” (Kekaha) lands:

> The ship arrived outside of Kaelehuluhulu, where the fleet for aku fishing had been since the early morning hours. The sustenance of those lands was fish.
>
> When the sun was rather high, the boy [I‘i] exclaimed, “How beautiful that flowing water is!” Those who recognized it, however, said, “That is not water, but pahoehoe. When the sun strikes it, it glistens, and you mistake it for water…”
>
> Soon the fishing canoes from Kawaihae, the Kaha lands, and Ooma drew close to the ship to trade for the pa‘i‘ai (hard poi) carried on board, and shortly a great quantity of aku lay silvery-hued on the deck. The fishes were cut into pieces and mashed; and all those aboard fell to and ate, the women by themselves.
>
> The gentle Eka sea breeze of the land was blowing when the ship sailed past the lands of the Mahaiulas, Awalua, Haleohiu, Kalaoas, Hoona, on to Oomas, Kohanaiki, Kaloko, Honokohaus, and Kealakehe, then around the cape of Hiiakanoholae… (I‘i 1959:109-110).”

Twentieth Century Land Tenure in the Vicinity of the Current Study Area

“*Kama‘āina* who have participated in oral history interviews (see Rechtman and Maly 2003), describe on-going travel between the uplands and coastal lands of ‘O‘oma, Kalaoa and other *ahupua‘a* in Kekaha throughout the twentieth century. The primary method of travel between 1900 and 1947, was by foot or on horse or donkey, and those who traveled the land, were generally residents of the ‘O‘oma, Kalaoa, Kohanaiki Homesteads and other lands in the immediate vicinity. The 1924 U.S.G.S. Keāhole Point quadrangle shows a trail/road, labeled “Kauhini Road” descending from the uplands of Kalaoa 4th/5th through the study area to Wawaloli (beach/pond)

at the shore of ʻOʻoma 1st. An upper portion of this road, labeled "Alanui Kauhini" is shown on an 1889 map prepared by J.S. Emerson. Kauhini Road was likely named for a former resident of the Kalaoa/ʻOʻoma area, who had applied for the Grant No. 1599 in the uplands of those *ahupuaʻa* in 1855, but who moved away before the grant was patented (see above, Summary of Land Tenure Described in Grant Records). On the 1924 U.S.G.S. map, Kauhini Road is shown crossing the realigned 1847 Government Road and continuing to the near shore alaloa. On a 1930 Treasury Department map of a portion of North Kona, the full extent of Kauhini Road, both the original (existing) and realigned (never built) 1847 Government Road, and the Kalaoa-ʻOʻoma Homestead lots and road are shown. The near shore trail on both maps is depicted along the coast between the ahupuaʻa of Honokāhau and Kalaoa 4th, where it terminates at the Keāhole Point lighthouse and light keeper's residence."

"The lighthouse at Keāhole Point started as a wooden mast beacon constructed sometime after 1906, and in 1910 the Territory of Hawaiʻi set aside the land at Keāhole Point for use as a lighthouse reservation (Moore et al. 1999). According to Dean (1991), John Makahi serviced the light from 1909 to 1912 and Samuel Leleo was the light keeper until 1914 when a "new" concrete lighthouse was constructed. Between 1915 and 1919 the light was attended to by Haliaka Kahananui, a resident of Kalaoa *mauka* (Kahananui received Grant No. 3750, Homestead Lot 47, in Kalaoa 4th along the southern edge of Kauhini Road in 1895). Kahananui "was responsible for refilling and lighting the gas light in the lighthouse on a weekly basis," following "a trail to the coast, walking or riding on horseback the 3 miles from her home". Her service ended when the oil lamps were replaced with battery powered electric lights."

"After World War II, retired military vehicles became available to the public, and after that time, the Alanui Aupuni and some of the smaller trails along the shore were modified for vehicular traffic. The primary routes of travel through the 1960s, descended from upland Kohanaiki and Kaloko, or came out of Kailua. In the 1950s, Huʻehuʻe Ranch bulldozed a Jeep road to the shore at Kaloko. The ranch, and some individuals who went to the shore either as a part of their ranch duties, or for leisure fishing along the coast, used this Jeep road. The 1959 U.S.G.S. Keāhole Point quadrangle shows that Kauhini Road and the near shore *alaloa* were also converted to "Jeep Trails" by this time. The *Alanui Aupuniwas* modified for vehicular travel from Kailua, to at least as far as Honokāhau and Kaloko *ahupuaʻa*, and remained in use through the 1970s."

"The coastal lands of Kekaha in the vicinity of the current study area, many of which became State-owned lands after statehood in 1959, remained untouched by modern development through the 1960s. It was not until 1968 when construction began on a section of the new Queen Kaʻahumanu Highway right-of-way between Kealakehe Ahupuaʻa and the newly planned Keāhole Airport on State-owned lands in Awalua, ʻŌhiki, Puʻukala, Kau, Makaʻula, Haleohiu, Hamanamana, and Kalaoa 1st-4th ahupuaʻa that the landscape of Kekaha began to drastically change. Work on the Keāhole Airport facility began on May 27, 1969, when the first 1,000 pound ceremonial charges of dynamite signaled the start of construction, and was completed thirteen months later, when the airport was dedicated on July 1, 1970. The Keāhole Point airport facility has substantially expanded since its 1970 dedication. The Queen Kaʻahumanu Highway,

between the airport and Kawaihae, was completed by ca. 1973, once again opening up travel across the kula kai (shoreward plains) of Kekaha to the general public."

"The construction of the Queen Kaʻahumanu Highway to Keāhole Airport opened up access to the Kekaha lands in the vicinity of the current study area, and created opportunities for further development of these lands. Recognizing the area's potential for ocean related research, thermal energy conversion demonstration, and aquaculture, the State of Hawaiʻi, in 1974, established the NELH at Keāhole Point. The initial NELH site consisted of an access road easement from the highway and 322 acres of coastal land adjacent to (south and west of) the airport. The access road (Makako Bay Drive) was in place by 1977, and construction of the initial offices, research facilities, and an Ocean Thermal Energy Conversion (OTEC) plant at NELH had begun by ca. 1980. After the construction of the NELH access road, Kauhini Road and the coastal Jeep Road were no longer regularly used to access the shoreline in the vicinity of the current study area. In 1986, in an effort to provide sites for the commercialization of research activities initiated at NELH, the State added an additional 548 acres of land (including the current study area) for the creation of the HOST Park. These two properties, although their missions were complementary, were administered separately until 1990, when the State Legislature (Chapter 227D, HRS) consolidated management of NELH and HOST Park's 870 acres of lands and facilities under a single state agency, the NELHA. Today, with several deep water pipelines pumping seawater to the facility, there are more than forty tenants engaged in aquaculture, water bottling, energy projects, research, and education on the NELHA lands."

Cultural Resources and Practices Related to the NELHA Commercial Center Site

As part of the proposed project, ASM Affiliates Principal Investigator (Robert B. Rechtman, Ph.D.) consulted with two individuals (Mr. Isaac "Paka" Harp and Ms. Nicole Lui) of native Hawaiian ancestry that have shown past and current interest in the archaeology and cultural history of the project site. Mr. Harp was actively involved in the Section 106 consultation for the Queen Kaʻahumanu Highway widening project, a segment of which, borders the project site. Mr. Harp was also a consulted party with respect to the Archaeological Inventory Survey (AIS) (Clark et al. 2017) that was conducted on behalf of the NELHA that included the project site. Ms. Lui is a cultural practitioner and kamaʻāina to the North Kona area, and is part of the team that has been providing cultural monitoring services for the Queen Kaʻahumanu Highway widening project. ASM Affiliates also contacted the Shane Nelson at the Office of Hawaiian Affairs - West Hawaiʻi. Shane was provided with project background information and he explained that with respect to this project, his office would defer to the consultations conducted with Mr. Harp and Ms. Lui.

Both Mr. Harp and Ms. Lui met individually with Robert B. Rechtman on site. The meeting with Ms. Lui took place March 21, 2018, and the meeting with Mr. Harp was on March 29, 2018. Both were shown a copy of the current proposed development plan as well as the archaeological site location map from the Clark et al. (2017) AIS.

Impacts and Mitigation Measures

The proposed project site does not appear to have been used for traditional cultural purposes in the recent memory of any of the extensive list of interviewees consulted as part of oral history research performed for nearby projects, and consultation for this project has not revealed any use. It is reasonable to conclude that based upon the limited range of resources and the proposed mitigation to all affected resources, including rare plants, the exercise of native Hawaiian rights related to gathering, access or other customary activities will not be affected, and there will be no adverse effect upon cultural practices or beliefs. ~~This~~The Draft EA ~~has been~~was distributed to agencies and groups who might have knowledge in order to confirm this finding.

3.2.3 Historic and Archaeological Resources

Existing Resources

An archaeological inventory survey for a 210-acre area that encompasses the project site was conducted by an archaeologist permitted with the State of Hawai‘i in 2014. Although 73 sites were found within the 210 acres, none of these are located in the project site. Sites located in the vicinity of the project include trails and roads, lava tubes and lava blisters, rock rings, cairns, and pahoehoe excavations. The survey results were accepted by the State Historic Preservation Division (SHPD) on January 9, 2017. Following the survey, a Preservation Plan was prepared for two sites (Gotay and Rechtman 2016) and accepted by SPHD on October 11, 2016.

Impacts and Mitigation

No historic or archaeological resources would be directly affected by the project. Archaeological monitoring was conducted by ASM Affiliates for the construction of the Kaiminani Road (which runs along the southern edge of the proposed project site and then south along Kahilihili Street down to Makako Bay Drive), and no additional archaeological sites were identified (Tam Sing and Rechtman 2017). Even though no sites were found during previous monitoring in the vicinity, there is still a potential for encountering a lava tube in the project site. The project would incorporate archaeological monitoring during the initial phase of surface disturbing activities in previously undisturbed sections of the site to minimize potential impacts to unanticipated discoveries.

3.3 Infrastructure

3.3.1 Utilities and Public Services including Wastewater Treatment

Existing Facilities and Services

Electrical power to the project site would be supplied by Hawai‘i Electric Light Company. Telephone and data service are available from both Oceanic Cable and Hawaiian Telephone.

The proposed wastewater treatment system is described in detail in Section 3.1.3. Solid waste would be hauled off site by a private contractor on a regular-basis to a solid waste management facility in compliance with the applicable provisions (HAR, Chapter 11-58.1, "Solid Waste Management Control"). No burning of wastes would occur on site during construction or during operation of the commercial center. Consistent with the NELHA Master Plan (NELHA 2011), which states that tenants should have waste management, recycling, and waste reduction plans, Mats4 LLC will ensure that solid waste is picked up on a weekly basis and cardboard, aluminum cans, and plastic bottles generated onsite would be recycled.

Fire, police and emergency management services are available in this part of North Kona. A police station is located in Kona, about five miles south of the project site. The Makalei Fire Station is located approximately six miles north east of the project site. EMT services are provided by the Hawai‘i County Fire Department. Emergency medical services are available at Kona Community Hospital, approximately 17 miles to the south.

Impacts and Mitigation Measures

Electricity and telephone/data service will be installed in underground lines along existing lines. A new septic system would be installed to service the commercial center.

3.3.2 Traffic

Existing and Proposed Facilities

As explained in the 2000 Highway Capacity Manual (Institute of Transportation Engineers 2000), the concept of level-of-service (LOS) is often used to describe the quality of traffic flow. There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. 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. LOS is usually applied to peak hour traffic, which is the "worst-case" scenario.

A traffic study for the project was conducted by Stantec (2018) that included analysis of the project site's intersection at Kaiminani Drive and Queen Ka‘ahumanu Highway, as well as an intersection north and one intersection south of the project site (see Appendix 2 for detailed diagrams of intersections). The traffic study considered traffic associated with existing and future facilities at NELHA (such as the commercial center) in the traffic projections. The study concluded that the Queen Ka‘ahumanu Highway intersections serving NELHA, including the intersections of Queen Ka‘ahumanu Highway with Kaiminani Drive, would operate at Level of Service E or better in 2018.

Queen Ka‘ahumanu Highway is a link in the principal highway system that circles the island. The HDOT is currently widening the roadway from two to four lanes North of Kealakehe Parkway up until just North of Keahole Airport Drive. The highway was previously widened to

four lanes South of Kealakehe Parkway to Henry Street. The widening project, including the portion directly adjacent to the project site, and that would affect the proposed project is underway and is due to be complete in the fourth quarter of 2018. Given the current and ongoing impacts to traffic from the highway widening project, several comments from the public were received during early scoping identified concerns with impacts to traffic from the project (Appendix 1). Specifically, HDOT requested that access in to the commercial center be as far away from the Kaiminani Drive and Queen Ka‘ahumanu Highway intersection as possible to minimize queueing issues at the intersection, and that onsite parking be arranged so traffic entering the site does not have similar queueing issues. In their comment, Hawaiian Landscapes Inc. also expressed concern about the project to traffic and requested that turn lanes, merge lanes, etc. be considered to minimize delays.

Impacts and Mitigation

In summary, the traffic analysis indicates that there will be no significant increase to LOS to the roadway network due to the proposed project development through the Horizon Year of 2028. The only intersection which demonstrates an increase in delay of more than a couple of seconds-per-vehicle is the Queen Ka‘ahumanu Highway and Kaiminani Drive intersection. The only movement at this section where this is the case, is the Northbound Left Turn movement. In the Future (2028) without Project condition, the Queen Kaahumanu Northbound Left movement is projected to impose 32.1 seconds-per-vehicle, while in the Future (2028) with Project condition, this movement is projected to impose 37.1 seconds-per-vehicle of delay. It should be noted that with current construction along the highway, the traffic signal for this intersection was not operating at normal standards during the traffic study and at the end of construction there will be two northbound left turn lanes. Actual delays may be less than the slight delays predicted by the TIAR. Therefore, the TIAR results should be considered a conservative estimate of future conditions. Following highway construction, traffic should improve and predicted effects to traffic are further minimized.

The project is currently proposing a right-in and right-out intersection from Kaiminani Drive to minimize these issues to the highway. The final traffic plan would take into consideration impacts to the traffic on the highway. The second turn lane as part of the highway widening described above would also minimize these impacts.

To clarify the comments received from HDOT during early consultation regarding the status of Phase 1 roads (Appendix 1), construction has been completed making the Queen Ka‘ahumanu and Kaiminani Drive intersection a four-leg intersection with Kaiminani Drive extension as the fourth, western (*makai*) leg. Additionally, Kahilihili Street extension has been built connecting Kaiminani Road with Makako Bay Drive.

3.4 Secondary and Cumulative Impacts

3.4.1 Potential Secondary Impacts

Secondary, or indirect, impacts are defined by Council on Environmental Quality (CEQ) as "effects which are caused by the [proposed] action and are later in time or further removed in distance, but are still reasonably foreseeable. Indirect effect may include growth-inducing effects and other effects related to changes in the pattern of land use, population density, or growth rate…"

No secondary impacts are anticipated should the proposed project proceed. Urban development will proceed in North Kona regardless of the proposed project. While the proposed project would help provide an additional service in the region, factors affecting development such as demand, property prices, and disposable income levels are likely to have a far greater effect on development pressures.

Given the factors above and the coverage of the existing roadway network, the proposed project is not constraining proposed development, and proceeding with the project would have only a minor effect on overall development trends in North Kona. Therefore, the proposed project would not induce secondary land uses, population changes, or effects on public facilities.

3.4.2 Potential Cumulative Impacts

Cumulative impacts are defined by CEQ as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Past Actions

With several deep water pipelines pumping seawater at an average rate of 20,000 gallons per minute to the facility, there are more than forty tenants engaged in aquaculture, water bottling, energy projects, research, and education on the NELHA lands. The West Hawai‘i Explorations Academy moved to its new location in 2012, just south of the project site, on NELHA lands.

Present and Reasonably Foreseeable Future Actions

As described above, there is current construction associated with the widening of the Queen Ka‘ahumanu Highway. Additionally, various projects to expand and improve the KOA are likely to occur over the next few years. Neither of these projects are likely to interact in any substantial way other than traffic, which is considered above in Section 3.3.2. Additional facilities at

NELHA are also anticipated, but even if several projects occur at once, the relatively minor scale of the projects and the spacing of lots within NELHA would prevent adverse affects from accumulating.

Groundwater and Biological Resources

The NPS has expressed concern that future development of NELHA/HOST Park lots might draw down groundwater and cause increased salinity in the existing anchialine pools leading to changes in the species composition.

Under both the No Action Alternative and the Proposed Action, development is likely to occur at NELHA/HOST Park; therefore, the NPS's concern is not unique to the proposed project. Industrial development and growth in general is proposed to occur in the Kona District in the coming years in accordance with Kona Community Development Plan. The County of Hawai‘i Department of Water Supply and NELHA have addressed the water needs for the project without negatively affecting the anchialine pools at the Kaloko-Honokōhau National Historical Park. As discussed in Section 3.1.3, from a cumulative perspective the fast-growing North Kona District includes many public and private projects being planned. Each development has some potential to affect use of water in the Keauhou Aquifer System. The guide to the effects of future developments on water use is the Hawai‘i County WUDP, which projects future uses and the strategy of the County to satisfy them within the sustainable yield of the aquifer. DWS has envisioned a number of source development strategies through the WUDP planning process to focus on meeting the anticipated demand scenario to ensure sustainable management of water resources. The cumulative impact of the potential withdrawal of all of the center's needed 3,500 gallons per day combined with the existing uses and reasonably foreseeable uses does not at this time require mitigation in addition to that occurring through DWS planning and monitoring. Safeguards in place can prevent and/or mitigate impacts in the foreseeable future.

Historic Resources

In the past, NELHA has complied with historic preservation regulations prior to development. This has resulted in the preservation of archaeological resources, including the preparation of two Preservation Plans for resources within the 210-acre parcel that encompasses the project site, one for a section of the Māmalahoa Trail and one for Sites 29272 and 29273 within NELHA/HOST Park. Previous Preservation Plans have been prepared and implemented for other resources on NELHA land. Archaeological monitoring was most recently done in conjunction with construction of the latest access roads (in portions of TMKs (3) 7-3-043:072 and 073) to avoid impacts to previously undiscovered cultural and archaeological resources during road construction. NELHA has coordinated with and will continue to coordinate with the State Historic Preservation Division (SHPD) regarding the development of its HOST Park internal roadway network and on development on its lots. Through the regulatory processes associated with historic resources, NELHA will consider and address (avoid, minimize, and/or mitigate) potential impacts to historic resources by future development at HOST Park.

Land Use

The project does not require any changes to land use designations and will not cumulatively affect land use because it is already consistent with community plans.

Cumulative Summary

In combination with past, present, and reasonably foreseeable future actions this project is not expected to negatively impact how the surrounding area beyond NELHA develops. The proposed project is consistent with NELHA's Master Plan and would not result in cumulative effects on the environment. NELHA is an existing facility and its development has been previously addressed in numerous environmental documents which is anticipated by the community.

3.5 Irreversible and Irretrievable Commitments of Resources

A commitment of resources is irreversible when primary or secondary impacts limit the future options for a resource; an irretrievable commitment refers to the use or consumption of resources that are neither renewable nor recoverable for future use.

All the land to be used by the proposed project is within NELHA and, therefore, has either been cleared for, or is anticipated to become commercial in nature. No new land would be irreversibly and irretrievably committed as a result of the proposed project.

The proposed project would require the commitment of natural, physical, and human resources to plan, design, construct, and operate. Diesel fuel to power equipment would be used during proposed project construction and building materials, such as concrete and asphalt, would be consumed. Some of those materials could ultimately be recycled for reuse, those that are not would be expended. Additionally, fuel would be transported to, stored at, and sold from the gas station during the operation of the commercial center.

3.6 Unavoidable Adverse Impacts

No unavoidable adverse impacts from the project are anticipated.

3.7 Unresolved Issues

NELHA is currently in discussion with Board of Water Supply regarding efforts to resolve the water supply situation. In their comment letter on the Draft EA, DWS will monitor the reductions in NELHA's current water usage to determine whether additional water can be available for new uses on NELHA land.

3.8 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, Department of Public Works, Engineering Division, Grading Permit
- County of Hawai‘i, Planning Department Plan Approval
- County of Hawai‘i, Leeward Planning Commission, SMA Use Permit (potential)
- State Department of Health, National Pollutant Discharge Elimination System Permit
- State Department of Health, Individual Wastewater System Approval
- State Historic Preservation Division, Chapter 6e Historic Sites Clearance

3.9 Consistency with Government Plans and Policies

3.9.1 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 gas station, convenience store, and electric vehicle charging site.

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.

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

The project site is located within the Urban State Land Use District, and is within the County’s General Industrial (MG-3a) zoning district and 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 SMA Use Permit from the Leeward Planning Commission. NELHA believes that the project is covered under the existing SMA Use Permit 239; however, this determination is subject to review and discussion by the Planning Department.

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 commercial center would incorporate measures to prevent pollution and promote recycling.

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 prepared for implementation during construction and submitted to SHPD for acceptance.

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 (by maintaining a buffer between the project site and the highway and by landscaping as part of project design) 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 within the industrial zoning district in the LUPAG. As discussed above in this section, the project has been found to be consistent with this designation. The proposed facility would provide much needed services and thereby minimize travel times for residents who would have to drive further for gas, convenience store items, and charging station for electric vehicles.

3.9.3 Kona Community Development Plan

The Kona Community Development Plan (CDP) encompasses the judicial districts of North and South Kona 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 General Plan now requires that a Community Development Plan shall be adopted by the County Council as an "ordinance," giving the CDP the force of law. This is in contrast to plans created over past years, adopted by "resolution" that served only as guidelines or reference documents to decision-makers. The Kona CDP was adopted in September 2008 by the County Council. The version referenced in this Environmental Assessment is at: http://www.hawaiicountycdp.info/north-and-south-kona-cdp/cdp-final-drafts.

The Plan has many elements and wide-ranging implications, but there are several major strategies that embody the guiding principles related to the economy, energy, environmental quality, flooding and other natural hazards, historic sites, natural beauty, natural resources and shoreline, housing, public facilities, public utilities, recreation, transportation, and land use. The project's proposed commercial use is generally consistent with all aspects of the Kona CDP. It is in keeping with the Plan's guiding principles in Chapter 3, including particularly item No. 6:

Provide infrastructure and essential facilities concurrent with growth.

Also by providing electric vehicle charging stations, the project would offer connections to alternative modes of transportation, an aspect of sustainability specifically discussed in the Guiding Principles section of the Plan in Item 3.2 (2).

Furthermore, Economic Policy 1.3 "NELHA as Stimulus for Energy and Research Industry" supports commercial development of the mauka NELHA area by businesses incubated at the NELHA's research area, and the project would provide much needed services in the area.

Two public comment letters were received on the Draft EA expressing concern with the project not being in conformance with the Kona CDP and contributing to sprawl in the area. As stated above, the project is consistent with the Kona CDP's guiding principle of providing infrastructure and essential facilities concurrent with growth. Additionally, the project is located within the Urban State Land Use District and the use is consistent with the County's General Industrial (MG-3a) zoning district. The use of the property for a commercial center is also consistent with NELHA's purpose as defined in HRS Chapter 227-D and is located in the Economic Driver zone identified in the NELHA Master Plan which was never planned as open space.

3.6.4 Consistency with HRS Chapter 227-D

HRS Chapter 227D states the following:

> "§227D-2 Establishment of the natural energy laboratory of Hawaii authority; purpose. (a) There is established the natural energy laboratory of Hawaii authority, which shall be a body corporate and politic and an instrumentality and agency of the State. The authority shall be placed within the department of business, economic development, and tourism for administrative purposes, pursuant to section 26-35. The purpose of the natural energy laboratory of Hawaii authority shall be to facilitate research, development, and commercialization of natural energy resources and ocean-related research, technology, and industry in Hawaii and to engage in retail, commercial, or tourism activities that will financially support that research, development, and commercialization at a research and technology park in Hawaii. Its duties shall include:
>
> 1) Establishing, managing, and operating facilities that provide sites for:
> (A) Research and development;

(B) Commercial projects and businesses utilizing natural resources, such as ocean water or geothermal energy;
(C) Compatible businesses engaged in scientific and technological investigations, or retail, commercial, and tourism activities; and
(D) Businesses or educational facilities that support the primary projects and activities…"

~~In that t~~The Commercial Center provides ancillary and accessory uses and services that support~~s~~ research and development of natural energy resources and ocean-related research, technology, and industry in Hawaii. This project is consistent with the Master Lease from the State of Hawaii which provides NELHA the flexibility to develop, maintain, and operate an ocean-related high technology industrial park in accordance with Chapter 206M, HRS. Accordingly, it ~~is~~ would be a legal and suitable tenant of NELHA with an existing and approved sub-lease.

PART 4: DETERMINATION

Based on the findings below, the NELHA has determined that the proposed project will not have any significant effect in the context of HRS 343, HRS and Section 11-200-12 of the HAR, and has issued a Finding of No Significant Impact (FONSI).

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 commercial development does not curtail 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 services.
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.* There are no rare, threatened, or endangered species or suitable habitat for these species present at the project site and no effects to these species are anticipated.
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 over a mile 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 commercial center will have solar electricity and incorporate in its design an effective use of natural light and ventilation, and the employment of local and renewable resources, as practical and possible.

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ENVIRONMENTAL ASSESSMENT

Matsuyama Commercial Center on NELHA Land

APPENDIX 1a

Comments in Response to Early Consultation

Harry Kim
Mayor

Paul K. Ferreira
Police Chief

Kenneth Bugado Jr.
Deputy Police Chief

County of Hawai`i

POLICE DEPARTMENT
349 Kapi'olani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-2389

February 22, 2018

Ms. Michelle Lefebrve
Stantec Consulting Services Inc.
PO Box 191
Hilo, Hawaii 96721

Dear Ms. Lefebrve:

RE: ENVIRONMENTAL ASSESSMENT EARLY CONSULTATION FOR PROPOSED COMMERCIAL CENTER,
ISLAND OF HAWAI'I, NORTH KONA DISTRICT, TMK: 7-3-043:113

This is in response to your letter dated February 15, 2018, regarding a request for input and comments on site conditions and issues regarding the above mentioned location.

Thank you for allowing the Hawai'i Police Department to make comments regarding this project. At this time, the Hawai'i Police Department has no comments.

Should you have questions, please contact Captain Gilbert Gaspar Jr., Commander of the Kona District, at 326-4646, extension 299.

Sincerely,

PAUL K. FERREIRA
POLICE CHIEF

From:	Sugihara, Doriann
To:	Lefebvre, Michele
Subject:	HFD Comments
Date:	Thursday, February 22, 2018 11:23:31 AM
Attachments:	_ENVIRONMENTAL ASSESSMENT 022218 Stantec Consulting, Access and Water Supply TMK 7-3-043_113 North Kona.pdf

Aloha Michelle~

Please see attached Hawai‘i Fire Department comments to Environmental Assessment Early Consultation for Proposed Commercial Center in North Kona District. A hard copy will not be mailed.

If you have any questions please feel free to call Captain Baybayan at 808-323-4760.

Thank you,

Doriann Sugihara
Fire Administration Office
(808) 932-2900

“Everyday may not be good….but there is something good in everyday!”

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

February 22, 2018

Michele Lefebvre PhD
Stantec Consulting Services Inc.
P.O. Box 191
Hilo, Hawai'i 96721

Dear Ms Lefebvre:

SUBJECT: **Environmental Assessment Early Consultation for Proposed Commercial Center, Island of Hawai'i, North Kona District TMK: 7-3-043:113**

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

NFPA 1, UNIFORM FIRE CODE, 2006 EDITION
Note: Hawai'i State Fire Code, National Fire Protection Association 2006 version, with County of Hawai'i 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) 323-4760.

DARREN J. ROSARIO
Fire Chief

CB:ds

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 18-047

February 28, 2018

Ms. Michele Lefebvre, PhD
Environmental Scientist
Stantec Consulting Services, Inc.
P.O. Box 191
Hilo, Hawaii 96721
Email: michele.lefebvre@stantec.com

Dear Ms. Lefebvre:

SUBJECT: Early Consultation Environmental Assessment (EC EA) for Proposed Commercial Center, North Kona, Hawaii
TMK: 7-3-043:113

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your EC EA to our office via email on February 16, 2018.

We understand from the EC EA summary that *"Mats4 LLC plans to construct and operate a commercial complex comprising the following: a filling station with six fuel pumps; a convenience retail store of 2,450 square feet (sf) and 130 sf of restrooms; and a commercial kitchen and restaurant consisting of 2,500 sf interior, plus 600 sf of exterior covered seating area, and 600 sf of exterior uncovered (open) seating area. Two electric vehicle charging stations are to be initially installed with provisions for additional stations in future. Space is also being provided for a future hydrogen fueling station. In addition to temporary and electric vehicle charging spaces, 37 permanent parking spaces would be provided, two of which would be ADA accessible. Road and drainage improvements would be conducted, and an individual wastewater system in compliance with State Department of Health regulations would be built."*

Hawaii's environmental review laws require Environmental Assessments (EAs) and Environmental Impact Statements (EISs) to consider health in the discussion and the mitigation measures to reduce negative impacts. In its definition of 'impacts,' §11-200-2, Hawaii Administrative Rules (HAR) includes health effects, whether primary (direct), secondary (indirect), or cumulative. Further, §11-200-12(b)(5), HAR, lists public health as one of the criteria for determining whether an action may have a significant impact on the environment.

We advocate that you consider health from a broad perspective; one that accounts for the social, economic, and environmental determinants of health and wellbeing. Community well-being can be impacted by access to physical activity, health care, feelings of social connectedness and safety. Design solutions that take these factors into consideration positively contribute to the social determinants of health in a community, improving the well-being of those who live there by influencing health promoting behaviors. Social determinants contribute to preventable chronic diseases such as asthma, diabetes, obesity, and cardiovascular disease.

An example of social influences include access to safe pedestrian corridors such as pathways, sidewalks, bike lanes, greenways and open space. §11-200-17(h), HAR, says EISs must discuss how proposed actions may conform or conflict with any policies for the affected area. This includes Hawaii's 2009 Complete Streets law, which requires the state and counties to establish policies to accommodate all users of the road, no matter age, ability, or mode of transportation. In 2015, Hawaii passed Act 97 which amended Hawaii's Renewable Portfolio Standards by setting a

goal for Hawaii to become one hundred percent renewable by the year 2045. To reach this goal Hawaii should transform its transportation sector from the use of fossil fuels to renewable fuel, electric vehicles (EV)s, and public transit systems including bikeshare programs. To address "range anxiety" and facilitate the adoption of EVs, it is essential that EV charging stations be added to any planned parking areas open to the EV driving public. Plans should strive to encourage the use of personal bicycles though the development of designated bike lanes and class A bike trails. All efforts should be made to reduce harmful vehicle emissions, reduce vehicle miles travelled (VMT's), encourage alternative modes of transport and increase physical activity.

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 to support sustainable healthy design are provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

If you haven't already, EPO recommends that you review the new Healthy Communities Policy Guide: https://planning-org-uploaded-media.s3.amazonaws.com/document/Healthy-Communities-Policy-Guide.pdf, Plan4health website: http://plan4health.us and the free, on-demand, six part Plan4Health webinar series available on the American Planning Association website.

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.

We suggest you review the requirements of the Clean Water Branch (Hawaii Administrative Rules {HAR}, Chapter 11-54-1.1, -3, 4-8) and/or the National Pollutant Discharge Elimination System (NPDES) permit (HAR, Chapter 11-55) at: http://health.hawaii.gov/cwb. If you have any questions, please contact the Clean Water Branch (CWB), Engineering Section at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov. If your project involves waters of the U.S., it is highly recommended that you contact the Army Corps of Engineers, Regulatory Branch at: (808) 835-4303.

Please note that all wastewater plans must conform to applicable provisions (HAR, Chapter 11-62, "Wastewater Systems"). We reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please review online guidance at: http://health.hawaii.gov/wastewater and contact the Planning and Design Section of the Wastewater Branch (WWB) at (808) 586-4294.

If temporary fugitive dust emissions could be emitted when the project site is prepared for construction and/or when construction activities occur, we recommend you review the need and/or requirements for a Clean Air Branch (CAB) permit (HAR, Chapter 11-60.1 "Air Pollution Control"). Effective air pollution control measures need to be provided to prevent or minimize any fugitive dust emissions caused by construction work from affecting the surrounding areas. This includes the off-site roadways used to enter/exit the project. The control measures could include, but are not limited to, the use of water wagons, sprinkler systems, and dust fences. For questions contact the Clean Air Branch via e-mail at: Cab.General@doh.hawaii.gov or call (808) 586-4200.

Any waste generated by the project (that is not a hazardous waste as defined in state hazardous waste laws and regulations), needs to be disposed of at a solid waste management facility that complies with the applicable provisions (HAR, Chapter 11-58.1 "Solid Waste Management Control"). The open burning of any of these wastes, on or off site, is strictly prohibited. You may wish you review the Minimizing Construction & Demolition Waste Management Guide at: http://health.hawaii.gov/shwb/files/2016/05/constdem16.pdf Additional information is accessible at: http://health.hawaii.gov/shwb. For specific questions call (808) 586-4226.

If noise created during the construction phase of the project may exceed the maximum allowable levels (HAR, Chapter 11-46, "Community Noise Control") then a noise permit may be required and needs to be obtained before the commencement of work. Relevant information is online at: http://health.hawaii.gov/irhb/noise EPO recommends you contact the Indoor and Radiological Health Branch (IRHB) at (808) 586-4700 with any specific questions.

The property may harbor vectors which may disperse to the surrounding areas when the site is cleared. In accordance with Title 11, HAR, Chapter 11-26, "Vector Control", the applicant shall ascertain the presence or absence of rodents on the property. Should the presence of vectors be determined, the applicant shall eradicate the vectors prior to clearing the site.

The Hawaii Disability and Communication Access Board (DCAB) recommends the inclusion of access for persons with disabilities through all phases of design and construction. New construction and alteration work shall comply with all applicable accessibility requirements. Projects covered by §103-50, Hawaii Revised Statutes, and HAR Title 11 Chapter 216 shall seek advice and recommendations from DCAB on any construction plans prior to commencing with construction. If you have any questions please contact DCAB at (808) 586-8121 or dcab@doh.hawaii.gov.

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.

To better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed an 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.

We hope this information is helpful. If you have any questions please contact us at DOH.epo@doh.hawaii.gov or call us at (808) 586-4337. Thank you for the opportunity to comment.

Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Environmental Planning Office

LM:nn

Attachment 1: Office of Environmental Quality Control (OEQC) viewer (of some past EA's, EIS's in area)
Attachment 2: U.S. EPA EJSCREEN Report for Project Area

NOTICE:
Please note that after serving 6+ years as Planner VI, managing the Environmental Planning Office (EPO), it is with sadness that I inform you that EPO will be closed on May 2nd due to lack of Federal EPA funding for the Manger, Public Participation Coordinator and Secretary II positions. The EPO website, to which so many of our land use+ letters and documents refer will, I hope, remain "live" but will have a banner stating that the site will no longer be updated. I believe the DOH.EPO@doh.hawaii.gov email will be removed.

Starting May 3rd, I look forward to connecting with you in my new role as the Senior Planner at the Office of Environmental Quality Control (OEQC). My email will remain the same but my street address and phone number will change. From what I understand, my old emails will be removed. The phone number for OEQC is (808) 586-4185 and address is 235 South Beretania Street, Suite 702, Honolulu, Hawaii, 96813.

Attachment 1: Office of Environmental Quality Control (OEQC) viewer (of some past EA's, EIS's in area)

Attachment 2: U.S. EPA EJSCREEN Report for Project Area

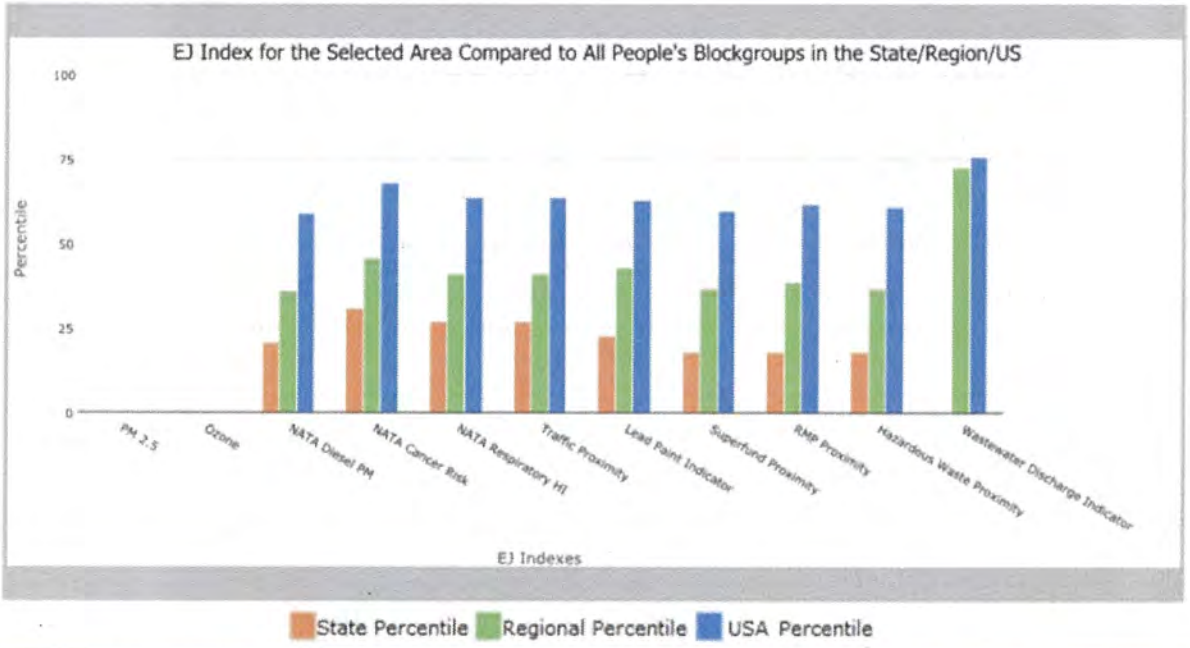
EJSCREEN Report (Version 2017)

1 mile Ring Centered at 19.725600,-156.033813, HAWAII, EPA Region 9

Approximate Population: 56

Input Area (sq. miles): 3.14

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	21	36	59
EJ Index for NATA* Air Toxics Cancer Risk	31	46	68
EJ Index for NATA* Respiratory Hazard Index	27	41	64
EJ Index for Traffic Proximity and Volume	27	41	64
EJ Index for Lead Paint Indicator	23	43	63
EJ Index for Superfund Proximity	18	37	60
EJ Index for RMP Proximity	18	39	62
EJ Index for Hazardous Waste Proximity	18	37	61
EJ Index for Wastewater Discharge Indicator	N/A	73	76



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 2017)

1 mile Ring Centered at 19.725600,-156.033813, HAWAII, EPA Region 9

Approximate Population: 56

Input Area (sq. miles): 3.14

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0

EJSCREEN Report (Version 2017)

1 mile Ring Centered at 19.725600,-156.033813, HAWAII, EPA Region 9

Approximate Population: 56

Input Area (sq. miles): 3.14

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	9.9	N/A	9.14	N/A
Ozone (ppb)	N/A	N/A	N/A	41.8	N/A	38.4	N/A
NATA* Diesel PM (µg/m³)	0.0159	0.149	11	0.978	<50th	0.938	<50th
NATA* Cancer Risk (lifetime risk per million)	25	34	11	43	<50th	40	<50th
NATA* Respiratory Hazard Index	0.52	1	11	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	9.4	1000	17	1100	11	590	16
Lead Paint Indicator (% Pre-1960 Housing)	0.0034	0.16	15	0.24	16	0.29	10
Superfund Proximity (site count/km distance)	0.0036	0.1	12	0.15	0	0.13	0
RMP Proximity (facility count/km distance)	0.042	0.39	5	0.98	2	0.73	3
Hazardous Waste Proximity (facility count/km distance)	0.0037	0.1	12	0.12	0	0.093	0
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0	0.04	N/A	13	59	30	40
Demographic Indicators							
Demographic Index	41%	51%	18	47%	42	36%	64
Minority Population	51%	77%	11	59%	41	38%	68
Low Income Population	31%	26%	66	36%	46	34%	49
Linguistically Isolated Population	3%	6%	45	9%	32	5%	60
Population With Less Than High School Education	6%	9%	41	17%	27	13%	30
Population Under 5 years of age	10%	6%	84	7%	81	6%	83
Population over 64 years of age	12%	16%	36	13%	58	14%	48

* 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.

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

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

March 9, 2018

Ms. Michele Lefebvre, PhD
Stantec Consulting Services Inc.
P.O. Box 191
Hilo, HI 967201

Dear Ms. Lefebvre:

Subject: Pre-Environmental Assessment Consultation for a Proposed Commercial Center
Tax Map Key 7-3-043:113

This is in response to your Pre-Environmental Assessment Consultation request dated February 15, 2018.

Please be informed that the existing water system within the Natural Energy Laboratory Hawai'i Authority (NELHA) Access Road from the Queen Ka'ahumanu Highway intersection to the subject properties is privately owned and operated. The existing water system is served by the Department with a master meter.

The Department cannot provide any additional water at this time. Extensive improvements and additions, which may include, but not be limited to source, storage, booster pumps, transmission, and distribution facilities, would be required. Currently, sufficient funding is not available from the Department for such improvements and no time schedule is set.

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

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

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

County of Hawai'i
PLANNING DEPARTMENT

March 16, 2018

Ms. Michele Lefebvre, PhD.
Stantec Consulting Services, Inc.
P.O. Box 191
Hilo, HI 96721

Dear Ms. Lefebvre:

SUBJECT: Environmental Assessment Early Consultation for proposed Commercial Center
TMK: (3) 7-3-043:113, O'oma, North Kona

We have the following comments in response to your letter received February 20, 2018, regarding the above matter.

The subject parcel is within the Urban State Land Use District, and is within the County's General Industrial (MG-3a) zoning district. The uses generally described in your letter are permissible in these districts, provided that any retailing activity is only an accessory use to one or more specifically permitted use, and not a principal use itself (among the others) in the General Industrial zoning district. Determination of accessory or principal use status for a particular proposed use such as retailing typically occurs during review of an application to the Planning Department for Plan Approval, a review process required prior to eligibility for applying for grading or building permits. This determination is primarily based on the Department's assessment of the relative scale of a proposed accessory use and its relevance to the principal use(s) to which it is identified as being accessory.

The site is also within the County of Hawai'i's Special Management Area (SMA) and accordingly is subject to provisions of Rule 9 of the County of Hawai'i Planning Commission's Rules of Practice and Procedures pursuant to the authority of Chapter 205A of the Hawai'i Revised Statutes. Based on the general information provided in your letter, a SMA Use Permit from the Leeward Planning Commission will be required. Such permit must be obtained prior to any site disturbance activities, and prior to application for any other agency permits or approvals.

Finally, the site is within the planning area of the Kona Community Development Plan (2008). Although the Kona CDP does not provide specific direction as to commercial, industrial or other uses in this location, we recommend that you review the Kona CDP to ensure project compliance with its various objectives and policies. We particularly note the Kona CDP's desire to retain the traditional characteristics of Kona's open spaces to the maximum extent possible. In support of CDP objectives

and policies relating to doing so, and consistent with the approximately 100-foot deep "Open" zoning district band extending part way into the subject parcel and for most of the distance south to Kailua-Kona along the *makai* side of the highway, a landscaping buffer should be considered, and may be required, along the subject parcel's Queen Ka'ahumanu Highway frontage to mitigate the visual impact along this entry corridor to Kailua-Kona. The form and density of such proposed landscaping is typically reviewed as part of the aforementioned Plan Approval application.

Thank you for providing us this opportunity for early general comments. We reserve the right to comment further once the draft environmental assessment is released.

Should you have any questions, please contact Keola Childs of this department at (808) 323-4780.

Sincerely

MICHAEL YEE
Planning Director

CKC:jaa
P:\wpwin60\CZM\Letters\2018\7-3-043-113 Commercial Center_Resp. to COR-18-116857.doc

From:	Nakamura, Darlene K
To:	Lefebvre, Michele
Cc:	Miller, Kim E
Subject:	Request for Comments - Mats4 LLC"s Proposed Commercial Center - Hawaii
Date:	Thursday, March 22, 2018 9:45:44 AM
Attachments:	Mats4 LLC Commercial Complex 3.20.18.pdf

To: Stantec Consulting, Inc.
Attn: Ms. Michele Lefebvre

Attached are DLNR's comments to the above-entitled subject matter.

Thank you,
Darlene

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

March 20, 2018

Stantec Consulting Inc.
Attention: Ms. Michele Lefebvre
P.O. Box 191
Hilo, Hawaii 96721

via email: michele.lefebvre@stantec.com

Dear Ms. Lefebvre:

SUBJECT: **Mats4 LLC**'s Environmental Assessment Early Consultation for Proposed Commercial Center within the NELHA property near Kona International Airport located at North Kona, Island of Hawaii; TMK: (3) 7-3-043:113

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) Division of Forestry & Wildlife, (c) Commission on Water Resource Management, and (d) Office of Conservation & Coastal Lands on the subject matter. Should you have any questions, please feel free to call Darlene Nakamura at (808) 587-0417. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosures
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

February 26, 2018

MEMORANDUM

TO:

FROM

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

TO

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Environmental Assessment Early Consultation for Proposed Commercial Center within the NELHA property near Kona International Airport
LOCATION: North Kona, Island of Hawaii; TMK: (3) 7-3-043:113
APPLICANT: Stantec Consulting Services Inc. on behalf of **Mats4 LLC**

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **March 16, 2018.**

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 Darlene Nakamura at 587-0417. Thank you.

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

Signed: _____

Print Name: Carty S. Chang, Chief Engineer

Date: 3/8/18

Attachments
cc: Central Files

2018 MAR -9 AM 11:13
STATE OF HAWAII
NATURAL RESOURCES
STATE PLANNING

'18 FEB 26 AM 10:02 ENGINEERING
LAND DIVISION

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji

Ref: Environmental Assessment Early Consultation for Proposed Commercial Center within the NELHA property near Kona International Airport, North Kona, Island of Hawaii; TMK: (3) 7-3-043:113

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 Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency 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.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 3/2/12

DAVID Y. IGE
GOVERNOR OF HAWAII

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

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

Michele Lefebvre
Environmental Scientist
Stantec Consulting Services Inc.
P.O. Box 191
Hilo, Hawaii

March 8, 2018

Dear Michele Lefebvre,

The Division of Forestry and Wildlife has received your inquiry regarding the proposed commercial center located in the North Kona District, at TMK 7-3-043:113 west of the intersection of Kaiminani Drive and Queen Ka'ahumanu Highway. The proposed project would include construction and operation of a commercial complex with a six fuel pump filing station, a 2,450 square foot convenience retail store, a 2,500 square foot commercial kitchen and restaurant, 1,200 square foot seating area, and 37 permanent parking spaces.

The State and Federally listed Hawaiian hoary bat or ʻŌpeʻapeʻa (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the proposed project. DOFAW recommends to avoid using barbed wire, as bat mortalities have been documented as a result of becoming ensnared by barbed wire during flight. Hawaiian hoary bats roost in both exotic and native trees. If any trees are planned for removal during the bat breeding season there is a risk of injury or mortality to juvenile bats. To minimize the potential for impacts to this species, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to breeding Hawaiian hoary bats.

The State and Federally listed Blackburn's Sphinx Moth (*Manduca blackburni*) has a historic range that encompasses the project area. Larvae of Blackburn's sphinx moth (BSM) feed on many nonnative hostplants that include tree tobacco (*Nicotiana glauca*) which grows in disturbed soil. To avoid harm to BSM, DOFAW recommends removing plants less than one meter in height or during the dry time of the year. If you remove tree tobacco over one meter in height or disturb the ground around or within several meters of these plants they must be checked thoroughly for the presence of eggs and larvae. If any BSM are found in areas to be disturbed please contact this office. DOFAW recommends that a vegetation survey be conducted to determine the presence of plants preferred by Blackburn's Sphinx Moth.

State and Federally listed waterbirds such as the Hawaiian duck (*Anas wyvilliana*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), Hawaiian goose or Nēnē (*Branta sandvicensis*) and Hawaiian moorhen (*Gallinula chloropus sandvicensis*) may occur in the vicinity of the proposed project site. If a nest is discovered at any point, please contact DOFAW staff. If a bird is present during ongoing construction activities, then all activities within 100 feet (30 m)

of the bird should cease, and the bird should also not be approached. Work may continue after the bird leaves the area of its own accord.

DOFAW notes that artificial lighting can adversely impact seabirds that may pass through the area at night causing disorientation which could result in collision with manmade artifacts or grounding of birds. If nighttime lighting is required DOFAW recommends that any lights used be fully shielded and downward facing to minimize impacts.

We appreciate your efforts to work with our office for the conservation of native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact James Cogswell, Wildlife Program Manager, at (808) 587-4187 or James.M.Cogswell@hawaii.gov.

Sincerely,

James Cogswell
Wildlife Program Manager

DAVID Y. IGE
GOVERNOR OF HAWAII

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

2018 FEB 26 PM 2:50

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2018 MAR 14 PM 12:21
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

February 26, 2018

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
_X_ Div. of Forestry & Wildlife
___Div. of State Parks
_X_ 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: Environmental Assessment Early Consultation for Proposed Commercial Center within the NELHA property near Kona International Airport
LOCATION: North Kona, Island of Hawaii; TMK: (3) 7-3-043:113
APPLICANT: Stantec Consulting Services Inc. on behalf of **Mats4 LLC**

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **March 16, 2018.**

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 Darlene Nakamura at 587-0417. Thank you.

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

Signed: /s/ Jeffrey T. Pearson, P.E.

Print Name: Deputy Director

Date: March 12, 2018

Attachments
cc: Central Files

FILE ID: RED. 4793.8
DOC ID: 19615

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

March 12, 2018

REF: RFD.4793.8

TO: Mr. Russell Tsuji, Administrator
Land Division

FROM: Jeffrey T. Pearson, P.E., Deputy Director
Commission on Water Resource Management

SUBJECT: Environmental Assessment Early Consultation for Proposed Commercial Center within the NELHA property near Kona International Airport

FILE NO.: RFD.4793.8
TMK NO.: (3) 7-3-043:113

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://dlnr.hawaii.gov/cwrm.

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☒ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☒ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EAP as having high water efficiency can be found at http://www.epa.gov/watersense.

☒ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://planning.hawaii.gov/czm/initiatives/low-impact-development/

☒ 6. We recommend the use of alternative water sources, wherever practicable.

☒ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.

☒ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at

http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

☐ 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

☐ 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

☐ 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.

☐ 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☐ 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.

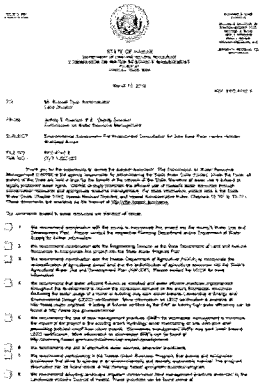
☐ 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☒ 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☒ OTHER: The DEA should discuss the projected water demands for the project, both potable and non-potable, and provide the calculations used to estimate demands. The DEA should identify the proposed water source(s) to support the project Water conservation and efficiency measures to be implemented should also be discussed.

If you have any questions, please contact Lenore Ohye of the Commission staff at 587-0216.



Doc Reviews (2) RFD.4792.3 Joint Base Pearl Harbor Hickam Wahiawa Annex / RFD.4793.8 Commercial Center NELHA property near Kona International Airport

Adobe Sign Document History 03/13/2018

Created:	03/12/2018
By:	Kathy Yoda (kathy.s.yoda@hawaii.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAA0wSSg1sa5FpNC6blgsDmBFzVsxGGzDD1

"Doc Reviews (2) RFD.4792.3 Joint Base Pearl Harbor Hickam Wahiawa Annex / RFD.4793.8 Commercial Center NELHA prop erty near Kona International Airport" History

Document created by Kathy Yoda (kathy.s.yoda@hawaii.gov)
03/12/2018 - 4:19:31 PM HST- IP address: 132.160.239.30

Document emailed to Jeffrey Pearson (jeff.pearson@hawaii.gov) for signature
03/12/2018 - 4:20:36 PM HST

Document viewed by Jeffrey Pearson (jeff.pearson@hawaii.gov)
03/13/2018 - 3:21:45 PM HST- IP address: 132.160.239.30

Document e-signed by Jeffrey Pearson (jeff.pearson@hawaii.gov)
Signature Date: 03/13/2018 - 3:23:49 PM HST - Time Source: server- IP address: 132.160.239.30

Signed document emailed to all eligible parties.
03/13/2018 - 3:23:49 PM HST

ETS
STATE OF HAWAI'I

HA-18-164

DAVID Y. IGE
GOVERNOR OF HAWAII

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

RECEIVED
OFFICE OF CONSERVATION
AND COASTAL LANDS
2018 FEB 26 A 11:35
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

February 26, 2018

MEMORANDUM

~~FROM~~
~~TO:~~

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

RECEIVED
LAND DIVISION
2018 MAR -8 AM 10:17
DEPT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

TO!
~~FROM:~~ Russell Y. Tsuji, Land Administrator
SUBJECT: Environmental Assessment Early Consultation for Proposed Commercial Center within the NELHA property near Kona International Airport
LOCATION: North Kona, Island of Hawaii; TMK: (3) 7-3-043:113
APPLICANT: Stantec Consulting Services Inc. on behalf of **Mats4 LLC**

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **March 16, 2018.**

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 Darlene Nakamura at 587-0417. Thank you.

Parcel w/in SLU URBAN
staff note: CON DISTRICT
adjacent - please take
care not to cross
property line to the
North

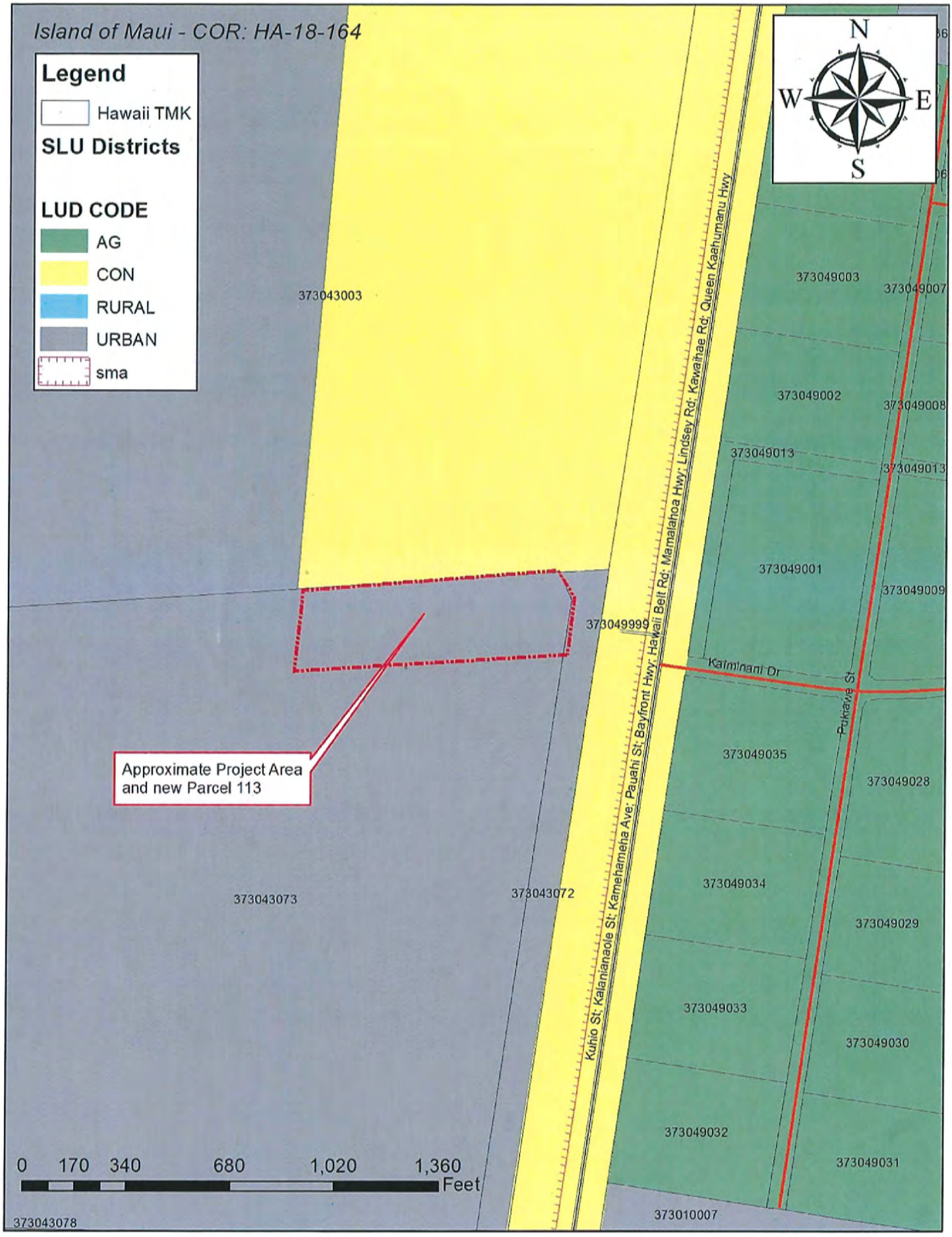
( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: _____

Print Name: ALEX J. ROY

Date: 3-7-18

Attachments
cc: Central Files


Island of Maui - COR: HA-18-164
Legend
Hawaii TMK
SLU Districts
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373049999
Kaiminani Dr
Pukiawe St
Kuhio St; Kalanianaole St; Kamehameha Ave; Pauahi St; Bayfront Hwy; Hawaii Belt Rd; Mamalahoa Hwy; Lindsey Rd; Kawaihae Rd; Queen Kaahumanu Hwy
Approximate Project Area and new Parcel 113
373049035
373049028
373049034
373049029
373049033
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373049032
373049031
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373043072
373010007
373043078
0 170 340 680 1,020 1,360
Feet

United States Department of the Interior

NATIONAL PARK SERVICE
Kaloko-Honokōhau National Historical Park
73-4786 Kanalani Street, # 14
Kailua-Kona, Hawai‘i 96740

IN REPLY REFER TO:
1.D. (2018-01)

March 23, 2018

Michele Lefebvre, PhD
Stantec Consulting Services Inc.
P.O. Box 191
Hilo, Hawai‘i 96721

Subject: Environmental Assessment Early Consultation for Proposed Commercial Center, Island of Hawai‘i, North Kona District, TMK: 7-3-043:113

Dear Dr. Lefebvre:

Thank you for providing the National Park Service (NPS) with the opportunity to provide input on the development of a Draft Environmental Assessment (EA) for a planned commercial complex comprising the following: a filling station with six fuel pumps; a convenience retail store of 2,450 square feet (sf) and 130 sf of restrooms; and a commercial kitchen and restaurant consisting of 2,500 sf interior, plus 600 sf of exterior covered seating area, and 600 sf of exterior uncovered (open) seating area. Two electric vehicle charging stations are to be initially installed with provisions for additional stations in future. Space is also being provided for a future hydrogen fueling station. In addition to temporary and electric vehicle charging spaces, 37 permanent parking spaces would be provided. Road and drainage improvements are proposed as a part of this project. An individual wastewater system in compliance with State Department of Health regulations is also proposed. The Natural Energy Laboratory of Hawai‘i Authority is the lessee and the property located near Kona International Airport west of the intersection of Kaiminani Drive and Queen Ka‘ahumanu Highway.

While the proposed project is considerable distance (~ 2.5 miles) from Kaloko-Honokōhau National Historical Park, contaminants, water, air, fish, birds, insects, etc. move; and our coastal natural and cultural resources in West Hawai‘i are fragile.

Congress established Kaloko-Honokōhau National Historical Park (Park) in 1978 to preserve, interpret, and perpetuate traditional native Hawaiian activities and culture by protecting the cultural and natural resources within the Park (16 U.S.C. § 396d(a)). The Park contains more than 450 known archeological and cultural sites, including several heiau, networks of ancient and historic trails, seawalls, more than 180 anchialine pools, two Hawaiian fishponds with associated wetlands, and a fishtrap. The land and waters within the Park provide habitat for approximately 17 federally listed, and candidate species for listing, under the Endangered Species Act. ‘Aimakapā Fishpond and wetland are listed as “Core Wetlands” by the U.S. Fish & Wildlife

Service for the recovery of two endangered waterbird species, the Hawaiian stilt (*Himantopus mexicanus knudseni*) and the Hawaiian coot (*Fulica americana alai*), and are important habitat for migratory waterfowl. Kaloko Fishpond is a loko kuapā and is being restored so that it can be managed as a traditional Hawaiian fishpond. In addition to the fishponds and pools, the Park boundary encompasses 596 acres of marine waters and coral reef habitat.

Approximately 150,000 visitors per year visit the Park (https://irma.nps.gov/Stats/). Local residents, cultural practitioners, and visitors from around the world come to experience Kaloko-Honokōhau's unique seascape, cultural and natural history, and to understand and exercise traditional Hawaiian practices.

Nighttime Lighting

The NPS Natural Sounds and Night Skies Division has six principles of sustainable lighting that go beyond minimizing and downshielding. We would like to suggest that projects planners and designers consider a full suite of measures that would more fully protect resources and values from artificial light. Lights should be of a color, intensity, placement, directionality, and operational cycle to minimize both impacts to nocturnal species and the natural visual character of the night. In designing, selecting, and operating outdoor lighting, the following approaches can achieve fully a sustainable solution.

1) Light only **where** it is needed
2) Light only **when** it is needed
3) **Shield** lights and direct them downward
4) Use the **minimum amount** of light necessary
5) Select lamps with **warmer colors** (less blue light)
6) Select the most **energy efficient** lamps and fixture

Impacts to the natural night-sky from lighting should be addressed in the Draft EA. Natural lightscapes are vital to the protection of wilderness character, fundamental to the historical and cultural context, and critical for Park wildlife. This project's contribution to the cumulative night-sky impacts to Kaloko-Honokōhau NHP should be analyzed.

Potable and Non-Potable Water Systems

The Draft EA should identify the sources of drinking and irrigation the water for the project and analyze the impacts of water withdrawal on groundwater-dependent ecosystems. The NPS is concerned about the direct and cumulative impacts of groundwater withdrawals on the cultural and natural resources within the Park that are dependent upon groundwater flow. The NPS requests that the Draft EA include information as to the location of the source of water for the project, the amount of water required for the project, and how that amount adds cumulatively to the current usage of groundwater and the proposed needs of the surrounding developments. Although the water demand for this project may be small given this project's size, the NPS notes that this project is only one of many projects that are proposed in the vicinity, and that the projected cumulative impacts of these withdrawals will be significant.

Wastewater Treatment

The Draft EA should thoroughly analyze the direct, indirect, and cumulative impacts of the disposal of treated wastewater on aquatic and marine ecosystems. The individual wastewater system's ability to adequately remove nutrients, pharmaceuticals and personal care products, and function as designed beyond the initial phase of operation should be analyzed.

Non-Point Source Pollution and Surface Water Drainage

The Draft EA should address, in detail, how polluted runoff from parking lots, driveways, and other surfaces will be controlled and treated. The proposed project is located in highly permeable lava with few accumulated soils. Rain and runoff carry pollutants quickly to groundwater, to coastal anchialine pools, and into nearshore waters. Although average rainfall is ~20 inches per year, rainfall accumulation is typically concentrated in a few intense events that cause a pulse of pollution flushing to drainage systems, to the water table, and into nearshore waters. For over a decade, Hawai‘i County and the Hawai‘i Land Use Commission have recognized the need to implement additional measures to control nonpoint source pollution flowing into the Park's inland and nearshore waters and surrounding areas (LUC Docket A00-732; COH Ord 02-114and 04-110). Standard county, state and federal regulations for drainage wells (i.e. dry wells) are designed to address flood control but not to prevent polluted surface water runoff from impacting the inland and coastal waters. Best management practices should therefore be discussed in the Draft EA.

Cumulative Impacts

The proposed project will contribute to the growing cumulative impacts from development adjacent to the Park and in the surrounding area. Therefore, the Draft EA should thoroughly analyze how the proposed project will contribute to the cumulative impacts, especially for those topics listed above, from development near the Park and along the Kona coast.

If you have any questions regarding this letter, please contact Dr. Jeff Zimpfer of my staff (808-329-6881 x1500 or jeff_zimpfer@nps.gov).

Sincerely,

Rhonda Loh
Acting Superintendent

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROY CATALANI
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

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

IN REPLY REFER TO:
DIR 0204
STP 8.2374

April 2, 2018

Ms. Michele Lefebvre, Ph.D.
Environmental Scientist
Stantec Consulting Services Inc.
P. O. Box 191
Hilo, Hawaii 96721

Dear Ms. Lefebvre:

Subject: Commercial Center
Environmental Assessment Early Consultation
North Kona, Hawaii
TMK: (3) 7-3-043:113

The Department of Transportation (DOT) understands, Mats4 LLC plans to construct and operate a commercial complex comprising the following: filling station, convenience retail store, commercial kitchen and restaurant. The project is located in the Natural Energy Laboratory of Hawaii Authority (NELHA), Hawaii Ocean Science and Technology (HOST) Park area and appears to be part of the general development of NELHA HOST Park at Keahole Point, Kailua-Kona.

DOT's comments on the subject project are as follows:

Airports Division (DOT-AIR)

1. The proposed site is located approximately 1 mile from the center-line of Runway 11/35 of the Ellison Onizuka Kona International Airport at Keahole (KOA). Any proposed development within five miles of an airport is subject to the State of Hawaii, Office of Planning, Technical Assistance Memorandum. You can find out more details through this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. Code of Federal Regulations, Title 14, Part 77.9, requires the submittal of Federal Aviation Administration (FAA) Form 7460-1, Notice of Proposed Construction or Alteration, for the project. This requirement is also applicable to tall equipment, such as cranes, that may be used during construction. FAA Form 7460-1 and criteria for its submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

3. If the proposed development includes photovoltaic (PV) panels, a glint and glare analysis must be submitted for FAA review. This analysis must be submitted with any Form 7460-1 Notice including PV panels. The following website may assist you with preparation of a glint and glare analysis: www.sandia.gov/glare.

   PV systems located in or near the approach path of the aircraft into KOA can create a hazardous condition for a pilot due to possible glint and glare reflected from the PV array. If glint or glare from the PV array creates a hazardous condition for pilots, the owner of the photovoltaic system must be prepared to immediately mitigate the hazard, upon notification by the DOT-AIR or FAA. The FAA has advised us that there can be no glint or glare from the PV array into the Air Traffic Control Tower cab at the airport.

   PV systems have also been known to emit radio frequency interference (RFI) to aviation-dedicated radio signals, disrupting the reliability of air-to-ground communications. The responsible PV system owner shall mitigate any RFI that affects aviation operations.

Highways Division (DOT-HWY)

We understand the NELHA Final Environmental Assessment (FEA) dated July 23, 2014 addressed NELHA's roadway connections to Queen Ka'ahumanu Highway and Kona International Airport.

1. The accepted NELHA FEA recommended Phase 1 transportation improvements be completed prior to the use of Phase I.

2. The proposed commercial center is a part of Phase 1; therefore, it is recommended the Phase 1 improvements be completed prior to it receiving its certificate of occupancy.

3. The project site layout should move access to Road A as far from the signalized Queen Kaahumanu Highway/Kaiminani Road intersection as possible so that there are no potential queuing issues that would impact the intersection. Onsite parking shall be arranged so traffic entering the site does not have similar potential queuing issues.

4. Access improvements for the commercial center shall be designed and constructed to be compatible with Phase 1 and Phase 2 transportation improvements.

5. We reserve further comments until we have reviewed the traffic assessment.

If there are any questions, please contact Mr. Blayne Nikaido of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7979.

Sincerely,

JADE T. BUTAY
Director of Transportation

From: Joe Roderick
To: Lefebvre, Michele
Subject: EA for Commercial Ctr TMK: 7-3-043:113
Date: Wednesday, April 18, 2018 9:40:47 AM

Aloha Michele,

I received your letter dated Feb. 15, 2018 in regards to the proposed commercial center at Kaiminani Drive and Queen K Hwy. I would like to receive a copy of the environmental assessment report. I think it will be a great addition to have these services in this area. However; my biggest concern is flow of traffic. I believe it is in everyone's best interest that this development dedicates area for accessing the property from the roads without interfering with the flow of traffic onto Kaiminani Drive as well as the Queen K Hwy. In my opinion, this means dedicated turns lanes, center merge lanes, and etc. to prevent vehicles accessing the property from stopping or interfering with vehicles traveling past. Obviously, I am not an expert in this field nor do I know the correct terminology, but I'm hoping that you understand what I'm getting at.

Thank you for your time and any additional information you can provide.

Best Regards,

Joe

Joe Roderick Hawaiian Landscapes, Inc.
dba Orchid Isle Landscaping
808.960.3633

ENVIRONMENTAL ASSESSMENT

Matsuyama Commercial Center on NELHA Land

APPENDIX 1b

Comments to Draft EA and Responses

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

May 15, 2018

Michele Lefebvre
Stantec Consulting Inc.
P.O. Box 191
Hilo, Hawai'i 96721

Dear Ms. Lefebvre:

SUBJECT: Draft Environmental Assessment (DEA)
Matsuyama Commercial Center of NELHA Land, North Kona Hawai'i
TMK (3) 7-3-043:113

We are in receipt of your letter dated May 8, 2018 in regards to a draft Environmental Assessment and Anticipated finding of no significant Impact for the above listed subject.

The Hawai'i Fire Department has no issues or comments with regards to the request for a draft Environmental Assessment – Matsuyama Commercial Center of NELHA Land and Anticipated finding of no significant Impact as noted above.

If you should have any questions, please feel free to contact my office at (808)323-4760.

Mahalo,

DARREN J. ROSARIO
Fire Chief

CB/ds

Stantec Consulting Services Inc.
P.O. Box 191
Hilo, HI 96721
Tel: (808) 494-2039

June 20, 2018

Mr. Darren Rosario
Fire Chief
Hawai'i Fire Department
Hilo, HI 96720

RE: Comments on Draft Environmental Assessment and Anticipated FONSI for Matsuyama Commercial Center on NELHA Land, North Kona District, Hawai'i Island

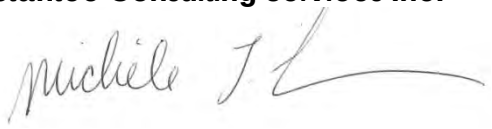
Dear Mr. Rosario:

Thank you for the comment letter dated May 15, 2018, in which you stated that the Hawai'i Fire Department had no issues or comments with the Draft EA.

We sincerely appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 494-2039.

Sincerely,

Stantec Consulting Services Inc.



Michele Lefebvre, Ph.D.
michele.lefebvre@stantec.com

cc: Burke Matsuyama
Gregory Barbour

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

June 8, 2018

Stantec Consulting Inc.
Attention: Ms. Michele Lefebvre
P.O. Box 191
Hilo, Hawaii 96721

via email: michele.lefebvre@stantec.com

Dear Ms. Lefebvre:

SUBJECT: Draft Environmental Assessment for the Proposed **Matsuyama Commercial Center on NELHA Lands** located at Kailua- Kona, Island of Hawaii; TMK: (3) 7-3-043:113

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) Commission on Water Resource Management, and (c) Office of Conservation & Coastal Lands on the subject matter. Should you have any questions, please feel free to call Darlene Nakamura at (808) 587-0417. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files
NELHA (via email: gb@nelha.org)
Attn: Mr. Gregory Barbour, Executive Director

DAVID Y. IGE
GOVERNOR OF HAWAII

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

'18 MAY 14 AM 10:59 ENGINEERING

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 11, 2018

RECEIVED
LAND DIVISION
2018 MAY 18 AM 11:12
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
_X_ Div. of Forestry & Wildlife
___Div. of State Parks
_X_ 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: Draft Environmental Assessment for the Proposed **Matsuyama Commercial Center on NELHA Lands**
LOCATION: Kailua-Kona, Island of Hawaii; TMK: (3) 7-3-043:113
APPLICANT: Stantec Consulting Inc. on behalf of **Mats4 LLC**

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **June 5, 2018.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on The Environmental Notice in the middle of the page.)

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 Darlene Nakamura at 587-0417. Thank you.

Attachments

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

Signed: _____

Print Name: Carty S. Chang, Chief Engineer

Date: 5/16/18

cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

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

2018 MAY 14 PM 3:23

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2018 JUN -5 PM 3:51
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

May 11, 2018

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division
_X_Div. of Forestry & Wildlife
___Div. of State Parks
_X_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: Draft Environmental Assessment for the Proposed **Matsuyama Commercial Center on NELHA Lands**
LOCATION: Kailua-Kona, Island of Hawaii; TMK: (3) 7-3-043:113
APPLICANT: Stantec Consulting Inc. on behalf of **Mats4 LLC**

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **June 5, 2018.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on The Environmental Notice in the middle of the page.)

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 Darlene Nakamura at 587-0417. Thank you.

Attachments

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

Signed: /s/ Jeffrey T. Pearson, P.E.

Print Name: Deputy Director

Date: June 4, 2018

cc: Central Files

FILE ID: RFD. 4857.8
DOC ID: 020193

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

June 4, 2018

REF: RFD.4857.8

TO: Mr. Russell Tsuji, Administrator
Land Division

FROM: Jeffrey T. Pearson, P.E., Deputy Director
Commission on Water Resource Management

SUBJECT: Matsuyama Commercial Center on NELHA Lands

FILE NO.: RFD.4857.8
TMK NO.: (3) 7-3-043:113

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://dlnr.hawaii.gov/cwrm.

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☐ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EAP as having high water efficiency can be found at http://www.epa.gov/watersense.

☐ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://planning.hawaii.gov/czm/initiatives/low-impact-development/

☐ 6. We recommend the use of alternative water sources, wherever practicable.

☐ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.

☐ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

☐ 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

☐ 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

☒ 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.

☒ 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☐ 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.

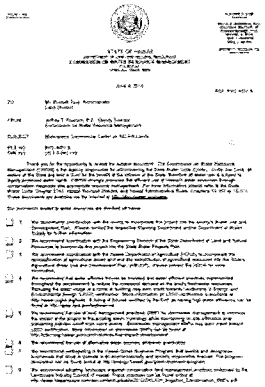
☐ 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ OTHER:

If you have any questions, please contact W. Roy Hardy of the Commission staff at 587-0225.



Doc Review RFD.4857.8 Matsuyama Commercial Center on NELHA Lands

Adobe Sign Document History 06/05/2018

Created:	06/04/2018
By:	Kathy Yoda (kathy.s.yoda@hawaii.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAAQ4uXLnxCyvyUfgZ-CDBTH2s2hK1kAlky

"Doc Review RFD.4857.8 Matsuyama Commercial Center on N ELHA Lands" History

Document created by Kathy Yoda (kathy.s.yoda@hawaii.gov)
06/04/2018 - 3:14:38 PM HST- IP address: 132.160.239.30

Document emailed to Jeffrey Pearson (jeff.pearson@hawaii.gov) for signature
06/04/2018 - 3:15:17 PM HST

Document viewed by Jeffrey Pearson (jeff.pearson@hawaii.gov)
06/05/2018 - 3:06:06 PM HST- IP address: 132.160.239.30

Document e-signed by Jeffrey Pearson (jeff.pearson@hawaii.gov)
Signature Date: 06/05/2018 - 3:06:26 PM HST - Time Source: server- IP address: 132.160.239.30

Signed document emailed to all eligible parties.
06/05/2018 - 3:06:26 PM HST

ETS
STATE OF HAWAI'I

Cve: HA 18-231

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

2018 MAY 14 A 11:53
RECEIVED
2018 MAY 18 AM 11:11
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII
LAND DIVISION

May 11, 2018

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division
_X_Div. of Forestry & Wildlife
___Div. of State Parks
_X_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: Draft Environmental Assessment for the Proposed **Matsuyama Commercial Center on NELHA Lands**
LOCATION: Kailua-Kona, Island of Hawaii; TMK: (3) 7-3-043:113
APPLICANT: Stantec Consulting Inc. on behalf of **Mats4 LLC**

Transmitted for your review and comment is information on the above-referenced subject matter. We would appreciate your comments by **June 5, 2018.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on The Environmental Notice in the middle of the page.)

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 Darlene Nakamura at 587-0417. Thank you.

Attachments

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

* KBA in Conservation District

Signed: K. Tiger Mills
Print Name: K. Tiger Mills
Date: 5-17-2018

cc: Central Files

Stantec Consulting Services Inc.
P.O. Box 191
Hilo, HI 96721
Tel: (808) 494-2039

June 20, 2018

Mr. Russell Tsuji
Land Administrator
State of Hawai'i
Department of Land and Natural Resources Land Division
P.O. Box 621
Honolulu, HI 96809

RE: Comments on Draft Environmental Assessment and Anticipated FONSI for Matsuyama Commercial Center on NELHA Land, North Kona District, Hawai'i Island

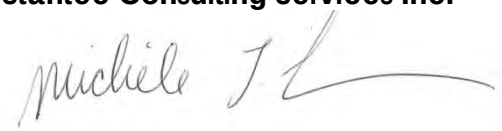
Dear Mr. Tsuji:

Thank you for the compiled comment letters dated June 8, 2018, in which the Engineering Division stated they had no additional comments and the Office of Conservation and Coastal Lands stated they had no additional comments and the project is not located in the Conservation District. In their comments, the Commission on Water Resource Management generally noted that it strongly promotes the efficient use of water resources through conservation measures and appropriate resources management, and specifically noted that a well construction permit is required before the commencement of any well construction work and a pump installation permit is required before ground water is developed as a source of supply for the project. Although no water development including wells or pumps are proposed as part of this project, the following text has been added to the Final EA "In response to a comment received from the Commission on Water Resource Management on the Draft EA, any wells that would be developed by NELHA to provide water for its developments would comply with the State Water Code, Chapter 174C, HRS, and HAR Chapters 13-167 to 13 171."

We sincerely appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 494-2039.

Sincerely,

Stantec Consulting Services Inc.



Michele Lefebvre, Ph.D.
michele.lefebvre@stantec.com

cc: Burke Matsuyama
Gregory Barbour

From:	Beck, Lawrence
To:	Lefebvre, Michele
Subject:	Matsuyama Comm. Ctr. NELHA 7-3-043-113 DEA OEQC 180607
Date:	Thursday, June 07, 2018 10:29:11 AM
Attachments:	Matsuyama Comm. Ctr. NELHA 7-3-043-113 DEA OEQC 180607.pdf

Dear Ms. Michele Lefebvre,

Please note that no additional water is currently available to NELHA Lands from the Hawaii County Department of Water Supply (DWS). The current overall usage is above the amount allocated and available to NELHA. However, DWS understands that responsible parties within NELHA are working to bring down the overall water usage and to find "replacement water" through on-site strategies, which may reduce the amount of water currently being provided by DWS. DWS will monitor the reductions over time to determine if DWS water can be made available for new uses within NELHA as water demand provided by DWS gets reduced from the current uses.

Sincerely,

Lawrence E. Beck, P.E.
Civil Engineer - Water Resources and Planning Branch
Department of Water Supply - County of Hawaii
345 Kekuanaoa Street, Suite 20 Hilo, HI 96720
Phone: 808-961-8070 X260 Fax: 808-961-8080
Email: lbeck@hawaiidws.org Web: www.hawaiidws.org

Stantec Consulting Services Inc.
P.O. Box 191
Hilo, HI 96721
Tel: (808) 494-2039

June 20, 2018

Mr. Lawrence Beck
Civil Engineer – Water Resources and Planning Branch
County of Hawai'i
Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, HI 96720

RE: Comments on Draft Environmental Assessment and Anticipated FONSI for Matsuyama Commercial Center on NELHA Land, North Kona District, Hawai'i Island

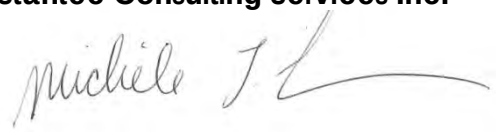
Dear Mr. Beck:

Thank you for the comment dated June 7, 2018, in which you noted that no additional water is currently available to NELHA lands from the Hawai'i County Department of Water Supply (DWS) since the current overall usage is above the amount allocated. DWS acknowledges that NELHA is working to bring down the overall current water usage so that additional water would be available for this project as well working on additional sources for water as described in Section 3.1.3 of the Final Environmental Assessment (FEA). The following text has been added to clarify that DWS will monitor the reductions in current use, "In their comment letter on the Draft EA, DWS will monitor the reductions in NELHA's current water usage to determine whether additional water can be available for new uses on NELHA land."

We sincerely appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 494-2039.

Sincerely,

Stantec Consulting Services Inc.



Michele Lefebvre, Ph.D.
michele.lefebvre@stantec.com

cc: Burke Matsuyama
Gregory Barbour

From:	Appleby, Karen J
To:	Lefebvre, Michele
Cc:	Barbour, Gregory P
Subject:	FW: EA comments: Mats4 proposed commercial development at NELHA
Date:	Friday, June 08, 2018 7:33:49 AM

Michele,

The information below was received at 6:30 pm 6/7/18, for your use.

From: Janice Glennie [mailto:palmtree7@earthlink.net]
Sent: Thursday, June 7, 2018 6:30 PM
To: nelha@nelha.org; michele.lefebdre@startec.com
Cc: holly kersten <chair@kona.surfrider.org>; stuart coleman <scoleman@surfrider.org>
Subject: EA comments: Mats4 proposed commercial development at NELHA

Aloha,

First we'd like to ask that there be additional time provided for the public to comment on this proposal's EA since the contact for the deciding agency was not listed in the publication notice.

The proposed Matsuyama (Mats4) commercial center will set a poor precedent which, if approved, would undermine over a decade of Smart Growth planning being undertaken in North and South Kona. Beside writing today on behalf of the Surfrider Foundation's Kona Kai Ea chapter with our concerns regarding this proposal, I, as a Surfrider rep for over a decade, have been directly involved in the Kona Community Development Plan (KCDP) since its inception almost 15 years ago, first as a member of the original Steering Committee and then the Action Committee on which I currently serve. Surfrider Kona Kai Ea members have deep concerns about the impact this development could have on regional land use planning including the environmental threats it poses. As a group whose focus is to help protect our island's waters and aquifer, Surfrider's Kona Kai Ea chapter strongly supports Smart Growth planning as a way to protect those waters, especially from avoidable negative impacts.

Some of the many reasons this proposal is ill-conceived and should be given a permit include, but are not limited to, the following:

- Mats5 proposed project will undermine the KCDP and contribute to sprawl.
- As in Dallas, Tucson and other sprawled cities, this proposed development sets a poor precedent for linear, unplanned development on a frontage road meant to ease rather than create traffic by providing space for safe bike paths and access to shoreline — not increased development.
- Project sets a poor precedent of developer-driven, non-planning that our region has been working hard to leave behind.
- In the KCDP, planned, smart growth "villages" (TODs and TNDs) are meant to replace car-dependent development as a way to decrease regional traffic burdens and use of fossil fuels,

meanwhile increasing opportunities for healthy living including walking and bike-riding.

- Commercial centers are meant to be developed within planned “villages” (TODs and TNDs), not outside as this one would be.
- A commercial center outside of a planned TOD/TND nearby would compete financially with and could even undermine the viability of conforming commercial entities which includes nearby planned developments like Palamanui.
- Mats4 Plan ignores stakeholder input into the KCDP (an ordinance) where thousands of stakeholder comments weighed in at 90% asking that no more development be allowed makai of Queen Ka’ahumanu Highway.
- Non point source runoff including petrochemicals are a threat to groundwater and fragile nearshore waters
- Lighting from the project could further confuse the travel and overall health of migratory and endemic birds as we’ve seen many times when light is injected into an area of that coastline.
- The sensitive and protected Kaloko-Honokohau National Park would be a nearby neighbor of this development which clearly does not add to its protection.
- An environmentally-based enterprise like NELHA should not be depending upon funding from polluting, petroleum-based, commercial development like a gas station and paved parking lots near the shoreline.

In conclusion, we feel that there is no compelling need to build a gas station on the makai Side of Queen Ka’ahumanu highway when other facilities exist nearby including at the entrance to Kohanaiki Shores and public beach park *which may not be noted in this EA since it states that the closest gas station is 3 miles away, which kohanaiki is not.*

We hope that this agency, at minimum, will require that a full EIS be done for this proposal to insure that our county's land use planning, natural resources, and strong social connections are not be further undermined by poor, developer-driven planning as has been the case in the past.

Mahalo and sincerely,
Janice Palma-Glennie
For Surfrider Foundation’s Kona Kai Ea chapter

Stantec Consulting Services Inc.
P.O. Box 191
Hilo, HI 96721
Tel: (808) 494-2039

June 20, 2018

Ms. Janice Palma-Glennie
palmtree7@earthlink.net

RE: Comments on Draft Environmental Assessment and Anticipated FONSI for Matsuyama Commercial Center on NELHA Land, North Kona District, Hawai'i Island

Dear Ms. Palma-Glennie:

Thank you for your comment email on June 7, 2018, regarding the Draft EA. Please find responses to your specific comments below.

1. *Request for additional time to provide public comment since the contact for the deciding agency was not listed in the publication notice.* The contact information for the deciding agency was listed on the cover letter for the DEA and AFONSI as nelha@nelha.org and phone number (808) 327-9586. Additionally, the name and contact information for the consultant was provided on the publication form and listed in the OEQC Environmental Notice of May 8, 2018 (http://oeqc2.doh.hawaii.gov/The_Environmental_Notice/2018-05-08-TEN.pdf). Comments could be provided to either the agency or the consultant. The Draft EA was available for the 30 days which is consistent with HAR Title 11, Chapter 200-9.1(b).

2. *The proposed Matsuyama (Mats4) commercial center will set a poor precedent and undermine over a decade of Smart Growth planning being undertaken in North and South Kona.* As described in Section 3.9.2 of the Final EA, the project is located within the Urban State Land Use District and the use is consistent with the County's General Industrial (MG-3a) zoning district. Additionally, the use of the property for a commercial center is consistent with NELHA's purpose as defined in HRS Chapter 227-D and is located in the Economic Driver zone identified in the NELHA Master Plan, and the NELHA Master Plan is consistent with the legislation that established NELHA (HRS Chapter 227).

3. *Mats4 proposed project will undermine the KCDP and contribute to sprawl*. See response to comment 2. As stated in Section 3.9.3 of the Final EA, the project is consistent with the Kona CDP's guiding principle of providing infrastructure and essential facilities concurrent with growth. Additionally, the project is consistent with the NELHA Master Plan and land use in the zoning district and the project location was never planned as open space. NELHA is sensitive to public concern about viewshed, which has been incorporated into project design as described in Section 3.1.6 of the Final EA.

4. *The project sets a poor precedent for linear, unplanned development on a frontage road meant to ease rather than create traffic by providing space for safe bike paths and access to shoreline — not increased development.* The project does not extend into the Queen Ka'ahumanu Highway right-of-way and would not impede any future construction of sidewalks or bike lanes.

5. *Project sets a poor precedent of developer-driven, non-planning*. See response to comment 2 above.

6. *In the KCDP, planned, smart growth "villages" (TODs and TNDs) are meant to replace car-dependent development as a way to decrease regional traffic burdens and use of fossil fuels.* As stated in the KCDP Policy LU–2.1: Village Types Defined—Transit-Oriented Developments (TODs) vs. Traditional Neighborhood Developments (TNDs). Both TODs and TNDs are compact mixed-use villages, characterized by a village center within a higher-density urban core, roughly equivalent to a 5-minute walking radius (1/4 mile), surrounded by a secondary mixed use, mixed-density area with an outer boundary roughly equivalent to a 10-minute walking radius from the village center (1/2 mile).

   TODs are intended to aid in developing livable, walkable communities, and reduce commuting time. More than anything, they are intended to guide centers of residential development. They are not intended to restrict any form of commercial activity outside their boundaries. Many commercial activities, such as large shopping malls, industrial and warehousing areas, and car dealerships are not necessarily easy or beneficial to integrate in TODs. Additionally, NELHA's Economic Driver is a mixed-use commercial/industrial research park consistent with TOD design principles.

   As stated in the Draft EA, the project supports NELHA's business and education facilities and would provide a much-needed gas station, electric charging station, and convenience store on the *makai* side of the Queen Ka'ahumanu Highway. Currently there are no other such facilities for traffic traveling southbound on this busy highway between Waikoloa and Kailua-Kona (approximately 28 miles). The closest fueling station to the Kona International Airport (KOA) is currently on the *mauka* side of the street and does not include electric charging stations. The electric charging stations and the potential for hydrogen fueling offer a substantial contribution to the use of renewable options in automobile travel. This project would provide these services one mile south of the KOA.

   This project would create a "catchment area" by lessening drive time, road trips, energy consumption, and CO_2 emissions for hundreds (possibly thousands) of residents who live *mauka* of Keahole point and who travel down Kaiminani Drive to go to the airport, resorts, and areas north of the airport for work – and who otherwise would have to turn left to drive "backwards" to Kohanaiki Shores for gas and convenience store items. This project will improve quality of life, roadway conditions, air quality for the region.

7. *Commercial centers are meant to be developed within planned "villages" (TODs and TNDs).* See response to comment 6.

8. *A commercial center outside of a planned TOD/TND nearby would compete financially with and could even undermine the viability of conforming commercial entities which includes nearby planned developments like Palamanui.* This project is a gas station/convenience store that is consistent with Master Lease from the State of Hawaii. The lease provides NELHA the flexibility to develop, maintain, and operate an ocean related high technology industrial park in accordance with Chapter 206M, and Chapter 227D, HRS. This project will provide ancillary and accessory uses that will assist in the development of an ocean related high technology industrial park. In addition, it is important to note that these uses for HOST Park were identified over 30 years ago and are consistent with the long-term planning for West Hawai'i.

   Additionally, If and when it is built, the Palamanui Village Center is proposed to be approximately 0.5 mile *mauka* of the Highway and is not intended/located to serve the existing populace of North Kona, but rather a new University Village and surrounding community (yet to be developed).

9. *Mats4 Plan ignores stakeholder input into the KCDP (an ordinance) where thousands of stakeholder comments weighed in at 90% asking that no more development be allowed* makai *of Queen Ka'ahumanu Highway.* As described in Section 3.1.6 of the Final EA, NELHA is aware of public concern regarding the view towards the ocean from the highway and the low-profile design of the project (less than 28 feet in elevation at the peak of the roof) and landscaping has taken this into consideration to minimize these impacts. Also, as stated in Section 3.9.3 of the Final EA, the project is consistent with the Kona CDP's guiding principle of providing infrastructure and essential facilities concurrent with growth.

10. *Non point source runoff including petrochemicals are a threat to groundwater and fragile nearshore waters.* As discussed in Section 3.1.3 of the Final EA, project design and BMPs would minimize potential impacts to both surface and ground water resources during project construction and operations.

11. *Lighting from the project could further confuse the travel and overall health of migratory and endemic birds along the coastline.* As discussed in Section 3.1.4, potential impacts to avian species would be minimized during construction and project operations. Additionally, lighting will be installed per County of Hawaii, County Code Chapter 14, Article 9, Section 15-50 Outdoor Lighting. The exterior light fixtures at fuel canopies, building and site pole lights shall be fully shielded so that the light emitted by the fixture is projected down.

12. *The project could impact Kaloko-Honokohau National Park.* As discussed in Section 3.1.3 of the Final EA, project design and BMPs would minimize potential impacts to both surface and ground water resources during project construction

and operations and impacts to Kaloko-Honokōhau National Historic Park are considered negligible.

13. *NELHA should not depend on funding from a gas station and paved parking lots near the shoreline.* The project site is over 3,000 feet from the shoreline. The project would not impact the shoreline and is consistent with the NELHA Master Plan which states that "public activities at the shorelines be managed to ensure that public access and use are consistent with conservation of the existing natural resources, do not compromise the security of NELHA and meet the recreational needs of the community."

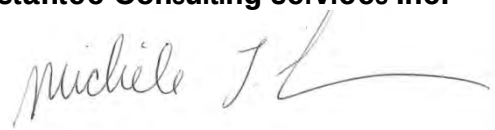
14. *The project is not needed since other facilities exist nearby including at the entrance to Kohanaiki Shores and public beach park which may not be noted in this EA since it states that the closest gas station is 3 miles away, which Kohanaiki is not.* The text in the Final EA has been clarified to read 1.8 miles south, rather than 3.2 miles south, to identify the Ohana Fuels Minit Gas Station at Hulikoa Drive which is located on the *mauka* side of the street.

15. *An EIS should be prepared.* No significant impacts (as defined by Section 11-200-12, HAR) were identified from the project; therefore, preparation of an EIS is not required. The proposed development is consistent with the earlier EIS's prepared for this site and the EA is consistent with Chapter 343.

We sincerely appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 494-2039.

Sincerely,

Stantec Consulting Services Inc.



Michele Lefebvre, Ph.D.
michele.lefebvre@stantec.com

cc: Burke Matsuyama
Gregory Barbour

From: Barbour, Gregory P
To: Lefebvre, Michele
Cc: Appleby, Karen J
Subject: FW: NELHA development
Date: Thursday, June 07, 2018 12:05:38 PM

Michele: Pls see comment below that we received. TY gb

Aloha
Gregory P. Barbour
Executive Director

_____

Mobile (808) 542-4622
Internet gb@nelha.org
Web www.nelha.org <http://www.nelha.org/>
Twitter @nelha1

Hawaii's Premier Ocean Science and Technology Park

On 6/7/18, 12:03 PM, "Appleby, Karen J" <karen.j.appleby@hawaii.gov> wrote:

This one came through. It is not the same person I spoke with.

Aloha,

Karen Appleby
NELHA Senior Secretary
Karen.j.appleby@hawaii.gov
karena@nelha.org
808-327-9585 ex 238
73-4460 Queen Kaahumanu Hwy #101
Kailua Kona, Hawaii 96740

On 6/7/18, 11:49 AM, "Carolyn Dillon" <carolyndillon4@gmail.com> wrote:

Aloha,

As a resident of Hawaii County I read with interest a May 13th Hawaii Tribune Herald article titled "Commercial center pegged for NELHA." I'm writing to express my concern about the plan for a six-pump filling station along with a 2,450-square-foot convenience store and a 2,500 square-foot kitchen and restaurant.

The plan contravenes Kona Community Development Plan by creating sprawl, situating more development on makai side of highway (a top concern of 90% of KCDP original input), and will start sprawl on frontage road. That road was meant to ease traffic by providing access to existing shoreline entities, not a gas station/fast food strip.

I'm strongly opposed to this development. I urge caution and greater scrutiny regarding its environmental impacts and the precedent it sets. Also, given that the published notice does not include the address for testimony the public should be given more time to comment.

Mahalo, Carolyn Dillon

Stantec Consulting Services Inc.
P.O. Box 191
Hilo, HI 96721
Tel: (808) 494-2039

June 20, 2018

Ms. Carolyn Dillon
carolyndillon4@gmail.com

RE: Comments on Draft Environmental Assessment and Anticipated FONSI for Matsuyama Commercial Center on NELHA Land, North Kona District, Hawai'i Island

Dear Ms. Dillon:

Thank you for your comment email on June 7, 2018, regarding the Draft EA. Please find responses to your specific comments below.

1. *The plan contravenes Kona Community Development Plan by creating sprawl, situating more development on makai side of highway (a top concern of 90% of KCDP original input), and will start sprawl on frontage road. That road was meant to ease traffic by providing access to existing shoreline entities, not a gas station/fast food strip.* As described in Section 3.9.2 of the Final EA, the project is located within the Urban State Land Use District and the use is consistent with the County's General Industrial (MG-3a) zoning district. Additionally, the use of the property for a commercial center is consistent with NELHA's purpose as defined in HRS Chapter 227-D and is located in the Economic Driver zone identified in the NELHA Master Plan, and the NELHA Master Plan is consistent with the legislation that established NELHA (HRS Chapter 227). Also, as stated in Section 3.9.3 of the Final EA, the project is consistent with the Kona CDP's guiding principle of providing infrastructure and essential facilities concurrent with growth.

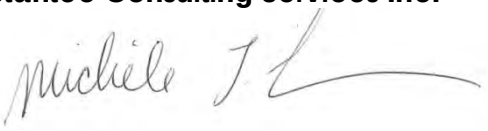
2. *Opposed to project development and request greater scrutiny regarding its environmental impacts and the precedent it sets.* Comment noted.

3. *Also, given that the published notice does not include the address for testimony the public should be given more time to comment.* The contact information for the deciding agency was listed on the cover letter for the DEA and AFONSI as nelha@nelha.org and phone number (808) 327-9586. Additionally, the name and contact information for the consultant was provided on the publication form and listed in the OEQC Environmental Notice of May 8, 2018 (http://oeqc2.doh.hawaii.gov/The_Environmental_Notice/2018-05-08-TEN.pdf). Comments could be provided to either the agency or the consultant. The Draft EA was available for the 30 days which is consistent with HAR Title 11, Chapter 200-9.1(b).

We sincerely appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 494-2039.

Sincerely,

Stantec Consulting Services Inc.



Michele Lefebvre, Ph.D.
michele.lefebvre@stantec.com

cc: Burke Matsuyama
Gregory Barbour

ENVIRONMENTAL ASSESSMENT

Matsuyama Commercial Center on NELHA Land

APPENDIX 2

Traffic Impact Assessment Report

NELHA
Matsuyama Food and Fuel
Traffic Impact Analysis Report

Kailua-Kona, Hawaii

April 2018

I. Table of Contents

Figures

Tables

Appendices

II. PROJECT DESCRIPTION

The Matsuyama Food and Fuel proposed development would be situated on a parcel of land (NELHA Lot 3 site) on the northwest corner of the Queen Kaahumanu Highway and Kaiminani Drive intersection in an area near Kailua-Kona on the Big Island of Hawaii (Figure 1).

The Matsuyama Family project will consist of a filling station with six (6) fuel pumps. There will be three (3) fuel canopies each with two (2) pumps. There will be a hydrogen pump in the future with an above ground storage tank as shown on figure 2. The future pump and tank location will be used for temporary parking until the pump goes in.

There will be two (2) electric vehicle charging stations with provisions to add additional stations in future.

There will be a convenience store/restaurant with 5,080 sq. ft. of gross building area. A preliminary breakdown of floor area provides 2,500 sq. ft. for the commercial kitchen/interior restaurant & 2,450 sq. ft. for the convenience store. In addition, there will be 130 sq. ft. of restroom area.

In addition to the interior restaurant area, 600 sq. ft. of exterior covered seating area and another 600-sq. ft. of exterior uncovered seating area will be provided.

There will be (42) parking spaces of which (2) will be ADA stalls. When the future hydrogen station goes in there will be (37) parking spaces.

Additionally, provided on-site are: one (1) 12’ x 50’ loading space will be provided, one (1) air/water filling station, two (2) trash receptacles (with 6 ft. high rock screen wall on three sides) and a propane tank.

The drive, fuel islands and parking spaces will be paved with asphalt paving and concrete paving over the underground fuel pumps and fuel islands as shown on Figure 2.

The individual wastewater system will be installed under the parking/drive areas.

All building, fuel canopy roof drainage, and site drainage will be directed into an underground storm system consisting of underground piping and three (3) drywells.

Photovoltaic panels will be provided on fuel canopies and the store. The ocean’s cold water is being studied for mechanical systems.

Legend

- Study Intersections
- Matsuyama Food and Fuel
- Existing Roadway

N

Stantec

0 2,000 4,000 Feet

Scale (8.5 x 11): 1:25,000

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii
NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet

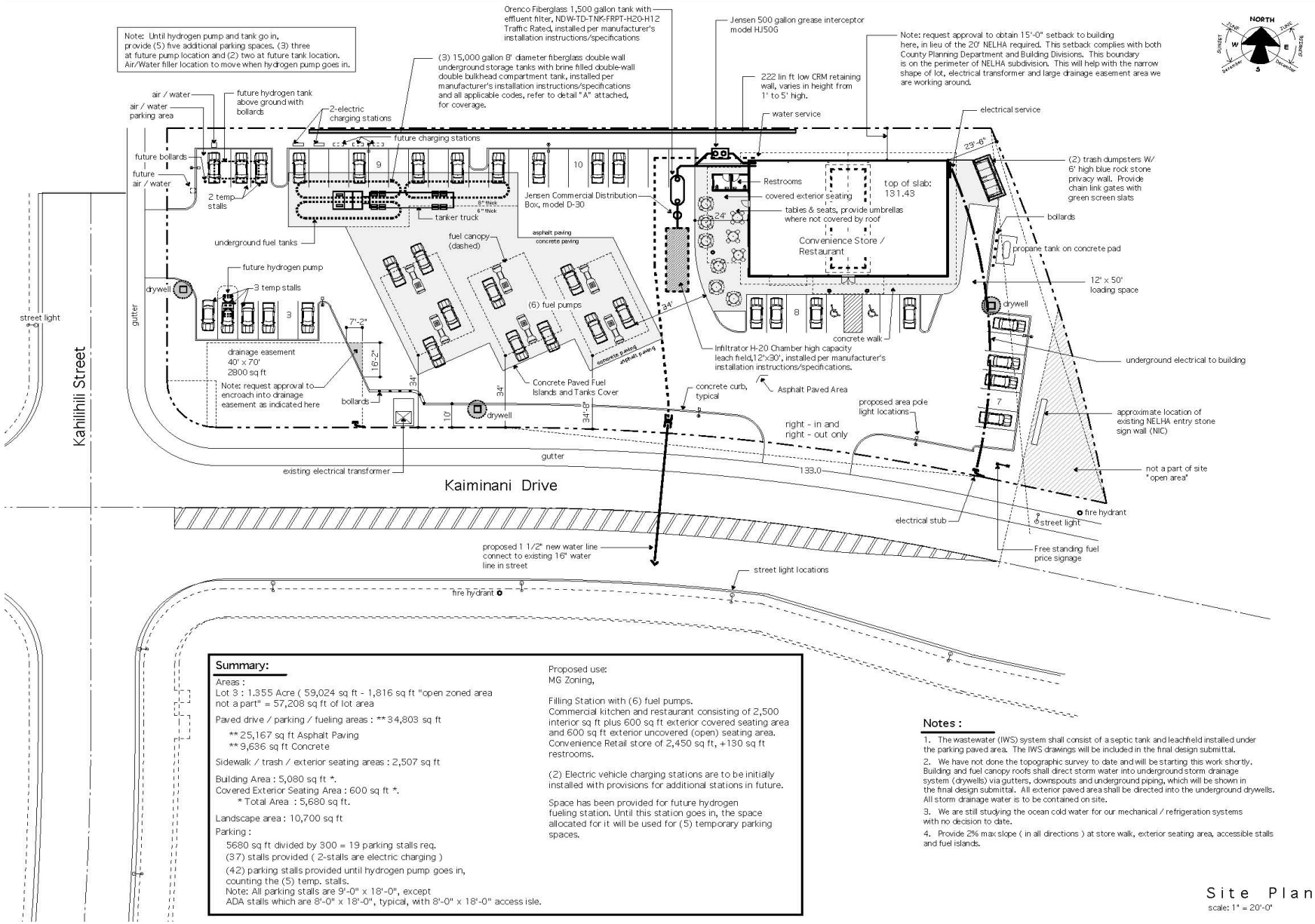
DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 3/21/2018	PROJECT NO: 2037201715	

Tax Map Key
Traffic Impact Analysis

Figure 1:
Project Location Map

V:\2037\Active\2037201715\03_data\gis_cad\gis\mxds\Fig1_Project_Location_8x11P.mxd Revised: 2018-03-21 By: mprice

Service Layer Credits:



Summary:

Areas :
Lot 3 : 1.355 Acre (59,024 sq ft - 1,816 sq ft "open zoned area not a part" = 57,208 sq ft of lot area

Paved drive / parking / fueling areas : ** 34,803 sq ft
** 25,167 sq ft Asphalt Paving
** 9,636 sq ft Concrete

Sidewalk / trash / exterior seating areas : 2,507 sq ft

Building Area : 5,080 sq ft *.
Covered Exterior Seating Area : 600 sq ft *.
* Total Area : 5,680 sq ft.

Landscape area : 10,700 sq ft

Parking :
5680 sq ft divided by 300 = 19 parking stalls req.
(37) stalls provided (2-stalls are electric charging)
(42) parking stalls provided until hydrogen pump goes in, counting the (5) temp. stalls.
Note: All parking stalls are 9'-0" x 18'-0", except ADA stalls which are 8'-0" x 18'-0", typical, with 8'-0" x 18'-0" access isle.

Proposed use:
MG Zoning,

Filling Station with (6) fuel pumps.
Commercial kitchen and restaurant consisting of 2,500 interior sq ft plus 600 sq ft exterior covered seating area and 600 sq ft exterior uncovered (open) seating area.
Convenience Retail store of 2,450 sq ft, +130 sq ft restrooms.

(2) Electric vehicle charging stations are to be initially installed with provisions for additional stations in future.

Space has been provided for future hydrogen fueling station. Until this station goes in, the space allocated for it will be used for (5) temporary parking spaces.

Notes :

1. The wastewater (IWS) system shall consist of a septic tank and leachfield installed under the parking paved area. The IWS drawings will be included in the final design submittal.
2. We have not done the topographic survey to date and will be starting this work shortly. Building and fuel canopy roofs shall direct storm water into underground storm drainage system (drywells) via gutters, downspouts and underground piping, which will be shown in the final design submittal. All exterior paved area shall be directed into the underground drywells. All storm drainage water is to be contained on site.
3. We are still studying the ocean cold water for our mechanical / refrigeration systems with no decision to date.
4. Provide 2% max slope (in all directions) at store walk, exterior seating area, accessible stalls and fuel islands.

Site Plan
scale: 1" = 20'-0"

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Tax Map Key Traffic Impact Analysis

Stantec

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii
NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet

DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 4/11/2018	PROJECT NO: 2037201715	

Figure **2**:
Project Site Plan

III. EXISTING CONDITIONS

Figure 2 illustrates the proposed Matsuyama Food and Fuel location. The proposed site is known as Lot 3 within the NELHA-controlled lands.

The majority of the NELHA lands are in the State Urban district which offers minimal constraints to development. Three sections are located in the State Conservation District which restricts many of the proposed or potential activities identified in the master plan. The three areas that comprise the Conservation District include: the tip at Keahole Point including the lighthouse site, a triangular section north of Wawaloli Beach and makai of the Makako Bay Drive; the end of the airport runway buffer, a larger piece mauka of one of the deep ocean cold water pump stations; and an archaeological site adjacent to Ooma.

The County General Plan and the Kona Community Development Plan include the NELHA site within their designated urban area. The County Land Use Pattern Allocation Guide (LUPAG) also identifies the shoreline area as an open district. There are restrictions on development in the open district usually limited to open space, recreational uses, single family homes, and accessory recreational facilities

Kona International Airport occupies the land just north of NELHA. Kona International Airport is classified as a primary commercial service small hub airport, reporting 1,519,345 total passenger enplanements (boardings) for 2007. This equates to approximately 0.20 percent of the total annual enplanements in the United States. In 2007, Kona International Airport ranked 76th out of 575 commercial service airports, and ninth of 73 small-hub airports in enplanements. For comparison, Honolulu International Airport ranked 25th for commercial service airports by reporting 10,279,791 total passenger enplanements in 2007.

Kona International Airport is situated on approximately 3,450 acres within the City of Kailua/Kona corporate limits, approximately nine miles northwest of the central business district.

The airport currently has an 11,000 foot runway, but plans to build additional runways makai of the existing runway, which will impact NELHA's operations. Additional conceptual plans for the airport include developing the frontage along Queen Kaahumanu Highway with operations that complement the airport and surrounding development, including a hotel/conference center and a cultural education center. Potential areas for partnership between the airport and NELHA include supplying renewable energy and deep seawater cooling for airport developments, renewable fuel vehicle transport for arriving passengers, and synergy between tenants along the Queen Kaahumanu corridor.

A. Geometric Configuration

1. Roadway Configuration

The island of Hawaii is served by a network of 1,393 miles of public roads. This includes 394 miles of state highways. The backbone of the system is the Hawaii Belt Road which circles the island. The Belt Road is comprised of State Highway (State Route 11) to the

south and State Highway (State Route 19) to the north. Queen Kaahumanu Highway (State Route 19) provides access to NELHA and is part of the Hawaii Belt Road.

The roadway network and lane configurations local to the proposed Matsuyama Food and Fuel development is represented in Figure 3.

1. Queen Kaahumanu Highway
   Queen Kaahumanu Highway is located along the mauka side of NELHA. Queen Kaahumanu Highway is currently a two-lane (north of Kealakehe Parkway), Class I State Highway with limited access and a posted speed limit of 45 miles per hour near the project location. Queen Kaahumanu Highway is a link in the principal highway system that circles the island. The Hawaii Department of Transportation (HDOT) is currently widening the roadway from two to four lanes north of Kealakehe Parkway up until just north of Keahole Airport Road. The highway was previously widened to four lanes south of Kealakehe Parkway to Henry Street. The widening project, including the portion directly adjacent to the study area, and that would affect the proposed Matsuyama Food and Fuel development is underway and is due to be completed in Q4 of 2018.

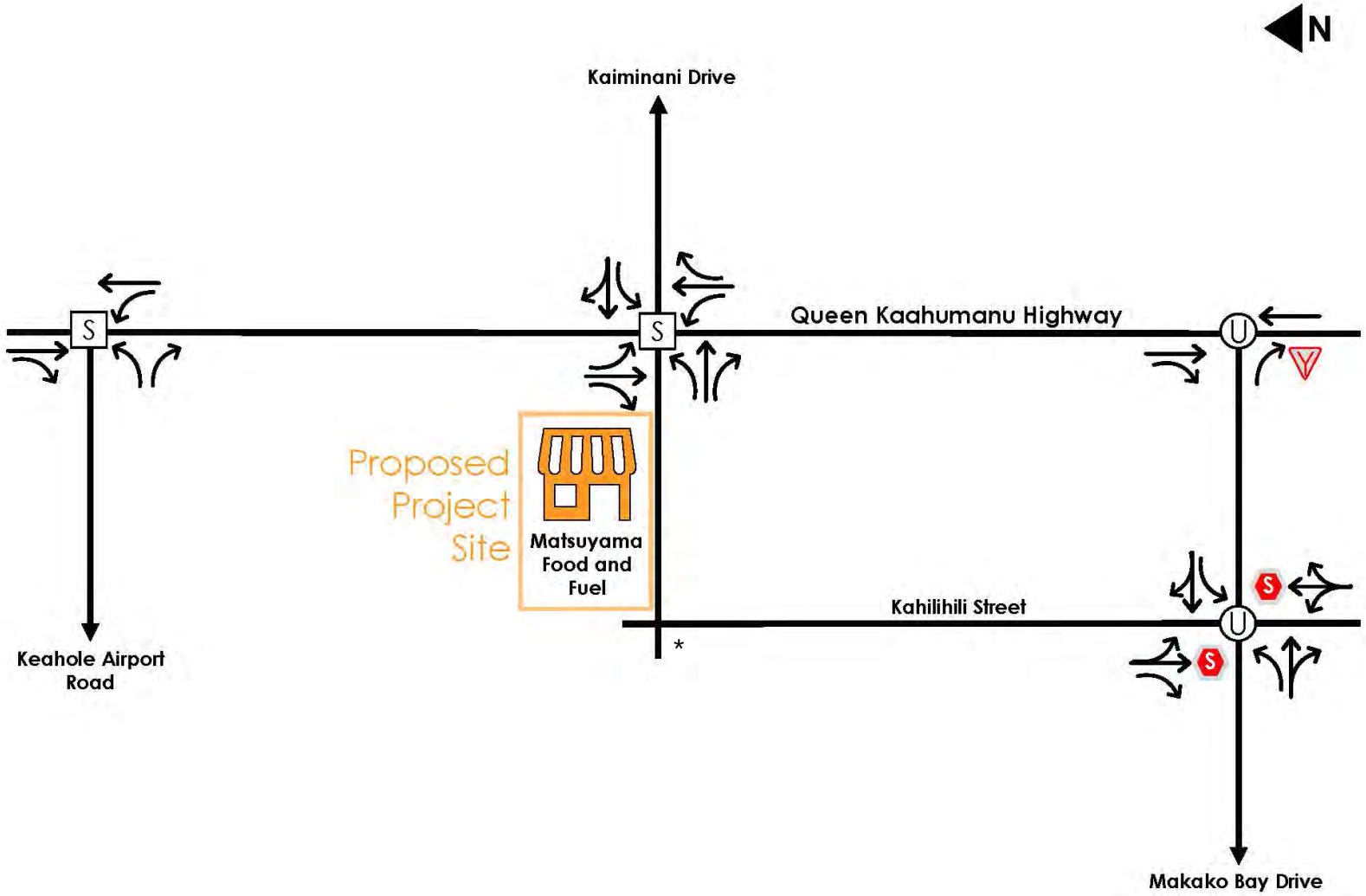
2. Keahole Airport Road
   Keahole Airport Road provides primary airport access from the highway to the passenger terminal as well as other airport facilities. Keahole Airport Road is a two-lane, undivided roadway. The posted speed limit on Keahole Airport Road is 25 mph.

3. Kaiminani Drive
   Kaiminani Drive is a collector road that extends west from Mamalahoa Highway, past Queen Kaahumanu Highway to Kahilihili Street where it currently transitions into a 90-degree turn southbound. However, the two roadways will be terminated as stub-outs forming a pseudo-four-leg intersection for future expansion within the NELHA park. Just mauka of Queen Kaahumanu Highway, Kaiminani Drive is a two-lane, undivided roadway. It provides Eastbound and Westbound left-turn lanes and right-turn storage lanes at its signalized intersection with Queen Kaahumanu Highway. The posted speed limit is 35 mph.

4. Kahilihili Street
   Kahilihili Street is currently a north-south running roadway within the NELHA park that terminates just south of Makako Bay Drive (and provides access to the West Hawaii Explorations Academy, Friends of NELHA, and CyanoTech Corporation). It is a two-lane, undivided roadway.

5. Makako Bay Drive
   Makako Bay Drive is a 24-foot wide asphaltic concrete pavement road. It is a two-lane, undivided roadway. The right-of-ways vary between 80 feet and 110 feet. The wider 110-foot section begins just after the first interior intersection and ends near the main roadway bend near the booster pump

station site. The Access Road is approximately 11,600 feet in length and is a public roadway. The road provides access to NELHA and tenant facilities, shoreline, “Pine Trees” beach and Wawaloli Beach Park. There is an access gate near Makako Bay Drive’s intersection with Queen Kaahumanu Highway. This gate is closed between 8 p.m. and 6 a.m. The posted speed limit is 25 mph.



Note: Drawing not to scale, for illustrative purposes only.
* Intersection currently paved with roads connecting on a curve.

Yield Sign
Stop Sign
Unsignalized Intersection
Signalized Intersection

Stantec

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii
NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet

DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 4/11/2018	PROJECT NO: 2037201715	

Figure 3:
Existing (2018) Lane Configuration

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B. Volumes

1. Vehicular Volumes

1. 24-Hour Volumes

Figure 4 shows 24-hour traffic volume plots along Queen Kaahumanu Highway just north of Makako Bay Drive. The Queen Kaahumanu Highway data was taken from HDOT counts at station T8M on Tuesday, September 16 and Wednesday, September 17, 2008. The 24-hour plot on Makako Bay Drive indicated three peak hours during the day that are associated with work and school-related trips during morning peak hours, lunch break related trips during the mid-day period, and home and school-related trips during afternoon peak hours.

Per 2016 HDOT data, the Annual Average Daily Traffic (AADT) on Queen Kaahumanu Highway north of Keahole Airport Access Road (between Mileposts 74.67 to 92.67) was 13,700. The AADT on Queen Kaahumanu Highway south of Keahole Airport Access Road for the section of the highway that runs directly adjacent to the proposed development, was 24,000 (mileposts 92.67 to 97.19).

2. Turning Movement Counts

In addition, turning movement counts were recorded via traffic counting personnel at the intersections of Queen Kaahumanu Highway and Keahole Airport Road, Queen Kaahumanu Highway and Kaiminani Drive, Queen Kaahumanu Highway and Makako Bay Drive, and Makako Bay Drive and Kahilihili Street. Figure 5 shows the existing peak hour traffic volumes at the recorded intersection locations. Based upon historical peak hour data and KOA flight schedules, counts were performed between 7am to 9am, 10am to noon, and from 2:30pm to 4:30pm, respectively.

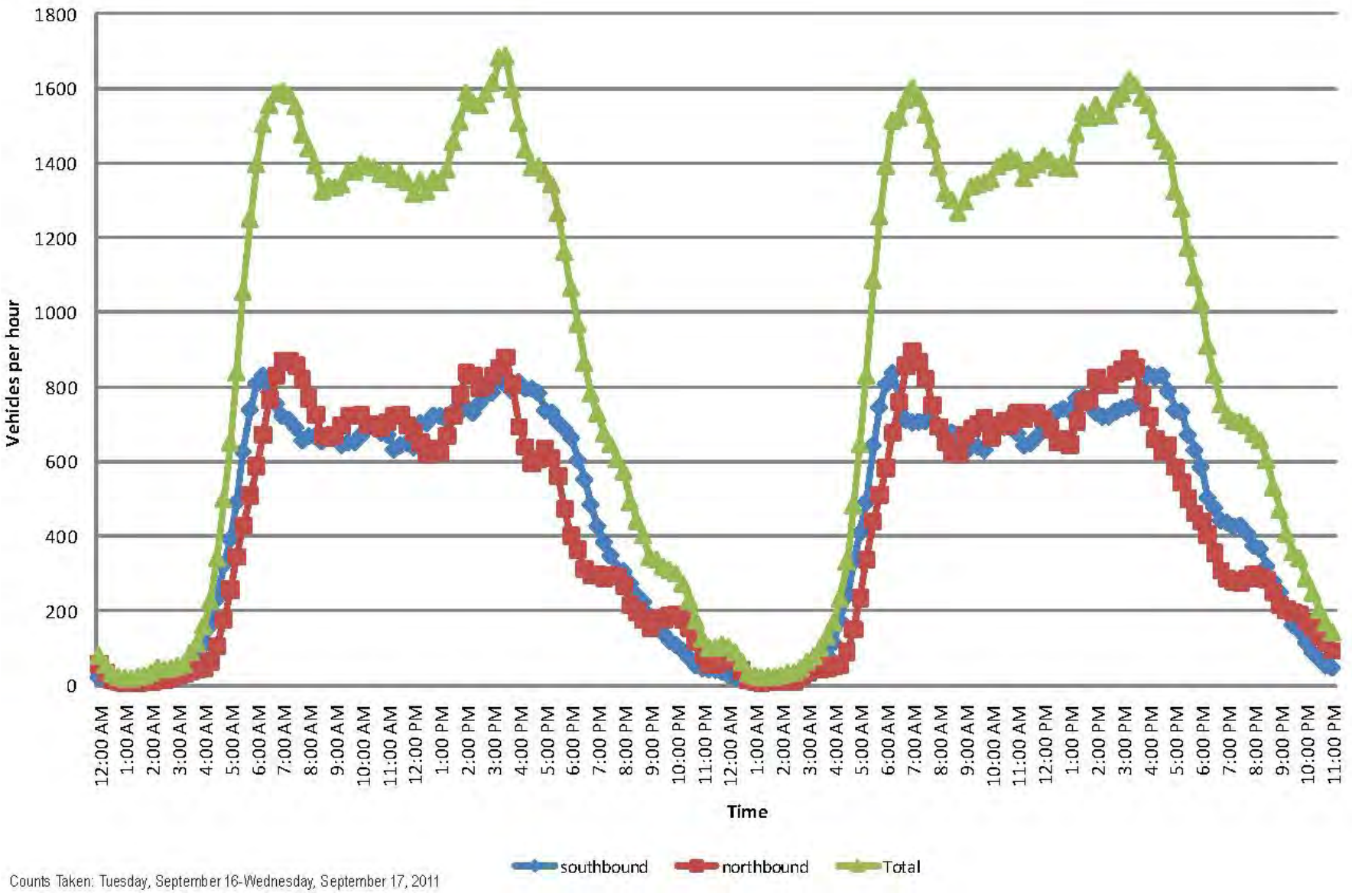
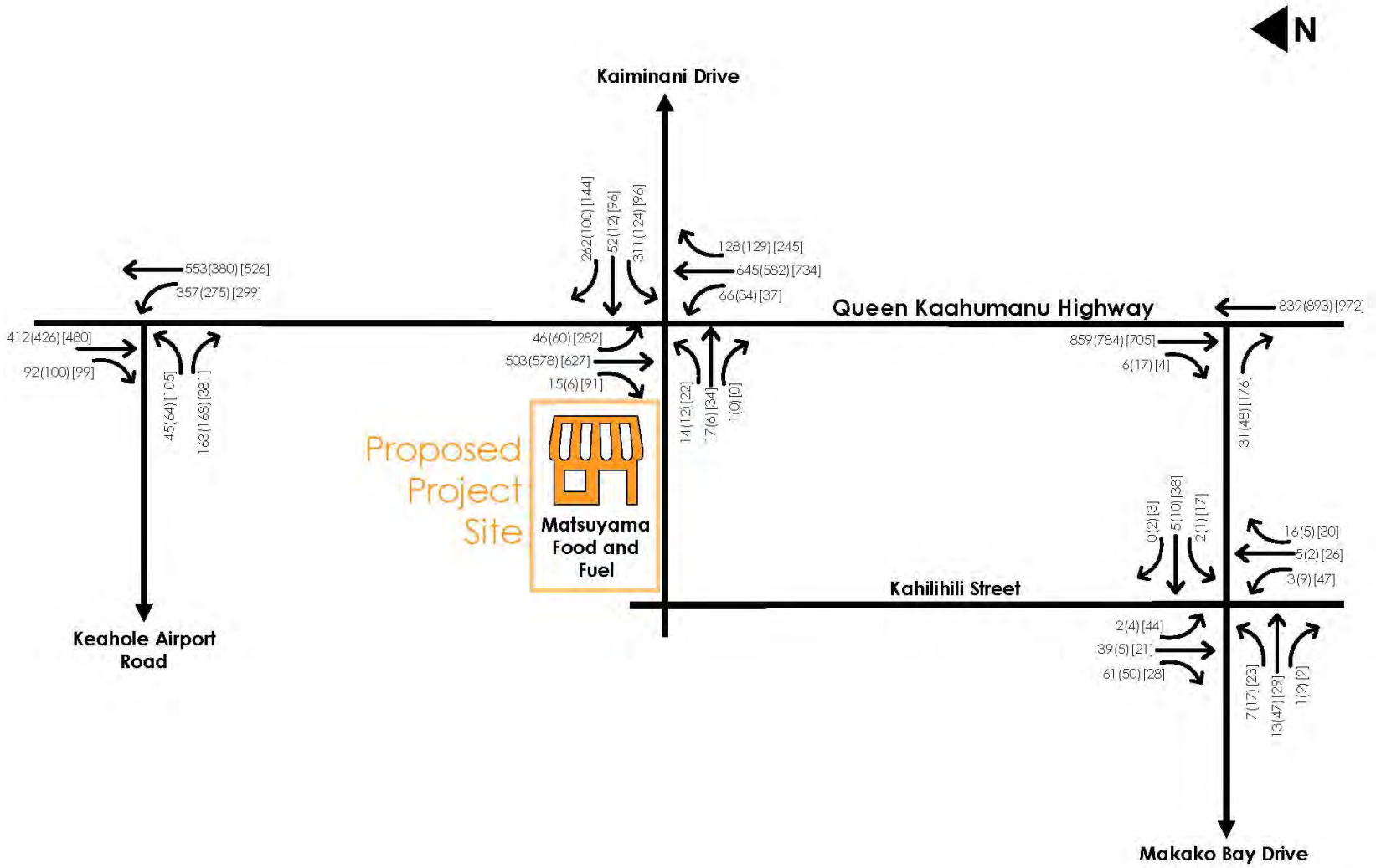


Figure 4: Queen Kaahumanu Highway North of Makako Bay Drive, 24-Hour Volume Distribution

Stantec



Note: Drawing not to scale, for illustrative purposes only.

→ AM (Mid-day)[PM]
Peak Hour Volume (vph)

Stantec

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet		
DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 4/11/2018	PROJECT NO: 2037201715	

Figure **5**:
Existing (2018) Project Peak Hour Volumes

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C. Level of Service

1. Methodology

The methodology used in the *Institute of Transportation Engineers* (*ITE*), *Trip Generation Manual, 10th Edition*, was reviewed and applied on this project.

Appendix A – Intersection Level of Service defines the methodology utilized in this study.

2. Intersection Level of Service Results

Table 1 below outlines the Existing roadway network Level of Service. Residual queues resulting from bottleneck conditions south of the existing roadway network in the southbound direction were observed. However, since these conditions were outside of the local roadway network of the proposed development, only the delays resulting from a microscopic examination of the local roadway network were considered in this study.

Existing (2018)	AM		Mid-Day		PM	
	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
Queen Kaahumanu Hwy & Keahole Airport Rd	**B**	**14.0**	**B**	**13.6**	**B**	**16.0**
Queen Kaahumanu NB Thru	A	2.7	A	2.4	A	3.2
Queen Kaahumanu NB Left	C	30.1	C	27.9	C	34.5
Queen Kaahumanu SB Thru	B	13.3	B	11.9	B	14.2
Queen Kaahumanu SB Right	A	0.0	A	0.0	A	0.0
Keahole Airport EB Left	C	31.4	C	28.9	D	35.6
Keahole Airport EB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu Hwy & Kaiminani St	**C**	**31.9**	**B**	**17.8**	**C**	**32.4**
Queen Kaahumanu NB Thru	C	28.7	B	14.2	C	31.4
Queen Kaahumanu NB Left	E	56.5	D	35.4	E	56.9
Queen Kaahumanu NB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu SB Thru	C	21.2	B	13.0	B	10.8
Queen Kaahumanu SB Left	D	44.0	D	35.9	E	61.8
Queen Kaahumanu SB Right	A	0.0	A	0.0	A	0.0
Kaiminani EB Thru	C	34.2	C	29.1	D	46.9
Kaiminani EB Left	D	46.7	D	40.4	E	56.2
Kaiminani EB Right	A	0.0	A	0.0	A	0.0
Kaiminani WB Thru	C	21.6	C	24.1	D	40.2
Kaiminani WB Left	D	50.1	D	40.4	E	71.0
Kaiminani WB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu Hwy & Makako Bay Dr	Unsignalized					
Queen Kaahumanu NB Thru	A	0.0	A	0.0	A	0.0
Queen Kaahumanu SB Thru-Right	A	0.0	A	0.0	A	0.0
Makako Bay EB Right	C	17.5	C	16.7	C	21.7
Makako Bay Dr & Kahilihili St	Unsignalized					
Makako Bay EB Thru-Left-Right	A	2.4	A	1.9	A	3.1
Makako Bay WB Thru-Left-Right	A	2.1	A	0.6	A	2.1
Kahilihili St NB Thru-Right-Left	A	8.8	A	9.4	B	10.3
Kahilihili St SB Thru-Right-Left	A	9.2	A	8.7	B	10.0

Table 1 - Existing (2018) Level of Service

IV. FUTURE CONDITIONS

A. Surrounding Area Conditions

Queen Kaahumanu Highway is in the process of being widened from a two-lane highway to a four-lane highway. Construction is currently underway for the segment of Queen Kaahumanu Highway north of Keahole Airport Rd and the segment between Kealakehe Parkway and Keahole Airport Road is estimated to be completed by November 2018.

B. Volumes

1. Future Without Project Volumes

As described in Section III.C.1 Methodology above, the Future Without Project Volumes are the projected background traffic volumes within the local roadway network, absent the proposed development.

Background traffic volumes are volumes not directly associated with the development proposed. These volumes are comprised of regional volumes using Queen Kaahumanu Highway and the rest of the local roadway network (Makako Bay Drive and Kahilihili Street) to travel past and through the existing NELHA development.

Embedded in the regional background traffic volumes are those trips generated by the expansion of the Kona International Airport. The airport's passenger traffic has risen at a steady rate. According to the 'Kona International Airport at Keahole Draft Airport Master Plan, January 2009, total airport passenger traffic was anticipated to rise at the steady rate of approximately 1.8% between 2005 and 2030. Historically, this rate has coincided and is anticipated to continue to coincide with the 3.7% annualized traffic growth along queen Kaahumanu Highway in the vicinity of the proposed Matsuyama Food and Fuel development.

C. Future (2028) without Project Level Of Service

Future (2028) without Project	AM		Mid-Day		PM	
	LOS	Delay	LOS	Delay	LOS	Delay
Queen Kaahumanu Hwy & Keahole Airport Rd	**B**	**15.0**	**B**	**14.5**	**B**	**17.1**
Queen Kaahumanu NB Thru	A	2.0	A	2.0	A	3.1
Queen Kaahumanu NB Left	C	31.8	C	29.2	C	34.9
Queen Kaahumanu SB Thru	B	15.9	B	13.2	B	17.5
Queen Kaahumanu SB Right	A	0.0	A	0.0	A	0.9
Keahole Airport EB Left	D	36.2	C	34.2	C	33.8
Keahole Airport EB Right	A	0.0	A	0.0	A	0.0

Queen Kaahumanu Hwy & Kaiminani St	**C**	**32.4**	**B**	**16.9**	**C**	**32.1**
Queen Kaahumanu NB Thru	C	28.4	B	14.3	C	32.5
Queen Kaahumanu NB Left	E	55.6	C	31.5	E	60.5
Queen Kaahumanu NB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu SB Thru	C	25.1	B	13.2	B	10.5
Queen Kaahumanu SB Left	E	56.7	D	35.6	E	56.2
Queen Kaahumanu SB Right	A	0.0	A	0.0	A	0.0
Kaiminani EB Thru	C	34.2	C	25.7	D	48.2
Kaiminani EB Left	D	44.7	C	34.9	E	55.8
Kaiminani EB Right	A	0.0	A	0.0	A	0.0
Kaiminani WB Thru	B	17.4	C	30.4	D	42.7
Kaiminani WB Left	D	46.0	C	31.4	E	66.9
Kaiminani WB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu Hwy & Makako Bay Dr	Unsignalized					
Queen Kaahumanu NB Thru	A	0.0	A	0.0	A	0.0
Queen Kaahumanu SB Thru-Right	A	0.0	A	0.0	A	0.0
Makako Bay EB Right	C	15.3	C	15.0	C	22.2
Makako Bay Dr & Kahilihili St	Unsignalized					
Makako Bay EB Thru-Left-Right	A	2.4	A	1.8	A	3.1
Makako Bay WB Thru-Left-Right	A	2.2	A	0.4	A	2.1
Kahilihili St NB Thru-Right-Left	A	9.0	A	9.8	B	11.7
Kahilihili St SB Thru-Right-Left	A	9.5	A	8.9	B	10.8

Table 2 - Future (2028) without Project Level of Service

1. Project Related Volumes

a) Trip Generation

The Institute of Transportation Engineers (ITE), Trip Generation, 10th Edition (2009) methodology was utilized to project the trips generated by the subject development in the Horizon Year of 2028. Land Use 853 (Convenience Market with Gasoline Pumps) and Land Use 932 (High-Turnover (Sit-Down) Restaurant) were used to represent the subject development and the corresponding data plots and directional distributions were applied during the pertinent peak hours in order to produce projected generated trips.

The traffic generated by the Matsuyama Food and Fuel development by the Horizon Year (2028), shown in Figure 8 was combined with the projected background traffic in 2028. This sum represents the Horizon, or Future, Year

(2028) traffic volumes with the Project. These volumes are represented in Figure 9.

		AM Peak Hour of Traffic			MD Peak Hour of Traffic			PM Peak Hour of Traffic		
Land Use Designation	**No. of Units**	**Avg Rate**	**Enter (vph)**	**Exit (vph)**	**Avg Rate**	**Enter (vph)**	**Exit (vph)**	**Avg Rate**	**Enter (vph)**	**Exit (vph)**
Convenience Market with Gasoline Pumps (Vehicle Fueling Positions)	6	16.57	99		17.03	102		19.07	114	
Directional Split %			50%	50%		50%	50%		50%	50%
		Pass-By %	50	49	**Pass-By %**	51	51	**Pass-By %**	57	57
Pass-By Trips		63%	32	31	50%	26	26	66%	38	38
Subtotal			18	18		25	25		19	19
High-Turnover (Sit-Down) Restaurant (1000 Sq. Feet Gross Floor Area)	3.7	10.81	40		13.33	49		9.85	36	
Directional Split %			55%	45%		53%	47%		60%	40%
		Pass-By %	22	18	**Pass-By %**	26	24	**Pass-By %**	22	14
Pass-By Trips		30%	7	5	30%	8	7	43%	9	6
Subtotal			15	13		18	17		13	8
Total Net Trips (external)			33	31		43	42		32	27
		= Pass-By % conservatively estimated based on available data.								

Table 3 – Matsuyama Food and Fuel Trip Generation

A significant portion of the trips that will be generated by these two types of Land Uses will attract drivers that are already using the roadway and are "passing-by" the proposed development. These trips are call "Pass-by" trips. The Trip Generation Manual establishes percentages of trips that should be considered pass-by trips based on studies of several such Land Uses across the United States. The average pass-by trip percentages have been applied to the Trip Generation Manual counts. Where a pass-by study information was not available (due to a differing time-of-day), a very conservative percentage was estimated (shown in gray in Table 3).

b) Trip Distribution and Assignment

The traffic generated by the Matsuyama Food and Fuel development for the Horizon Year (2028) was distributed and assigned to the network based on the regional travel patterns, or trend analysis, observed from Existing Year (2018) turning movement count data. It is reflected in the project-generated traffic turning movement volumes.

c) Trip Distribution and Assignment

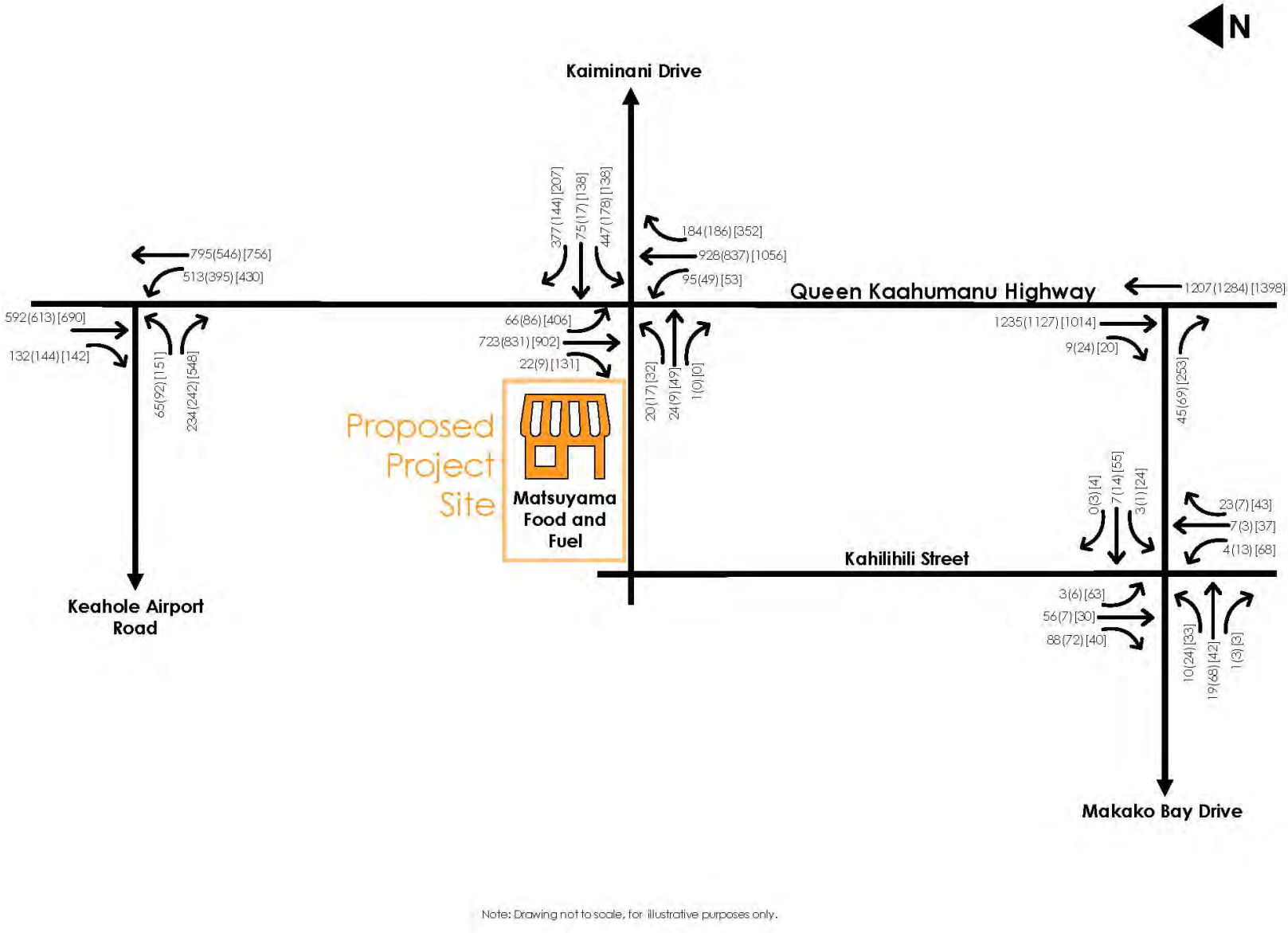
The regional traffic north and southbound along Queen Kaahumanu Highway, as well as the current traffic within the localized NELHA development is projected to continue to increase based on past data. This growth rate was identified as

3.7% within the "Traffic Study, Natural Energy Laboratory of Hawaii Authority, Kailua-Kona, Hawaii, Parsons Brinckerhoff, April 2011." This rate was confirmed via Hawaii Department of Transportation (HDOT) counts on Kamehameha Highway and was therefore projected as the background traffic growth rate from the present to the Horizon Year of 2028.

The background traffic volumes became the base traffic volumes for which the Project Related traffic volumes were added in order to arrive at the Total Traffic Volumes with the Project in the Horizon Year (2028).

2. Future (2028) With Project Volumes

The traffic generated by the Matsuyama Food and Fuel development by the Horizon Year (2028), shown in Figure 8 was combined with the projected background traffic in 2028. This sum represents the Horizon, or Future, Year (2028) traffic volumes with the Project. These volumes are represented in Figure 9.



Note: Drawing not to scale, for illustrative purposes only.

→ AM (Mid-day)[PM]
Peak Hour Volume (vph)

Stantec

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii
NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet

DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 4/11/2018	PROJECT NO: 2037201715	

Figure 6:
Future (2028) Without Project Peak Hour Volumes

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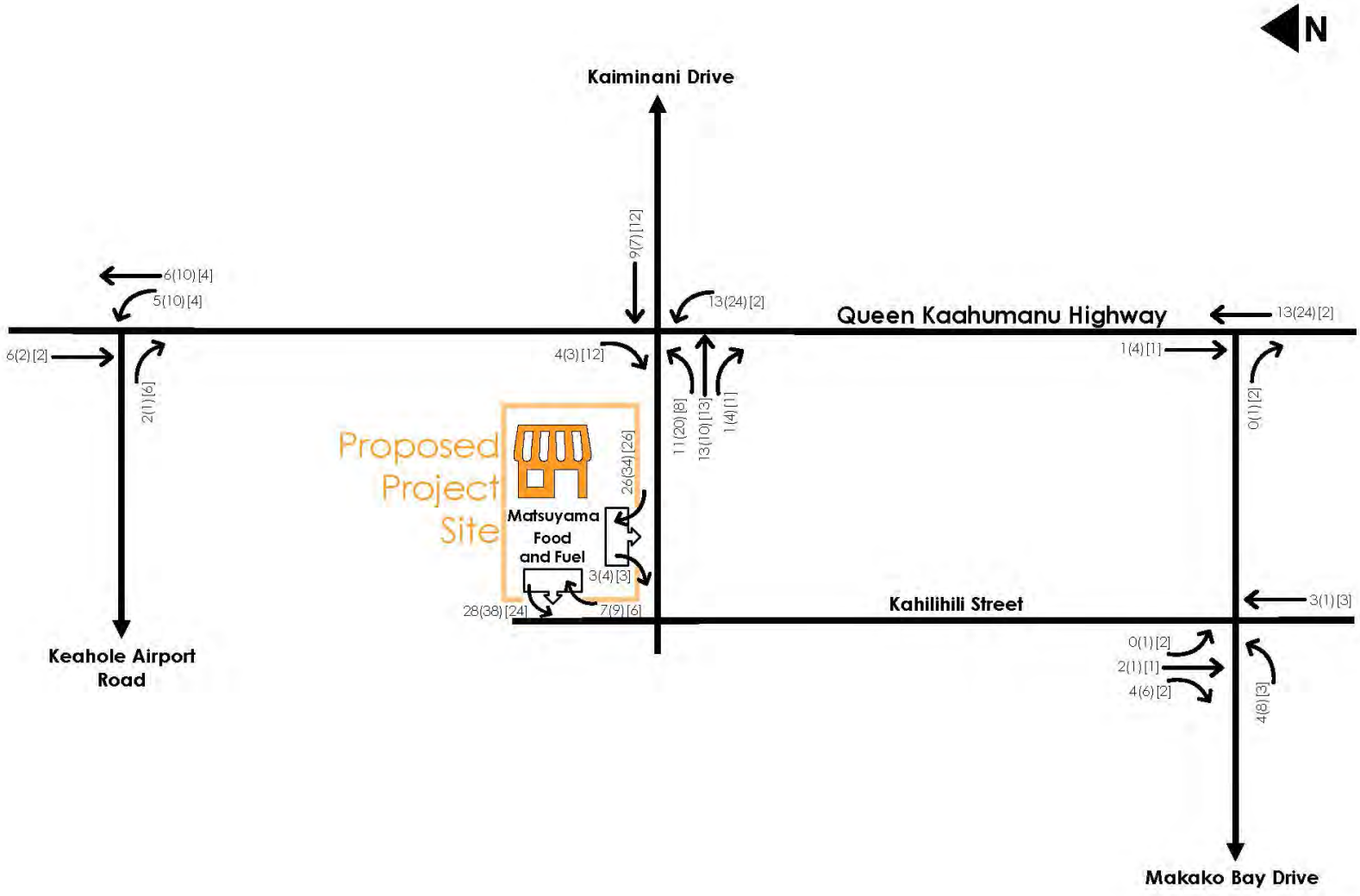

Note: Drawing not to scale, for illustrative purposes only.

→ AM (Mid-day) [PM] Peak Hour Volume (vph)

Driveway

Stantec

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet		
DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 4/11/2018	PROJECT NO: 2037201715	

Figure 7:
Project Related Peak Hour Volumes

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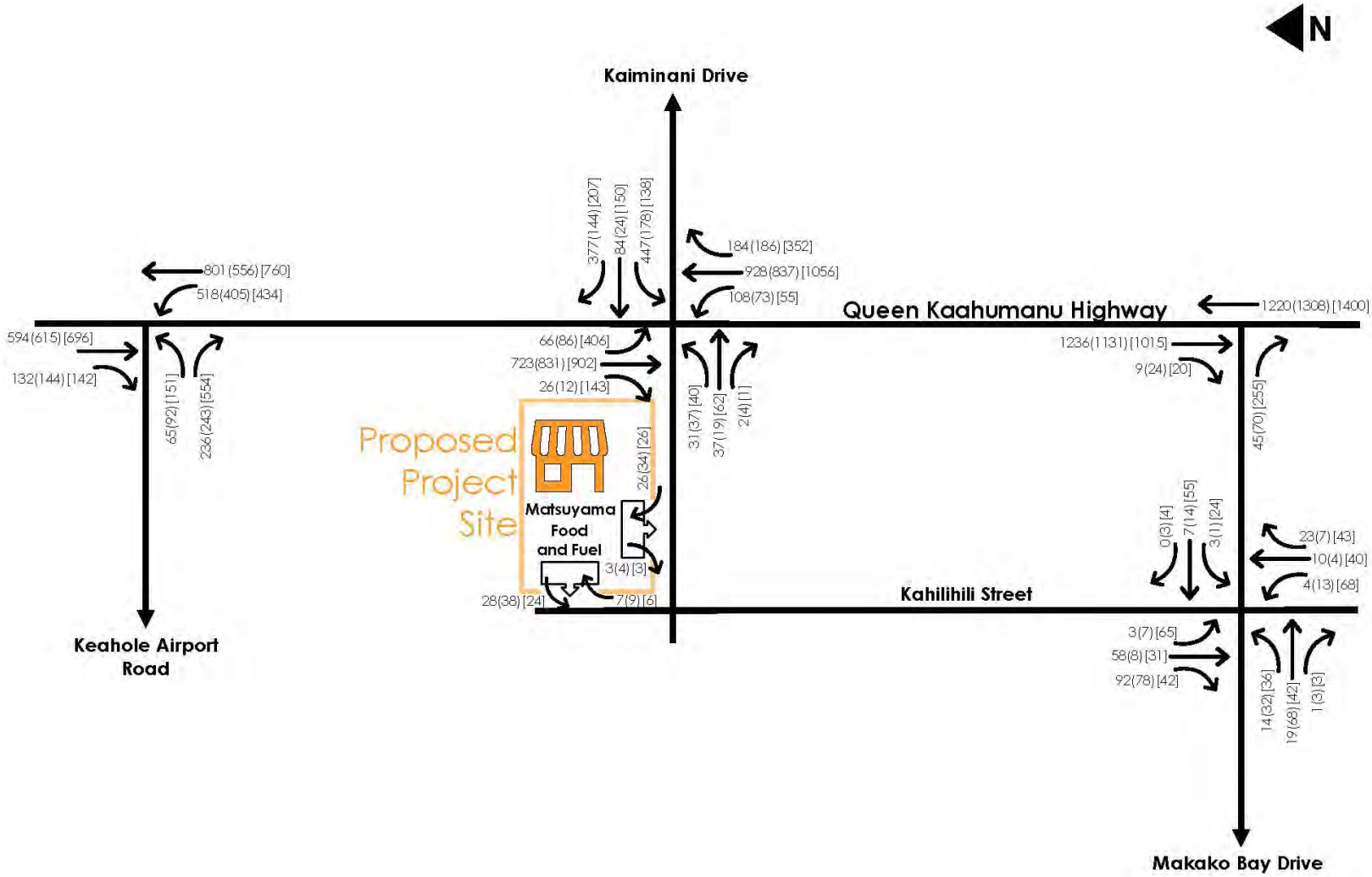

Note: Drawing not to scale, for illustrative purposes only.

→ AM (Mid-day) [PM] Peak Hour Volume (vph)

Driveway

Stantec

Queen Ka'ahumanu Highway - Kailua-Kona, Hawaii NAD 1983 StatePlane Hawaii 1 FIPS 5101 Feet		
DRAWN BY: MRP	1ST REVIEW: JT	2ND REVIEW: PA
DATE: 4/11/2018	PROJECT NO: 2037201715	

Figure **8**:
Future (2028) Project Related Peak Hour Volumes

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D. Future (2028) with Project Intersection Level of Service

Future (2028) with Project	AM		Mid-Day		PM	
	LOS	Delay	LOS	Delay	LOS	Delay
Queen Kaahumanu Hwy & Keahole Airport Rd	**B**	**15.1**	**B**	**14.7**	**B**	**17.2**
Queen Kaahumanu NB Thru	A	1.9	A	2.1	A	3.1
Queen Kaahumanu NB Left	C	31.1	C	29.7	D	35.1
Queen Kaahumanu SB Thru	B	16.2	B	13.5	B	17.8
Queen Kaahumanu SB Right	A	0.0	A	0.0	A	0.0
Keahole Airport EB Left	D	40.1	C	34.2	C	33.8
Keahole Airport EB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu Hwy & Kaiminani Dr	**C**	**33.0**	**B**	**18.5**	**C**	**32.9**
Queen Kaahumanu NB Thru	C	28.6	B	15.3	C	33.3
Queen Kaahumanu NB Left	D	54.5	C	33.7	E	60.3
Queen Kaahumanu NB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu SB Thru	C	26.3	B	14.9	B	10.8
Queen Kaahumanu SB Left	E	57.2	D	37.9	E	57.0
Queen Kaahumanu SB Right	A	0.0	A	0.0	A	0.0
Kaiminani EB Thru	D	35.1	C	25.4	D	49.6
Kaiminani EB Left	D	36.7	C	27.2	D	46.6
Kaiminani EB Right	A	0.0	A	0.0	A	0.0
Kaiminani WB Thru	B	17.9	C	20.2	D	43.9
Kaiminani WB Left	D	46.3	C	32.8	E	67.6
Kaiminani WB Right	A	0.0	A	0.0	A	0.0
Queen Kaahumanu Hwy & Makako Bay Dr	Unsignalized					
Queen Kaahumanu NB Thru	A	0.0	A	0.0	A	0.0
Queen Kaahumanu SB Thru-Right	A	0.0	A	0.0	A	0.0
Makako Bay EB Right	C	15.3	C	15.1	C	22.5
Makako Bay Dr & Kahilihili St	Unsignalized					
Makako Bay EB Thru-Left-Right	A	3.0	A	2.3	A	3.3
Makako Bay WB Thru-Left-Right	A	2.2	A	0.4	A	2.1
Kahilihili St NB Thru-Right-Left	A	9.1	A	10.0	B	11.9
Kahilihili St SB Thru-Right-Left	A	9.5	A	9.0	B	10.9

Table 4 - Future (2028) with Project Level of Service

V. SUMMARY AND RECOMMENDATIONS

In summary, the traffic analysis indicates that there will be no significant increase to roadway network Level of Service due to the proposed Matsuyama Food and Fuel development through the Horizon Year of 2028. No intersection within the roadway network is projected to demonstrate delay of more than a couple of seconds-per-vehicle from the Existing (2018) condition to the Horizon Year (2028) with Project condition. The widening of Queen Kaahumanu Highway from two lanes to four lanes and the addition of a second Kaiminani Drive Eastbound left-turn lane at the intersection with Queen Kaahumanu Highway more than amply improves traffic capacity to meet the projected background traffic growth for the next ten years, as well as the Matsuyama Food and Fuel development.

No additional roadway network improvements are recommended in order to accommodate the traffic generated by the Matsuyama Food and Fuel development.

VI. REFERENCES

"Traffic Study: Natural Energy Laboratory of Hawaii Authority," Kailua-Kona, Hawaii, Parsons Brinckerhoff, April 2011.

"Final, Laaloa Avenue County Park, Tax Map Key 7-7-008:030, Traffic Impact Analysis Report," Kailua-Kona, Island of Hawaii, SSFM International, September 12, 2017.

Letter from Roger Lundstrom, Project Architect, Tinguely Development, Inc. to Mr. Gregory P. Barbour, Executive Director, Natural Energy Laboratory of Hawaii Authority, dated December 10, 2017.

APPENDIX A – INTERSECTION LEVEL OF SERVICE DEFINITIONS

INTERSECTION LEVEL OF SERVICE DEFINITIONS

The *Highway Capacity Manual* defines six Intersection Levels of Service (LOS), labeled A through F, from free flow to congested conditions.

Levels of Service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions: in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Specifically, LOS criteria for traffic signals are stated in terms of the average control delay per vehicle, typically for a 15-minute analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group.

LEVEL-OF-SERVICE A: Low control delay, up to 10 s/veh. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.

LEVEL-OF-SERVICE B: Control delay greater than 10 and up to 20 s/veh. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.

LEVEL-OF-SERVICE C: Control delay greater than 20 and up to 35 s/veh. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LEVEL-OF-SERVICE D: Control delay greater than 35 and up to 55 s/veh. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high v/c ratios.

LEVEL-OF-SERVICE E: Control delay greater than 55 and up to 80 s/veh. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.

LEVEL-OF-SERVICE F: Control delay in excess of 80 s/veh. This level, considered unacceptable to most drivers, often occurs with oversaturation, that is when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

For unsignalized intersections, the *Highway Capacity Manual* evaluates gaps in the major street traffic flow and calculates available gaps for left-turns across oncoming traffic and for the left and right-turns onto the major roadway from the minor street. Average control delay, based on these factors, is still used to define the levels of service.

LEVEL-OF-SERVICE A: Low control delay, up to 10 s/veh.

LEVEL-OF-SERVICE B: Control delay greater than 10 and up to 15 s/veh.

LEVEL-OF-SERVICE C: Control delay greater than 15 and up to 25 s/veh.

LEVEL-OF-SERVICE D: Control delay greater than 25 and up to 35 s/veh.

LEVEL-OF-SERVICE E: Control delay greater than 35 and up to 50 s/veh.

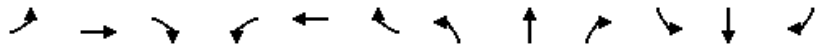
LEVEL-OF-SERVICE F: Control delay in excess of 50 s/veh.

APPENDIX B – INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	163	357	553	412	92
Future Volume (veh/h)	45	163	357	553	412	92
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	49	0	388	601	448	0
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	85	76	451	1466	840	714
Arrive On Green	0.05	0.00	0.25	0.79	0.45	0.00
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	49	0	388	601	448	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	1.5	0.0	11.4	5.5	9.5	0.0
Cycle Q Clear(g_c), s	1.5	0.0	11.4	5.5	9.5	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	85	76	451	1466	840	714
V/C Ratio(X)	0.58	0.00	0.86	0.41	0.53	0.00
Avail Cap(c_a), veh/h	585	522	568	1466	840	714
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.5	0.0	19.4	1.8	10.8	0.0
Incr Delay (d2), s/veh	6.0	0.0	10.6	0.8	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	6.8	3.0	5.4	0.0
LnGrp Delay(d),s/veh	31.4	0.0	30.1	2.7	13.3	0.0
LnGrp LOS	C		C	A	B	
Approach Vol, veh/h	49			989	448	
Approach Delay, s/veh	31.4			13.4	13.3	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.5		7.1	18.4	29.1		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		43.0		18.0	17.5	21.0		
Max Q Clear Time (g_c+I1), s		7.5		3.5	13.4	11.5		
Green Ext Time (p_c), s		4.6		0.1	0.5	1.9		

Intersection Summary	
HCM 2010 Ctrl Delay	14.0
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	17	1	311	52	262	66	645	128	46	503	15
Future Volume (veh/h)	14	17	1	311	52	262	66	645	128	46	503	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	15	18	0	338	57	0	72	701	0	50	547	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	32	106	90	378	469	0	92	829	705	77	813	691
Arrive On Green	0.02	0.06	0.00	0.21	0.25	0.00	0.05	0.45	0.00	0.04	0.44	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	0	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	15	18	0	338	57	0	72	701	0	50	547	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	0	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	0.6	0.7	0.0	13.8	1.8	0.0	3.0	24.9	0.0	2.1	17.4	0.0
Cycle Q Clear(g_c), s	0.6	0.7	0.0	13.8	1.8	0.0	3.0	24.9	0.0	2.1	17.4	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	32	106	90	378	469	0	92	829	705	77	813	691
V/C Ratio(X)	0.47	0.17	0.00	0.89	0.12	0.00	0.78	0.85	0.00	0.65	0.67	0.00
Avail Cap(c_a), veh/h	119	450	383	393	738	0	119	829	705	119	813	691
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.2	33.5	0.0	28.5	21.5	0.0	34.9	18.4	0.0	35.1	16.7	0.0
Incr Delay (d2), s/veh	10.5	0.8	0.0	21.6	0.1	0.0	21.6	10.3	0.0	8.9	4.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.4	0.0	9.0	0.9	0.0	2.0	15.0	0.0	1.2	10.0	0.0
LnGrp Delay(d),s/veh	46.7	34.2	0.0	50.1	21.6	0.0	56.5	28.7	0.0	44.0	21.2	0.0
LnGrp LOS	D	C		D	C		E	C		D	C	
Approach Vol, veh/h		33			395			773			597	
Approach Delay, s/veh		39.9			46.0			31.3			23.1	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.7	37.6	20.4	8.7	8.4	37.0	5.8	23.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	32.5	16.5	18.0	5.0	32.5	5.0	29.5
Max Q Clear Time (g_c+I1), s	4.1	26.9	15.8	2.7	5.0	19.4	2.6	3.8
Green Ext Time (p_c), s	0.0	2.0	0.1	0.0	0.0	2.4	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	31.9
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑	↑	↱
Traffic Vol, veh/h	0	31	0	839	859	6
Future Vol, veh/h	0	31	0	839	859	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	34	0	912	934	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	934	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	322	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	322	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	322	-	-
HCM Lane V/C Ratio	-	0.105	-	-
HCM Control Delay (s)	-	17.5	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	13	1	2	5	0	3	5	16	2	39	61
Future Vol, veh/h	7	13	1	2	5	0	3	5	16	2	39	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	14	1	2	5	0	3	5	17	2	42	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	5	0	0	15	0	0	94	40	15	51	40	5
Stage 1	-	-	-	-	-	-	31	31	-	9	9	-
Stage 2	-	-	-	-	-	-	63	9	-	42	31	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1616	-	-	1603	-	-	889	852	1065	948	852	1078
Stage 1	-	-	-	-	-	-	986	869	-	1012	888	-
Stage 2	-	-	-	-	-	-	948	888	-	972	869	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1616	-	-	1603	-	-	798	847	1065	923	847	1078
Mov Cap-2 Maneuver	-	-	-	-	-	-	798	847	-	923	847	-
Stage 1	-	-	-	-	-	-	981	865	-	1007	887	-
Stage 2	-	-	-	-	-	-	846	887	-	945	865	-

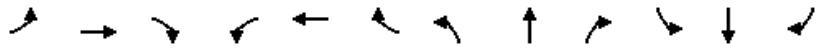
Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	2.1	8.8	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	972	1616	-	-	1603	-	-	923	974
HCM Lane V/C Ratio	0.027	0.005	-	-	0.001	-	-	0.002	0.112
HCM Control Delay (s)	8.8	7.2	-	-	7.2	-	-	8.9	9.2
HCM Lane LOS	A	A	-	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	168	275	380	426	100
Future Volume (veh/h)	64	168	275	380	426	100
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	70	0	299	413	463	0
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	110	98	362	1412	866	736
Arrive On Green	0.06	0.00	0.20	0.76	0.46	0.00
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	70	0	299	413	463	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	1.9	0.0	8.1	3.5	8.9	0.0
Cycle Q Clear(g_c), s	1.9	0.0	8.1	3.5	8.9	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	110	98	362	1412	866	736
V/C Ratio(X)	0.64	0.00	0.83	0.29	0.53	0.00
Avail Cap(c_a), veh/h	637	569	478	1412	866	736
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.9	0.0	19.1	1.9	9.6	0.0
Incr Delay (d2), s/veh	5.9	0.0	8.8	0.5	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	4.8	1.9	5.1	0.0
LnGrp Delay(d),s/veh	28.9	0.0	27.9	2.4	11.9	0.0
LnGrp LOS	C		C	A	B	
Approach Vol, veh/h	70			712	463	
Approach Delay, s/veh	28.9			13.1	11.9	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		42.5		7.6	14.7	27.8		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		38.0		18.0	13.5	20.0		
Max Q Clear Time (g_c+I1), s		5.5		3.9	10.1	10.9		
Green Ext Time (p_c), s		2.2		0.1	0.3	1.6		

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	6	0	124	12	100	34	582	129	60	578	6
Future Volume (veh/h)	12	6	0	124	12	100	34	582	129	60	578	6
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	13	7	0	135	13	0	37	633	0	65	628	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	65	56	172	215	0	68	964	820	97	995	846
Arrive On Green	0.02	0.04	0.00	0.10	0.12	0.00	0.04	0.52	0.00	0.05	0.53	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	0	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	13	7	0	135	13	0	37	633	0	65	628	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	0	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	0.4	0.2	0.0	4.5	0.4	0.0	1.2	15.1	0.0	2.2	14.4	0.0
Cycle Q Clear(g_c), s	0.4	0.2	0.0	4.5	0.4	0.0	1.2	15.1	0.0	2.2	14.4	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	29	65	56	172	215	0	68	964	820	97	995	846
V/C Ratio(X)	0.45	0.11	0.00	0.79	0.06	0.00	0.55	0.66	0.00	0.67	0.63	0.00
Avail Cap(c_a), veh/h	146	551	468	219	627	0	146	964	820	146	995	846
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.7	28.4	0.0	26.9	24.0	0.0	28.7	10.7	0.0	28.2	10.0	0.0
Incr Delay (d2), s/veh	10.7	0.7	0.0	13.6	0.1	0.0	6.7	3.5	0.0	7.7	3.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.1	0.0	2.9	0.2	0.0	0.7	8.7	0.0	1.3	8.2	0.0
LnGrp Delay(d),s/veh	40.4	29.1	0.0	40.4	24.1	0.0	35.4	14.2	0.0	35.9	13.0	0.0
LnGrp LOS	D	C		D	C		D	B		D	B	
Approach Vol, veh/h		20			148			670			693	
Approach Delay, s/veh		36.4			39.0			15.4			15.2	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	36.0	10.4	6.6	6.8	37.0	5.5	11.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.3	31.5	7.5	18.0	5.0	31.5	5.0	20.5
Max Q Clear Time (g_c+I1), s	4.2	17.1	6.5	2.2	3.2	16.4	2.4	2.4
Green Ext Time (p_c), s	0.0	3.1	0.0	0.0	0.0	3.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.8
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑	↑	↱
Traffic Vol, veh/h	0	48	0	893	784	17
Future Vol, veh/h	0	48	0	893	784	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	52	0	971	852	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	852	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	359	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	359	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	359	-	-
HCM Lane V/C Ratio	-	0.145	-	-
HCM Control Delay (s)	-	16.7	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.5	-	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	47	2	1	10	2	9	2	5	4	5	50
Future Vol, veh/h	17	47	2	1	10	2	9	2	5	4	5	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	51	2	1	11	2	10	2	5	4	5	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	13	0	0	53	0	0	132	103	52	106	103	12
Stage 1	-	-	-	-	-	-	88	88	-	14	14	-
Stage 2	-	-	-	-	-	-	44	15	-	92	89	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1606	-	-	1553	-	-	840	787	1016	873	787	1069
Stage 1	-	-	-	-	-	-	920	822	-	1006	884	-
Stage 2	-	-	-	-	-	-	970	883	-	915	821	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1606	-	-	1553	-	-	786	778	1016	859	778	1069
Mov Cap-2 Maneuver	-	-	-	-	-	-	786	778	-	859	778	-
Stage 1	-	-	-	-	-	-	910	813	-	995	883	-
Stage 2	-	-	-	-	-	-	914	882	-	897	812	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0.6	9.4	8.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	845	1606	-	-	1553	-	-	859	1034
HCM Lane V/C Ratio	0.021	0.012	-	-	0.001	-	-	0.005	0.058
HCM Control Delay (s)	9.4	7.3	-	-	7.3	-	-	9.2	8.7
HCM Lane LOS	A	A	-	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	105	381	299	526	480	99
Future Volume (veh/h)	105	381	299	526	480	99
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	114	0	325	572	522	0
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	150	134	380	1436	903	767
Arrive On Green	0.08	0.00	0.21	0.77	0.48	0.00
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	114	0	325	572	522	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	3.9	0.0	11.0	6.3	12.5	0.0
Cycle Q Clear(g_c), s	3.9	0.0	11.0	6.3	12.5	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	150	134	380	1436	903	767
V/C Ratio(X)	0.76	0.00	0.86	0.40	0.58	0.00
Avail Cap(c_a), veh/h	513	458	499	1436	903	767
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	27.9	0.0	23.5	2.4	11.5	0.0
Incr Delay (d2), s/veh	7.7	0.0	10.9	0.8	2.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	6.5	3.5	7.1	0.0
LnGrp Delay(d),s/veh	35.6	0.0	34.5	3.2	14.2	0.0
LnGrp LOS	D		C	A	B	
Approach Vol, veh/h	114			897	522	
Approach Delay, s/veh	35.6			14.5	14.2	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		52.5		9.8	17.8	34.7		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		48.0		18.0	17.5	26.0		
Max Q Clear Time (g_c+I1), s		8.3		5.9	13.0	14.5		
Green Ext Time (p_c), s		3.4		0.2	0.4	2.2		

Intersection Summary	
HCM 2010 Ctrl Delay	16.0
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	34	0	96	35	144	37	734	245	282	627	91
Future Volume (veh/h)	22	34	0	96	35	144	37	734	245	282	627	91
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	24	37	0	104	38	0	40	798	0	307	682	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	44	91	77	131	182	0	61	926	787	340	1219	1036
Arrive On Green	0.02	0.05	0.00	0.07	0.10	0.00	0.03	0.50	0.00	0.19	0.65	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	0	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	24	37	0	104	38	0	40	798	0	307	682	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	0	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	1.3	1.8	0.0	5.5	1.8	0.0	2.1	35.9	0.0	16.1	19.0	0.0
Cycle Q Clear(g_c), s	1.3	1.8	0.0	5.5	1.8	0.0	2.1	35.9	0.0	16.1	19.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	91	77	131	182	0	61	926	787	340	1219	1036
V/C Ratio(X)	0.55	0.41	0.00	0.80	0.21	0.00	0.66	0.86	0.00	0.90	0.56	0.00
Avail Cap(c_a), veh/h	106	352	299	132	379	0	125	926	787	363	1219	1036
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.0	44.0	0.0	43.4	39.6	0.0	45.5	21.1	0.0	37.7	9.0	0.0
Incr Delay (d2), s/veh	10.3	2.9	0.0	27.5	0.6	0.0	11.5	10.4	0.0	24.2	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.0	0.0	3.7	0.9	0.0	1.2	21.1	0.0	10.2	10.3	0.0
LnGrp Delay(d),s/veh	56.2	46.9	0.0	71.0	40.2	0.0	56.9	31.4	0.0	61.8	10.8	0.0
LnGrp LOS	E	D		E	D		E	C		E	B	
Approach Vol, veh/h		61			142			838			989	
Approach Delay, s/veh		50.6			62.7			32.6			26.7	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	51.9	11.5	9.1	7.8	66.9	6.9	13.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	47.4	7.1	18.0	6.7	60.2	5.7	19.4
Max Q Clear Time (g_c+I1), s	8.1	37.9	7.5	3.8	4.1	21.0	3.3	3.8
Green Ext Time (p_c), s	0.1	3.4	0.0	0.1	0.0	4.4	0.0	0.1

Intersection Summary		
HCM 2010 Ctrl Delay	32.4	
HCM 2010 LOS	C	

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	176	0	972	705	4
Future Vol, veh/h	0	176	0	972	705	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	191	0	1057	766	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	766	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	403	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	403	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	403	-	-
HCM Lane V/C Ratio	-	0.475	-	-
HCM Control Delay (s)	-	21.7	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	2.5	-	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	29	2	17	38	3	47	26	30	44	21	28
Future Vol, veh/h	23	29	2	17	38	3	47	26	30	44	21	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	32	2	18	41	3	51	28	33	48	23	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	44	0	0	34	0	0	188	163	33	193	163	43
Stage 1	-	-	-	-	-	-	83	83	-	79	79	-
Stage 2	-	-	-	-	-	-	105	80	-	114	84	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1564	-	-	1578	-	-	772	729	1041	767	729	1027
Stage 1	-	-	-	-	-	-	925	826	-	930	829	-
Stage 2	-	-	-	-	-	-	901	828	-	891	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1564	-	-	1578	-	-	716	709	1041	706	709	1027
Mov Cap-2 Maneuver	-	-	-	-	-	-	716	709	-	706	709	-
Stage 1	-	-	-	-	-	-	910	813	-	915	820	-
Stage 2	-	-	-	-	-	-	840	819	-	820	812	-

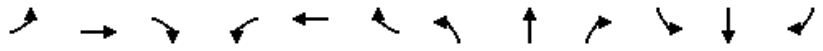
Approach	EB	WB	NB	SB
HCM Control Delay, s	3.1	2.1	10.3	10
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	785	1564	-	-	1578	-	-	706	861
HCM Lane V/C Ratio	0.143	0.016	-	-	0.012	-	-	0.068	0.062
HCM Control Delay (s)	10.3	7.3	-	-	7.3	-	-	10.5	9.5
HCM Lane LOS	B	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.2	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	65	234	513	795	592	132
Future Volume (veh/h)	65	234	513	795	592	132
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	71	0	558	864	643	0
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	102	91	617	2809	1315	588
Arrive On Green	0.06	0.00	0.35	0.79	0.37	0.00
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	71	0	558	864	643	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	2.4	0.0	18.1	4.0	8.4	0.0
Cycle Q Clear(g_c), s	2.4	0.0	18.1	4.0	8.4	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	102	91	617	2809	1315	588
V/C Ratio(X)	0.69	0.00	0.90	0.31	0.49	0.00
Avail Cap(c_a), veh/h	528	471	748	2809	1315	588
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.0	0.0	18.8	1.7	14.6	0.0
Incr Delay (d2), s/veh	8.2	0.0	12.8	0.3	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	11.0	2.0	4.3	0.0
LnGrp Delay(d),s/veh	36.2	0.0	31.6	2.0	15.9	0.0
LnGrp LOS	D		C	A	B	
Approach Vol, veh/h	71			1422	643	
Approach Delay, s/veh	36.2			13.6	15.9	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		52.5		8.0	25.5	27.0		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		48.0		18.0	25.5	18.0		
Max Q Clear Time (g_c+I1), s		6.0		4.4	20.1	10.4		
Green Ext Time (p_c), s		6.0		0.1	0.9	2.6		

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	24	1	447	75	377	95	928	184	66	723	22
Future Volume (veh/h)	20	24	1	447	75	377	95	928	184	66	723	22
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	22	26	0	486	82	0	103	1009	0	72	786	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	44	116	99	526	623	0	131	1231	551	92	1153	516
Arrive On Green	0.02	0.06	0.00	0.30	0.33	0.00	0.07	0.35	0.00	0.05	0.33	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	0	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	22	26	0	486	82	0	103	1009	0	72	786	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	0	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	0.9	1.0	0.0	19.8	2.3	0.0	4.3	19.4	0.0	3.0	14.4	0.0
Cycle Q Clear(g_c), s	0.9	1.0	0.0	19.8	2.3	0.0	4.3	19.4	0.0	3.0	14.4	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	116	99	526	623	0	131	1231	551	92	1153	516
V/C Ratio(X)	0.51	0.22	0.00	0.92	0.13	0.00	0.78	0.82	0.00	0.78	0.68	0.00
Avail Cap(c_a), veh/h	128	449	382	559	901	0	147	1231	551	119	1153	516
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.9	33.3	0.0	25.4	17.3	0.0	34.0	22.2	0.0	34.9	21.8	0.0
Incr Delay (d2), s/veh	8.8	1.0	0.0	20.6	0.1	0.0	21.6	6.2	0.0	21.8	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.5	0.0	12.6	1.2	0.0	2.9	10.4	0.0	2.0	7.5	0.0
LnGrp Delay(d),s/veh	44.7	34.2	0.0	46.0	17.4	0.0	55.6	28.4	0.0	56.7	25.1	0.0
LnGrp LOS	D	C		D	B		E	C		E	C	
Approach Vol, veh/h		48			568			1112			858	
Approach Delay, s/veh		39.0			41.9			30.9			27.7	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	30.4	26.6	9.2	10.0	28.8	6.3	29.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.6	25.5	23.5	18.0	6.2	24.3	5.4	36.1
Max Q Clear Time (g_c+I1), s	5.3	21.4	21.8	3.0	6.3	16.4	2.9	4.3
Green Ext Time (p_c), s	0.0	2.2	0.3	0.0	0.0	2.9	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	32.4
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	45	0	1207	1235	9
Future Vol, veh/h	0	45	0	1207	1235	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	49	0	1312	1342	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	671	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	399	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	399	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	399	-	-
HCM Lane V/C Ratio	-	0.123	-	-
HCM Control Delay (s)	-	15.3	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	19	1	3	7	0	4	7	23	3	56	88
Future Vol, veh/h	10	19	1	3	7	0	4	7	23	3	56	88
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	21	1	3	8	0	4	8	25	3	61	96

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	8	0	0	22	0	0	137	58	22	74	58	8
Stage 1	-	-	-	-	-	-	44	44	-	14	14	-
Stage 2	-	-	-	-	-	-	93	14	-	60	44	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1612	-	-	1593	-	-	834	833	1055	916	833	1074
Stage 1	-	-	-	-	-	-	970	858	-	1006	884	-
Stage 2	-	-	-	-	-	-	914	884	-	951	858	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1612	-	-	1593	-	-	712	826	1055	882	826	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	712	826	-	882	826	-
Stage 1	-	-	-	-	-	-	963	852	-	999	882	-
Stage 2	-	-	-	-	-	-	774	882	-	914	852	-

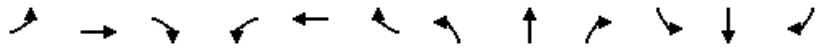
Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	2.2	9	9.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	947	1612	-	-	1593	-	-	882	962
HCM Lane V/C Ratio	0.039	0.007	-	-	0.002	-	-	0.004	0.163
HCM Control Delay (s)	9	7.2	-	-	7.3	-	-	9.1	9.5
HCM Lane LOS	A	A	-	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	92	242	395	546	613	144
Future Volume (veh/h)	92	242	395	546	613	144
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	100	0	429	593	666	0
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	132	117	493	2710	1443	646
Arrive On Green	0.07	0.00	0.28	0.77	0.41	0.00
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	100	0	429	593	666	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	3.1	0.0	12.9	2.6	7.7	0.0
Cycle Q Clear(g_c), s	3.1	0.0	12.9	2.6	7.7	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	132	117	493	2710	1443	646
V/C Ratio(X)	0.76	0.00	0.87	0.22	0.46	0.00
Avail Cap(c_a), veh/h	569	507	648	2710	1443	646
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.5	0.0	19.3	1.9	12.1	0.0
Incr Delay (d2), s/veh	8.7	0.0	9.9	0.2	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	7.7	1.3	3.9	0.0
LnGrp Delay(d),s/veh	34.2	0.0	29.2	2.0	13.2	0.0
LnGrp LOS	C		C	A	B	
Approach Vol, veh/h	100			1022	666	
Approach Delay, s/veh	34.2			13.5	13.2	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.5		8.7	20.1	27.4		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		43.0		18.0	20.5	18.0		
Max Q Clear Time (g_c+I1), s		4.6		5.1	14.9	9.7		
Green Ext Time (p_c), s		3.7		0.2	0.7	2.5		

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	9	0	178	17	144	49	837	186	86	831	9
Future Volume (veh/h)	17	9	0	178	17	144	49	837	186	86	831	9
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	10	0	193	18	0	53	910	0	93	903	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	39	86	73	242	299	0	90	1486	665	123	1551	694
Arrive On Green	0.02	0.05	0.00	0.14	0.16	0.00	0.05	0.42	0.00	0.07	0.44	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	0	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	18	10	0	193	18	0	53	910	0	93	903	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	0	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	0.5	0.3	0.0	5.8	0.4	0.0	1.6	11.0	0.0	2.8	10.5	0.0
Cycle Q Clear(g_c), s	0.5	0.3	0.0	5.8	0.4	0.0	1.6	11.0	0.0	2.8	10.5	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	39	86	73	242	299	0	90	1486	665	123	1551	694
V/C Ratio(X)	0.46	0.12	0.00	0.80	0.06	0.00	0.59	0.61	0.00	0.76	0.58	0.00
Avail Cap(c_a), veh/h	162	612	520	340	799	0	162	1486	665	178	1551	694
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.5	25.1	0.0	22.9	19.5	0.0	25.5	12.4	0.0	25.1	11.6	0.0
Incr Delay (d2), s/veh	8.4	0.6	0.0	8.5	0.1	0.0	6.1	1.9	0.0	10.6	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.2	0.0	3.4	0.2	0.0	0.9	5.7	0.0	1.7	5.5	0.0
LnGrp Delay(d),s/veh	34.9	25.7	0.0	31.4	19.6	0.0	31.5	14.3	0.0	35.6	13.2	0.0
LnGrp LOS	C	C		C	B		C	B		D	B	
Approach Vol, veh/h		28			211			963			996	
Approach Delay, s/veh		31.6			30.4			15.3			15.3	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	27.5	12.0	7.0	7.3	28.5	5.7	13.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	23.0	10.5	18.0	5.0	23.5	5.0	23.5
Max Q Clear Time (g_c+I1), s	4.8	13.0	7.8	2.3	3.6	12.5	2.5	2.4
Green Ext Time (p_c), s	0.0	3.9	0.1	0.0	0.0	4.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	16.9
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	69	0	1284	1127	24
Future Vol, veh/h	0	69	0	1284	1127	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	1396	1225	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	613	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	435	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	435	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	435	-	-
HCM Lane V/C Ratio	-	0.172	-	-
HCM Control Delay (s)	-	15	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.6	-	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	68	3	1	14	3	13	3	7	6	7	72
Future Vol, veh/h	24	68	3	1	14	3	13	3	7	6	7	72
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	74	3	1	15	3	14	3	8	7	8	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	18	0	0	77	0	0	190	148	76	152	148	17
Stage 1	-	-	-	-	-	-	128	128	-	19	19	-
Stage 2	-	-	-	-	-	-	62	20	-	133	129	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1599	-	-	1522	-	-	770	743	985	815	743	1062
Stage 1	-	-	-	-	-	-	876	790	-	1000	880	-
Stage 2	-	-	-	-	-	-	949	879	-	870	789	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1599	-	-	1522	-	-	698	730	985	795	730	1062
Mov Cap-2 Maneuver	-	-	-	-	-	-	698	730	-	795	730	-
Stage 1	-	-	-	-	-	-	862	777	-	984	879	-
Stage 2	-	-	-	-	-	-	871	878	-	846	776	-

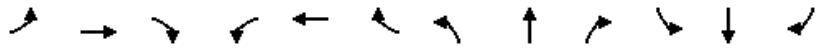
Approach	EB	WB	NB	SB
HCM Control Delay, s	1.8	0.4	9.8	8.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	771	1599	-	-	1522	-	-	795	1021
HCM Lane V/C Ratio	0.032	0.016	-	-	0.001	-	-	0.008	0.084
HCM Control Delay (s)	9.8	7.3	-	-	7.4	-	-	9.6	8.8
HCM Lane LOS	A	A	-	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	151	548	430	756	690	142
Future Volume (veh/h)	151	548	430	756	690	142
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	164	0	467	822	750	0
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	210	188	522	2627	1340	599
Arrive On Green	0.12	0.00	0.29	0.74	0.38	0.00
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	164	0	467	822	750	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.8	0.0	16.3	5.0	10.8	0.0
Cycle Q Clear(g_c), s	5.8	0.0	16.3	5.0	10.8	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	210	188	522	2627	1340	599
V/C Ratio(X)	0.78	0.00	0.89	0.31	0.56	0.00
Avail Cap(c_a), veh/h	494	441	645	2627	1340	599
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	27.7	0.0	21.9	2.8	15.8	0.0
Incr Delay (d2), s/veh	6.2	0.0	13.1	0.3	1.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	9.8	2.5	5.5	0.0
LnGrp Delay(d),s/veh	33.8	0.0	34.9	3.1	17.5	0.0
LnGrp LOS	C		C	A	B	
Approach Vol, veh/h	164			1289	750	
Approach Delay, s/veh	33.8			14.6	17.5	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		52.5		12.2	23.5	29.0		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		48.0		18.0	23.5	20.0		
Max Q Clear Time (g_c+I1), s		7.0		7.8	18.3	12.8		
Green Ext Time (p_c), s		5.6		0.3	0.7	2.5		

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	49	0	138	138	207	53	1056	352	406	902	131
Future Volume (veh/h)	32	49	0	138	138	207	53	1056	352	406	902	131
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	35	53	0	150	150	0	58	1148	0	441	980	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	56	98	84	181	229	0	75	1370	613	475	2168	970
Arrive On Green	0.03	0.05	0.00	0.10	0.12	0.00	0.04	0.39	0.00	0.27	0.61	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	0	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	35	53	0	150	150	0	58	1148	0	441	980	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	0	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	1.8	2.6	0.0	7.8	7.3	0.0	3.1	27.8	0.0	22.9	14.0	0.0
Cycle Q Clear(g_c), s	1.8	2.6	0.0	7.8	7.3	0.0	3.1	27.8	0.0	22.9	14.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	56	98	84	181	229	0	75	1370	613	475	2168	970
V/C Ratio(X)	0.62	0.54	0.00	0.83	0.65	0.00	0.78	0.84	0.00	0.93	0.45	0.00
Avail Cap(c_a), veh/h	96	355	301	186	449	0	171	1370	613	516	2168	970
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	45.2	43.7	0.0	41.6	39.5	0.0	44.8	26.3	0.0	33.7	9.8	0.0
Incr Delay (d2), s/veh	10.6	4.5	0.0	25.2	3.1	0.0	15.7	6.3	0.0	22.5	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.5	0.0	5.1	4.0	0.0	1.8	14.7	0.0	14.1	7.0	0.0
LnGrp Delay(d),s/veh	55.8	48.2	0.0	66.9	42.7	0.0	60.5	32.5	0.0	56.2	10.5	0.0
LnGrp LOS	E	D		E	D		E	C		E	B	
Approach Vol, veh/h		88			300			1206			1421	
Approach Delay, s/veh		51.2			54.8			33.9			24.7	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	41.1	14.2	9.5	8.5	62.4	7.5	16.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.5	36.6	9.9	18.0	9.1	55.0	5.1	22.8
Max Q Clear Time (g_c+I1), s	24.9	29.8	9.8	4.6	5.1	16.0	3.8	9.3
Green Ext Time (p_c), s	0.4	3.7	0.0	0.1	0.0	7.0	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	32.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	253	0	1398	1014	20
Future Vol, veh/h	0	253	0	1398	1014	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	275	0	1520	1102	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	551	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	478	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	478	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	478	-	-
HCM Lane V/C Ratio	-	0.575	-	-
HCM Control Delay (s)	-	22.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	3.6	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	33	42	3	24	55	4	68	37	43	63	30	40
Future Vol, veh/h	33	42	3	24	55	4	68	37	43	63	30	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	46	3	26	60	4	74	40	47	68	33	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	64	0	0	49	0	0	272	236	48	277	235	62
Stage 1	-	-	-	-	-	-	120	120	-	114	114	-
Stage 2	-	-	-	-	-	-	152	116	-	163	121	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1538	-	-	1558	-	-	680	665	1021	675	666	1003
Stage 1	-	-	-	-	-	-	884	796	-	891	801	-
Stage 2	-	-	-	-	-	-	850	800	-	839	796	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1538	-	-	1558	-	-	607	638	1021	595	639	1003
Mov Cap-2 Maneuver	-	-	-	-	-	-	607	638	-	595	639	-
Stage 1	-	-	-	-	-	-	864	778	-	871	787	-
Stage 2	-	-	-	-	-	-	766	786	-	741	778	-

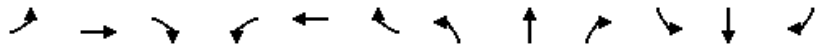
Approach	EB	WB	NB	SB
HCM Control Delay, s	3.1	2.1	11.7	10.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	698	1538	-	-	1558	-	-	595	806
HCM Lane V/C Ratio	0.23	0.023	-	-	0.017	-	-	0.115	0.094
HCM Control Delay (s)	11.7	7.4	-	-	7.4	-	-	11.8	9.9
HCM Lane LOS	B	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0.1	-	-	0.4	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	65	236	518	801	594	132
Future Volume (veh/h)	65	236	518	801	594	132
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	71	0	563	871	646	0
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	98	88	623	2858	1372	614
Arrive On Green	0.06	0.00	0.35	0.81	0.39	0.00
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	71	0	563	871	646	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	2.6	0.0	19.8	4.1	9.0	0.0
Cycle Q Clear(g_c), s	2.6	0.0	19.8	4.1	9.0	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	98	88	623	2858	1372	614
V/C Ratio(X)	0.72	0.00	0.90	0.30	0.47	0.00
Avail Cap(c_a), veh/h	487	434	824	2858	1372	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.5	0.0	20.2	1.6	15.0	0.0
Incr Delay (d2), s/veh	9.6	0.0	10.9	0.3	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	11.4	2.0	4.5	0.0
LnGrp Delay(d),s/veh	40.1	0.0	31.1	1.9	16.2	0.0
LnGrp LOS	D		C	A	B	
Approach Vol, veh/h	71			1434	646	
Approach Delay, s/veh	40.1			13.4	16.2	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		57.5		8.1	27.6	29.9		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		53.0		18.0	30.5	18.0		
Max Q Clear Time (g_c+I1), s		6.1		4.6	21.8	11.0		
Green Ext Time (p_c), s		6.1		0.1	1.3	2.1		

Intersection Summary	
HCM 2010 Ctrl Delay	15.1
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	37	2	447	84	377	108	928	184	66	723	26
Future Volume (veh/h)	31	37	2	447	84	377	108	928	184	66	723	26
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	34	40	0	486	91	0	117	1009	0	72	786	0
Adj No. of Lanes	2	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	117	120	102	526	609	0	148	1227	549	92	1116	499
Arrive On Green	0.03	0.06	0.00	0.30	0.33	0.00	0.08	0.35	0.00	0.05	0.32	0.00
Sat Flow, veh/h	3442	1863	1583	1774	1863	0	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	34	40	0	486	91	0	117	1009	0	72	786	0
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	0	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	0.7	1.5	0.0	19.9	2.6	0.0	4.8	19.5	0.0	3.0	14.6	0.0
Cycle Q Clear(g_c), s	0.7	1.5	0.0	19.9	2.6	0.0	4.8	19.5	0.0	3.0	14.6	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	117	120	102	526	609	0	148	1227	549	92	1116	499
V/C Ratio(X)	0.29	0.33	0.00	0.92	0.15	0.00	0.79	0.82	0.00	0.78	0.70	0.00
Avail Cap(c_a), veh/h	230	448	381	557	908	0	163	1227	549	118	1116	499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.3	33.5	0.0	25.5	17.8	0.0	33.7	22.3	0.0	35.1	22.6	0.0
Incr Delay (d2), s/veh	1.4	1.6	0.0	20.8	0.1	0.0	20.8	6.3	0.0	22.1	3.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.8	0.0	12.8	1.3	0.0	3.2	10.6	0.0	2.0	7.7	0.0
LnGrp Delay(d),s/veh	36.7	35.1	0.0	46.3	17.9	0.0	54.5	28.6	0.0	57.2	26.3	0.0
LnGrp LOS	D	D		D	B		D	C		E	C	
Approach Vol, veh/h		74			577			1126			858	
Approach Delay, s/veh		35.8			41.8			31.3			28.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	30.5	26.7	9.3	10.7	28.1	7.0	29.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.6	25.5	23.5	18.0	6.9	23.6	5.0	36.5
Max Q Clear Time (g_c+I1), s	5.0	21.5	21.9	3.5	6.8	16.6	2.7	4.6
Green Ext Time (p_c), s	0.0	2.2	0.3	0.1	0.0	2.6	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	33.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	45	0	1220	1236	9
Future Vol, veh/h	0	45	0	1220	1236	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	49	0	1326	1343	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	672	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	398	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	398	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	398	-	-
HCM Lane V/C Ratio	-	0.123	-	-
HCM Control Delay (s)	-	15.3	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	19	1	3	7	0	4	10	23	3	58	92
Future Vol, veh/h	14	19	1	3	7	0	4	10	23	3	58	92
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	21	1	3	8	0	4	11	25	3	63	100

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	8	0	0	22	0	0	148	66	22	84	66	8
Stage 1	-	-	-	-	-	-	52	52	-	14	14	-
Stage 2	-	-	-	-	-	-	96	14	-	70	52	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1612	-	-	1593	-	-	820	825	1055	903	825	1074
Stage 1	-	-	-	-	-	-	961	852	-	1006	884	-
Stage 2	-	-	-	-	-	-	911	884	-	940	852	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1612	-	-	1593	-	-	694	816	1055	865	816	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-	694	816	-	865	816	-
Stage 1	-	-	-	-	-	-	952	844	-	997	882	-
Stage 2	-	-	-	-	-	-	766	882	-	897	844	-

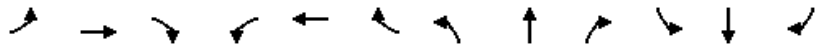
Approach	EB	WB	NB	SB
HCM Control Delay, s	3	2.2	9.1	9.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	929	1612	-	-	1593	-	-	865	957
HCM Lane V/C Ratio	0.043	0.009	-	-	0.002	-	-	0.004	0.17
HCM Control Delay (s)	9.1	7.3	-	-	7.3	-	-	9.2	9.5
HCM Lane LOS	A	A	-	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	92	243	405	556	615	144
Future Volume (veh/h)	92	243	405	556	615	144
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	100	0	440	604	668	0
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	132	117	503	2710	1423	636
Arrive On Green	0.07	0.00	0.28	0.77	0.40	0.00
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	100	0	440	604	668	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	3.1	0.0	13.3	2.7	7.8	0.0
Cycle Q Clear(g_c), s	3.1	0.0	13.3	2.7	7.8	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	132	117	503	2710	1423	636
V/C Ratio(X)	0.76	0.00	0.87	0.22	0.47	0.00
Avail Cap(c_a), veh/h	569	507	648	2710	1423	636
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.5	0.0	19.2	1.9	12.4	0.0
Incr Delay (d2), s/veh	8.7	0.0	10.5	0.2	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	7.9	1.3	4.0	0.0
LnGrp Delay(d),s/veh	34.2	0.0	29.7	2.1	13.5	0.0
LnGrp LOS	C		C	A	B	
Approach Vol, veh/h	100			1044	668	
Approach Delay, s/veh	34.2			13.7	13.5	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.5		8.7	20.4	27.1		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		43.0		18.0	20.5	18.0		
Max Q Clear Time (g_c+I1), s		4.7		5.1	15.3	9.8		
Green Ext Time (p_c), s		3.8		0.2	0.7	2.4		

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	19	4	178	24	144	73	837	186	86	831	12
Future Volume (veh/h)	37	19	4	178	24	144	73	837	186	86	831	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	40	21	0	193	26	0	79	910	0	93	903	0
Adj No. of Lanes	2	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	123	105	242	300	0	112	1448	648	121	1466	656
Arrive On Green	0.04	0.07	0.00	0.14	0.16	0.00	0.06	0.41	0.00	0.07	0.41	0.00
Sat Flow, veh/h	3442	1863	1583	1774	1863	0	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	40	21	0	193	26	0	79	910	0	93	903	0
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	0	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	0.6	0.6	0.0	5.9	0.7	0.0	2.5	11.5	0.0	2.9	11.3	0.0
Cycle Q Clear(g_c), s	0.6	0.6	0.0	5.9	0.7	0.0	2.5	11.5	0.0	2.9	11.3	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	142	123	105	242	300	0	112	1448	648	121	1466	656
V/C Ratio(X)	0.28	0.17	0.00	0.80	0.09	0.00	0.71	0.63	0.00	0.77	0.62	0.00
Avail Cap(c_a), veh/h	306	597	507	331	779	0	174	1448	648	174	1466	656
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.1	24.8	0.0	23.5	20.1	0.0	25.8	13.2	0.0	25.8	12.9	0.0
Incr Delay (d2), s/veh	1.1	0.6	0.0	9.2	0.1	0.0	7.9	2.1	0.0	12.1	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.3	0.0	3.5	0.3	0.0	1.5	6.0	0.0	1.8	5.8	0.0
LnGrp Delay(d),s/veh	27.2	25.4	0.0	32.8	20.2	0.0	33.7	15.3	0.0	37.9	14.9	0.0
LnGrp LOS	C	C		C	C		C	B		D	B	
Approach Vol, veh/h		61			219			989			996	
Approach Delay, s/veh		26.6			31.3			16.7			17.0	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	27.5	12.2	8.2	8.0	27.8	6.8	13.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	23.0	10.5	18.0	5.5	23.0	5.0	23.5
Max Q Clear Time (g_c+I1), s	4.9	13.5	7.9	2.6	4.5	13.3	2.6	2.7
Green Ext Time (p_c), s	0.0	3.8	0.1	0.0	0.0	3.8	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	18.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	70	0	1308	1131	24
Future Vol, veh/h	0	70	0	1308	1131	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	76	0	1422	1229	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	615	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	434	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	434	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	434	-	-
HCM Lane V/C Ratio	-	0.175	-	-
HCM Control Delay (s)	-	15.1	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.6	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	68	3	1	14	3	13	4	7	7	8	78
Future Vol, veh/h	32	68	3	1	14	3	13	4	7	7	8	78
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	74	3	1	15	3	14	4	8	8	9	85

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	18	0	0	77	0	0	212	166	76	171	166	17
Stage 1	-	-	-	-	-	-	146	146	-	19	19	-
Stage 2	-	-	-	-	-	-	66	20	-	152	147	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1599	-	-	1522	-	-	745	727	985	792	727	1062
Stage 1	-	-	-	-	-	-	857	776	-	1000	880	-
Stage 2	-	-	-	-	-	-	945	879	-	850	775	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1599	-	-	1522	-	-	668	710	985	769	710	1062
Mov Cap-2 Maneuver	-	-	-	-	-	-	668	710	-	769	710	-
Stage 1	-	-	-	-	-	-	838	759	-	978	879	-
Stage 2	-	-	-	-	-	-	860	878	-	820	758	-

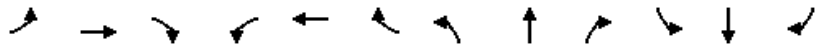
Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	0.4	10	9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	745	1599	-	-	1522	-	-	769	1015
HCM Lane V/C Ratio	0.035	0.022	-	-	0.001	-	-	0.01	0.092
HCM Control Delay (s)	10	7.3	-	-	7.4	-	-	9.7	8.9
HCM Lane LOS	B	A	-	-	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	151	554	434	760	696	142
Future Volume (veh/h)	151	554	434	760	696	142
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	164	0	472	826	757	0
Adj No. of Lanes	1	1	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	210	188	527	2627	1330	595
Arrive On Green	0.12	0.00	0.30	0.74	0.38	0.00
Sat Flow, veh/h	1774	1583	1774	3632	3632	1583
Grp Volume(v), veh/h	164	0	472	826	757	0
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1770	1770	1583
Q Serve(g_s), s	5.8	0.0	16.5	5.1	11.0	0.0
Cycle Q Clear(g_c), s	5.8	0.0	16.5	5.1	11.0	0.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	210	188	527	2627	1330	595
V/C Ratio(X)	0.78	0.00	0.90	0.31	0.57	0.00
Avail Cap(c_a), veh/h	494	441	645	2627	1330	595
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	27.7	0.0	21.8	2.8	16.0	0.0
Incr Delay (d2), s/veh	6.2	0.0	13.3	0.3	1.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	9.9	2.5	5.7	0.0
LnGrp Delay(d),s/veh	33.8	0.0	35.1	3.1	17.8	0.0
LnGrp LOS	C		D	A	B	
Approach Vol, veh/h	164			1298	757	
Approach Delay, s/veh	33.8			14.8	17.8	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		52.5		12.2	23.7	28.8		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		48.0		18.0	23.5	20.0		
Max Q Clear Time (g_c+I1), s		7.1		7.8	18.5	13.0		
Green Ext Time (p_c), s		5.6		0.3	0.7	2.5		

Intersection Summary	
HCM 2010 Ctrl Delay	17.2
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	62	1	138	150	207	55	1056	352	406	902	143
Future Volume (veh/h)	40	62	1	138	150	207	55	1056	352	406	902	143
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	43	67	0	150	163	0	60	1148	0	441	980	0
Adj No. of Lanes	2	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	108	92	181	231	0	77	1359	608	474	2151	962
Arrive On Green	0.04	0.06	0.00	0.10	0.12	0.00	0.04	0.38	0.00	0.27	0.61	0.00
Sat Flow, veh/h	3442	1863	1583	1774	1863	0	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	43	67	0	150	163	0	60	1148	0	441	980	0
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	1863	0	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	1.2	3.4	0.0	7.9	8.0	0.0	3.2	28.2	0.0	23.1	14.3	0.0
Cycle Q Clear(g_c), s	1.2	3.4	0.0	7.9	8.0	0.0	3.2	28.2	0.0	23.1	14.3	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	108	92	181	231	0	77	1359	608	474	2151	962
V/C Ratio(X)	0.35	0.62	0.00	0.83	0.70	0.00	0.78	0.84	0.00	0.93	0.46	0.00
Avail Cap(c_a), veh/h	181	352	299	184	448	0	173	1359	608	512	2151	962
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	44.9	43.9	0.0	42.0	40.1	0.0	45.1	26.8	0.0	34.1	10.1	0.0
Incr Delay (d2), s/veh	1.7	5.7	0.0	25.7	3.9	0.0	15.1	6.6	0.0	22.9	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.9	0.0	5.2	4.4	0.0	1.9	15.0	0.0	14.3	7.2	0.0
LnGrp Delay(d),s/veh	46.6	49.6	0.0	67.6	43.9	0.0	60.3	33.3	0.0	57.0	10.8	0.0
LnGrp LOS	D	D		E	D		E	C		E	B	
Approach Vol, veh/h		110			313			1208			1421	
Approach Delay, s/veh		48.4			55.3			34.7			25.2	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.0	41.1	14.2	10.0	8.7	62.4	7.9	16.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.5	36.6	9.9	18.0	9.3	54.8	5.0	22.9
Max Q Clear Time (g_c+I1), s	25.1	30.2	9.9	5.4	5.2	16.3	3.2	10.0
Green Ext Time (p_c), s	0.4	3.6	0.0	0.2	0.0	7.0	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	32.9
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↱		↑↑	↑↑	↱
Traffic Vol, veh/h	0	255	0	1400	1015	20
Future Vol, veh/h	0	255	0	1400	1015	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	-	500
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	277	0	1522	1103	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	552	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	477	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	477	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	477	-	-
HCM Lane V/C Ratio	-	0.581	-	-
HCM Control Delay (s)	-	22.5	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	3.6	-	-

Intersection	
Int Delay, s/veh	8.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	42	3	24	55	4	68	40	43	65	31	42
Future Vol, veh/h	36	42	3	24	55	4	68	40	43	65	31	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	46	3	26	60	4	74	43	47	71	34	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	64	0	0	49	0	0	280	242	48	285	241	62
Stage 1	-	-	-	-	-	-	126	126	-	114	114	-
Stage 2	-	-	-	-	-	-	154	116	-	171	127	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1538	-	-	1558	-	-	672	660	1021	667	660	1003
Stage 1	-	-	-	-	-	-	878	792	-	891	801	-
Stage 2	-	-	-	-	-	-	848	800	-	831	791	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1538	-	-	1558	-	-	596	632	1021	584	632	1003
Mov Cap-2 Maneuver	-	-	-	-	-	-	596	632	-	584	632	-
Stage 1	-	-	-	-	-	-	856	772	-	869	787	-
Stage 2	-	-	-	-	-	-	762	786	-	729	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.3	2.1	11.9	10.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	688	1538	-	-	1558	-	-	584	803
HCM Lane V/C Ratio	0.239	0.025	-	-	0.017	-	-	0.121	0.099
HCM Control Delay (s)	11.9	7.4	-	-	7.4	-	-	12	10
HCM Lane LOS	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0.1	-	-	0.4	0.3